'Less is More': Consumer Spending and the Size of Economic Stimulus Payments

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Abstract

We study the consumption response to unexpected transitory income gains of different size, using hypothetical questions from the Italian Survey of Household Income and Wealth. Affluent households exhibit a higher Marginal Propensity to Consume (MPC) out of large gains while families with low cash-on-hand display a higher MPC out of small gains. We show that the spending of higher earners is consistent with the predictions of a model with non-homothetic preferences on consumption while the MPC heterogeneity across shock size for low-income families can be accounted for by borrowing constraints. Our results suggest that, for a given level of public spending, a fiscal transfer of smaller size paid to a larger group of low-income households stimulates aggregate consumption more than a larger transfer paid to a smaller group.

JEL classification: D12, D14, E21, E62, H23.

Key words: non-homothetic preferences, non-essential spending, liquidity constraints.

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1 Introduction

The global pandemic of 2020-21 has attracted renewed attention on how fiscal policy can support aggregate demand and stimulate spending. A main dimension of this debate has centered around the size of the stimulus payments to households and how this relates to the Marginal Propensity to Consume (MPC) along the income distribution. If, on the one hand, the MPC was small (with the windfall mostly used to save or repay debt, Mian and Sufi, 2010, Romer, 2021) and invariant to income, then large and untargeted fiscal transfers would be needed to generate a significant boost to aggregate consumption. If, on the other hand, the MPC was higher for smaller payments to low-income families, then less sizable but targeted transfers could have an even larger aggregate demand impact, and at a significantly lower cost for public finances.

On the theoretical side, standard life-cycle permanent income models predict variation in the MPC neither across small and large windfalls nor along the income distribution, as household consumption is proportional to life time resources at all times. In models with liquidity constraints and precautionary saving in the tradition of Aiyagari (1994), however, the MPC is (i) higher for smaller income gains and (ii) a negative function of disposable income. More recently, Kaplan and Violante (2014) show that transaction costs to accessing illiquid wealth makes the MPC out of smaller fiscal transfers higher than out of larger transfers, especially among (constrained) high earners. To the best of our knowledge, no theoretical argument has been so far advanced to account for the possibility that affluent households may exhibit higher MPC out of large gains.

Despite these contrasting theoretical predictions, the empirical evidence on how the MPC (out of temporary and unanticipated windfalls) may vary jointly with *both* the size of the shock *and* the level of household resources is at best scant. An inherent limitation of existing studies on actual data is that households typically face only one stimulus payment (rather than two payments of significantly different sizes) and therefore eliciting the MPC out of small and large shocks necessarily rely on comparing households with different characteristics. This is problematic for two reasons. First, the size of any actual fiscal transfer is endogenous and dependant on observed characteristics such as income, job status, marital status and number of children. Second, households may also differ along unobserved characteristics, which would make it hard to interpret any MPC heterogeneity as the mere result of heterogeneity in the shock size.

In this paper, we overcome these important limitations by comparing the MPC out of small and large income gains for the very same household. We do so by exploiting a unique set of questions in the Italian Survey of Household Income and Wealth (SHIW), which ask respondents how much they would spend in response to a one-off increase in their disposable resources as large as one month and one year of their income, respectively. The advantage of this approach is twofold. First, by focusing on within-household variation only, one can be confident that any MPC heterogeneity does not reflect unobserved heterogeneity. Second, the difference in the magnitude of the two income gains is not only independent from individual characteristics but also sufficiently large to elicit any possible heterogeneity in spending due to the size of the windfall.

Our empirical findings can be summarized as follows. First, the MPC out of small income changes is a negative function of household resources whereas the MPC out of large income changes display a slightly positive gradient, if any. Second, families with low cash-on-hand exhibit a higher MPC out of the smaller gains whereas affluent households are characterized by a higher MPC out of the larger windfalls. Third, affluent households devote a significantly larger share of their food spending on eating out —which we interpret as a proxy for the importance of non-essential spending in their consumption basket— and the budget share spent on luxury goods and services is a significant predictor of a higher MPC, especially when it comes to large gains.

To interpret our empirical results, we develop a model with non-homothetic preferences on essential and non-essential consumption, and show that it generates two predictions that line up with our estimates: MPCs and disposable resources out of the large income gains are negatively correlated; the MPC out of the large windfalls is larger among affluent households. We also show that, on the other hand, a model with borrowing constraints and idiosyncratic risk can account for: the negative slope of the MPCs with respect to cash-on-hand out of the small income gains; the higher MPC out of the small windfalls among families with low liquid wealth.

Our favourite interpretation is that borrowing constraints are a significant determinant of spending among households with low cash-on-hand, and thus make the MPC out of small income gains higher than out of large gains at the bottom of the income distribution. Among affluent households, however, liquidity considerations are likely to be less salient and non-essential items are a driver of total expenditure: non-homothetic preferences may thus provide a rationale for the empirical result that families with high cash-on-hand exhibit a higher MPC out of large gains. Finally, an increasing number of empirical analyses report significant MPCs also among high-income households (Misra and Surico, 2014, Kueng, 2018, Kreiner, Dreyer Lassen and Leth-Petersen, 2019, Boutros, 2021, Chetty, Friedman and Stepner, 2021, Ferraro and Valaitis, 2020). Our paper offers a novel interpretation for this finding, based on non-homothetic preferences.

As for policy implications, we simulate a number of fiscal experiments that vary either the size of the transfer to households or the way in which the stimulus package is financed. Based on the MPC heterogeneity across shock size and household resources documented above, our simulations reach three main conclusions. First, for a given level of public spending, a smaller payment to a larger fraction of low cash-on-hand households produces a significantly larger increase in aggregate consumption than a larger transfer paid to a smaller group of disadvantages families. Second, raising taxes among affluent households to finance the stimulus package produces a positive and economically significant *net effect* on aggregate consumption when the fiscal transfers are small. Finally, the distortionary effects of taxation are minimized by levying a smaller tax increase on the wealth and income of a larger share of affluent households rather than a higher tax hike for a smaller fraction of top earners.

Related literature. An influential literature has estimated the MPC out of temporary income shocks exploiting quasi-natural experimental variation (Johnson, Parker and Souleles, 2006, Parker et al., 2013, Agarwal and Qian, 2014, Misra and Surico, 2014, Kueng, 2018, Boutros, 2021). These studies can only allow for limited heterogeneity by splitting households into a handful of groups based on observables such as age, income, and liquidity. In contrast, we elicit a MPC for each household and thus exploit the full variation across shock size and household resources.[1]

The second approach to study MPC heterogeneity relies on responses to survey questions on how much of an hypothetical (actual) income windfall households would spend (have

[1] Jappelli and Pistaferri (2010) survey the vast MPC literature. Ampudia et al. (2018) explore MPC heterogeneity across European countries using a structural model with wealth and asset market participation.

spent). Examples include Jappelli and Pistaferri (2014, 2020), Christelis et al. (2019), Fuster, Kaplan and Zafar (2021), and Christelis et al. (2022) (Coibion, Gorodnichenko and Weber, 2020, Parker and Souleles, 2019).[2] A main advantage of this approach is that it delivers a full distribution of MPCs across each household in the sample; on the other hand, it relies on the assumption that, in an actual situation, households would act consistently with their response in the hypothetical scenario.

Finally, we contribute to the literature on non-homothetic preferences and aggregate spending (Deaton, 1974, 1992, Attanasio and Browning, 1995, Browning and Crossley, 2000, De Nardi, 2004, Guvenen, 2006, De Nardi and Fella, 2017, Andreolli, Rickard and Surico, 2024). We build on these works by deriving novel implications for how non-homotheticity generates heterogeneity in both income elasticities and intertemporal substitution, and through that, makes the MPC vary with both the shock size and household resources.

Structure of the paper. In Section 2, we describe and summarize the data. In Section 3, we report our main empirical findings on MPC heterogeneity across shock sizes and shares of luxury spending along the income distribution. In Section 4, we present our main theoretical result by fully characterizing the equilibrium of a model with non-homothetic preferences: the MPC is an increasing and convex function of income. In Section 5, we evaluate the predictions of (i) a model with liquidity constraints and (ii) the model with non-homothetic preferences, and show the extent to which they can explain our empirical findings. In Section 6, we simulate the aggregate demand impact of a number of policy experiments that vary the size of the economic payments to households and whether the stimulus package is financed with debt or a tax hike (for top earners). The Appendices contain further descriptive statistics, a set of empirical robustness checks and details of the theoretical derivations.

2 Research Design and Descriptive Statistics

This section presents the research design behind our empirical analysis and summary statistics of the Italian Survey of Household Income and Wealth (SHIW). Each SHIW wave covers a

[2] Using an on-line survey of Dutch households, Christelis et al. (2019) find that the differences in individual MPCs across one month and *three months* income gains do not vary systematically with cash-on-hand but that households with lower liquidity exhibit a higher MPC out of losses than out of gains of the same size. This asymmetry chimes with the aggregate evidence in Barnichon, Debortoli and Matthes (2021).

sample of around $8,000$ households that are representative of the Italian population. The survey provides detailed information on demographic characteristics, income, consumption, wealth and the composition of debt. The unit of observation is the family and data are collected through personal interviews to the household head or the person most knowledgeable about the family's finances.

Our analysis is based on questions in which respondents were asked about how much they would spend if they unexpectedly received windfall equal to either a month or a year of their household income. The questions about the small gains was only asked in 2010; the questions about the large gains was only asked in 2012. Fortunately, the SHIW is a rotating panel with more than 50% retention across successive waves. This implies that we can identify a sample of around $4,500$ households who have answered the MPC questions on small and large gains in both waves.

A number of features make the SHIW hypothetical questions well suited for our purposes. First, methods that estimate actual consumption changes from actual income changes can only identify shocks of one size per respondent, implying that the evaluation of any MPC heterogeneity across shock size necessarily relies on a comparison between different households. In contrast, by exploiting hypothetical questions asked to the same individual about gains of different sizes, we exploit only within-household variation and thus control also for unobserved heterogeneity. A second advantage, relative to other surveys in which the large hypothetical income change is only a small multiple of the small change, is that –in the SHIW– the big gain is twelve times as large as the small gain. The significant larger distance in the magnitude of the two income shocks is likely to improve the identification of any possible MPC heterogeneity across shock size relative to the case in which small and large gains are much closer to each other.[3]

Unlike other surveys that ask qualitative questions on whether households would mostly spend or mostly save their income gain, the SHIW questions ask for a quantitative answer about the percentage of the windfall that would be spent. This has two main advantages:

[3]This is a key difference with Fagereng, Holm and Natvik (2021), who exploit lottery wins in Norway to estimate MPCs. The largest liquidity bin in Fagereng, Holm and Natvik (2021) starts at 21600 USD while the bin associated with their largest shock sizes begins at USD 8300. For a household in the top of the income distribution, a shock size bin that starts at USD 8300 will necessarily include many windfalls that are relatively small in size relative to that household income, thereby making hard to explore any possible heterogeneity by shock size.

(i) it avoids the interpretational problem of what exactly the respondent may have meant by mostly spent or mostly saved, (ii) it provides a substantially larger sample of individual MPCs that can be used to elicit the full distribution of the consumption responses to unanticipated income shocks (both across household characteristics and across shock size). This compares favourably to most existing studies, which typically can only allow for limited MPC heterogeneity by splitting households into a handful of groups along some observable covariates. Finally, the size of the income gains in the SHIW hypothetical questions is quantified as a *fixed fraction* of the annual income of each household. In contrast, most earlier works are based on income gains of a *fixed dollar amount*, whose absolute value may actually be large relative to the income of families with low cash-on-hand but small relative to the income of affluent families.

It should be noted, that while the MPC question for the annual windfall refers to a one year horizon, no time frame is specified for the monthly income windfall question. A possible concern is that affluent households might have interpreted the one month income windfall question as referring to a one month time frame and that similar MPCs may have emerged if both questions explicitly referred to the same time frame. The asymmetric time frame interpretation hypothesis, however, would account neither for the large average MPC for rich families after a one year income shock (which we document below in Section 3) nor for the finding that such average MPC is at least as large as its less affluent household counterpart. In contrast, our proposed non-homothetic preference model offers an explanation for this specific finding.

Our approach is based on the implicit assumption that households respond to the hypothetical questions as truthfully as they would do for actual gains. While it is hard to evaluate this hypothesis, Parker and Souleles (2019) report that, for the 2008 US tax rebates, households with a higher self-reported MPCs (the closest questions in the American CEX and NCP to the hypothetical questions in the Italian SHIW) also exhibit higher revealed-preference MPCs estimated using actual changes in spending/income, and that the two methods yield similar propensity to spend on average. Similarly, a number of recent papers suggest that survey answers match actual behaviour in a variety of settings. Wiswall and Zafar (2017) survey preferences of undergraduates for different workplace characteristics while in university and find, four years later, that these former students select themselves into jobs with characteristics that match their survey answers. Mas and Pallais (2019) show that survey evidence on the labour supply elasticity are consistent with the same elasticity elicited on actual work choices in a controlled experiment. Finally, Maestas et al. (2023) report that surveys based answers on non-monetary working conditions are closely in line with observed job characteristics in a representative sample of American workers.

Descriptive statistics about the sample of households that we observe in both the 2010 and 2012 waves are displayed in the top part of Table 1. As these refer to the same group of households, the main purpose of this table is to verify that the income and financial positions of this sub-sample have not significantly changed over the two waves. This appears indeed to be the case along the whole distribution of income, financial wealth and other demographics, suggesting that any difference in the answers to the hypothetical MPC questions can hardly be attributed to changes in individual circumstances or macroeconomic events that may have affected household finances. In the second part of Table 1, we display the distribution of individual MPCs in 2010 (one month income gain), in 2012 (one year income gain) and the distribution of the difference in the MPCs across the two waves for each household: negative values mean that the MPC out of large gains is higher than the MPC out of small gains. In Figure 1, we present the full distributions of individual MPCs out of the small windfall (on the left), out of the large windfall (in the middle), and the difference of the two MPCs (on the right). In the row 'Eating outside share', we report the share of food consumption spent on eating out, which is only available for 2012. As we will argue below, we interpret this share as a (conservative) proxy for the share of non-necessity purchases in a household consumption basket.[4] Finally, in the last row of Table 1, we report the distribution of the household-specific (log) changes in cash-on-hand between 2010 and 2012. This reveals that financial circumstances in 2012 have become worse on average. In our main results, we show that our results are robust to controlling for household-level changes in cash-on-hand.

The summary statistics in this section suggest a number of regularities. First, the consumption responses to both income changes display clusters around MPC values of zero, one half and one. Second, the average MPC for the case of small income gains is 0.48; this is only slightly larger than the average MPC of 0.44 for the large gains. Third, the share of

[4]We confirm our main results also with alternative proxies for non-necessity consumption such as spending on durables, presented in Appendix D, and on vacations, available upon request.

households reporting a MPC of zero (one) is higher (lower) for the case of large windfalls. Fourth, the distribution of the household-specific difference in MPCs across the two shocks is centered at zero and evenly spread across negative and positive values. In the rest of the paper, we focus on the distribution in the right panel of Figure 1, with the goal of shedding light on the reasons for why some households report a higher MPC out of the smaller income gain while others report a higher MPC out of the larger one. We will show that heterogeneity in liquid wealth and non-necessity consumption is key to understand each of these findings.

3 Empirical Evidence

In this section, we present our main findings of pervasive MPC heterogeneity across the distribution of cash-on-hand and the size of the temporary and unanticipated income windfalls. To investigate the role of luxury goods and services to account for the higher MPCs out of large income gains among affluent households, we exploit the variation in food spending shares on eating out (a proxy for non-essential consumption) along the cash-on-hand distribution and show that this is a significant predictor of a larger MPC, especially for the case of large windfalls. We also present a sensitivity analysis and evidence on regional heterogeneity.

3.1 The consumption response to small and large income gains

Theories of idiosyncratic risk, precautionary savings and borrowing constraints in the tradition of Aiyagari (1994) emphasize liquidity as an important driver of the heterogeneous responses of consumption to temporary and unanticipated income changes. The intuition is that affluent households are less likely to face a liquidity constraint as a result of fluctuations in their income. Furthermore, for any given level of cash-on-hand, larger income gains make it less likely that a borrowing constraint would be binding relative to the case of small positive income changes.

As shown in Section 4 and Appendix H, this class of models generate two main testable predictions. First, for any income gain of a given size, the MPC of families with low liquidity should be higher than the MPC of families with high cash-on-hand. Second, households with low liquidity should exhibit a higher MPC out of small income gains than out of large ones. On the other hand, there should be little heterogeneity in the marginal propensity to consume across shock size for affluent households, as they are less likely to be credit constrained even in the case of small income gains.

In this section, we bring these predictions to the data by looking at the distribution of individual MPCs out of small and large income gains (and their within-household difference) along the cash-on-hand distribution. We use survey questions on how much households would spend of a transitory windfall equal to one month and one year of their income, respectively, to elicit the MPCs out of small and large income gains. As for measuring cash-on-hand, we follow Jappelli and Pistaferri (2014) and add household disposable income and financial wealth net of unsecured debt.

As a preliminary step towards the more formal econometric analysis with a rich set of controls below, in Figure 2, we fit a high order polynomial to the relationship between MPC and liquidity along the percentiles of the cash-on-hand distribution. Bands represent 95% confidence intervals. The top chart in blue refers to the spending response to small income gains, the middle panel represents the response to large income gains and the figure on the bottom overlaps the non-parametric estimates of the relationship between MPC and cash-on-hand for the two shock sizes.

Despite its simplicity, Figure 2 reveals a number of interesting results –confirmed by the regression analysis below. First, for the case of small income gains in the upper panel, the MPC is monotonically decreasing with cash-on-hand, ranging from 0.7 at the bottom of the cash-on-hand distribution to 0.25 at the top.[5] Second, for the case of large income gains (middle panel), in sharp contrast, the relationship between MPC and cash-on-hand is relatively flat, with a slightly positive gradient. Third, a comparison of the correlation between MPC and cash-on-hand across small and large income gains in the bottom panel reveals that, only for households with lower cash-on-hand (in the bottom 60%), the MPC out of small income gains is significantly higher than the MPC out of large gains. On the other hand, for affluent households (in the top 20% of the cash-on-hand distribution), the MPC is significantly higher for larger shocks.[6]

[5] The significant negative correlation between individual MPCs out of small unexpected temporary income gains and cash-on-hand hold in both SHIW waves in which this question was asked, namely 2010 and 2016. Jappelli and Pistaferri (2020) show that this relationship is not driven by unobserved heterogeneity.

[6] In Appendix B, we show that at the bottom of the cash-on-hand distribution, the result of a lower MPC for the larger income change reflects a combination of the two extensive margins: more respondents report a MPC=0 and less families report a MPC=1 for the case of large gains.In contrast, at the top of the cash-on-hand distribution, the higher MPCs for larger income gains is mostly driven by the fact that far less

A formal way of estimating the relationship between MPC and cash-on-hand for small and large income gains is reported in Table 2. The first two columns display the estimates of a cross-sectional regression of individual MPC on a set of dummies that capture the position of each household along the deciles of the cash-on-hand distribution in 2010.[7] The first (second) column refers to the case of small (large) income gains. The third column projects the difference in MPCs between the small and large shocks for each household on the cash-on-hand decile dummies. The second triplet of columns, 4 to 6, adds a rich set of demographic controls, namely family size, years of education and dummies for age, gender, marital status, employment status and whether the household is resident in the south and/or in a small city.[8] Given that the dependent variable is censored either between zero and one (in the case of the MPCs in each wave) or between minus one and one (in the case of the difference in MPCs across waves), the estimates in this section are based on a tobit model, but similar findings are obtained using OLS.

The first column of Table 2 reveals that the average MPC out of small windfalls is 0.74 for the first decile of the cash-on-hand distribution and 0.27 for the tenth decile. In between these, the average MPC decreases monotonically with liquidity. The second column, however, depicts a starkly different picture: there is less variation in average MPCs out of large income gains along the cash-on-hand distribution, with point estimates ranging from 0.36 to 0.43 at either end. Our main result is summarized in the third column. For households in the bottom 60% of the cash-on-hand distribution, the MPC out of small income gains is higher than the MPC out of large gains, with an average difference of 0.23 in the first decile, which monotonically falls to a significant 0.05 in the sixth decile. On the other hand, the negative and decreasing estimates associated with the top 30% imply that, for affluent households, the MPC out of small gains is significantly lower than for large gains, reaching values below −0.08 in the top quintile. The last three columns show that these findings, and in particular that the MPC difference (across shock size) decreases with income, are robust to controlling

households report a MPC=0 (rather than by more families reporting a MPC=1). This also helps reconcile the result in Figure 1, which shows a high density of values at 0 and 1 for both shocks, with the smoother pattern in Figure 2, where we compute the average MPC response in each percentile.

[7] Very similar results are obtained using the deciles of the cash-on-hand distribution in 2012 instead.

[8] To retain the full set of dummies for the cash-on-hand deciles, we have demeaned all other regressors and removed the intercept across all specifications. In the last column, we have further added the log difference of individual cash-on-hand to control for the possibility that some households may have changed decile of the cash-on-hand distribution from 2010 to 2012.

for demographic characteristics.

The main take away from Table 2 is that the results in Figure 2 are robust to controlling for a wide range of individual characteristics. In particular, it is still the case that: (i) for small income gains, individual MPCs are monotonically decreasing with cash-on-hand; (ii) for large income gains, the MPCs have a mildly positive correlation with income. Moreover, while for poorer families the MPC out of small gains is higher than the MPC out of large gains, affluent households exhibit a significantly higher MPC out of the large gains.[9] In Section 4, we will show that a model with no borrowing constraint but non-homothetic preferences on non-essential consumption can resolve the puzzle among affluent households. In the next section, we move a first step in that direction by showing that (i) families with higher cash-on-hand consume a higher share of non-necessity goods and services, and (ii) a higher share of luxury consumption predicts a higher MPC out of large income gains.

3.2 Non-essential spending

In the previous section, we have argued that the higher MPC for affluent households facing a large income gain is inconsistent with the presence of borrowing constraints and idiosyncratic risk. In Section 4, we will show this formally in the context of Aiyagari (1994)'s model, which in turn begs the question of what may rationalize the otherwise puzzling behaviour of families with high income and financial wealth.

A first step towards the resolution of the puzzle stems from noting that affluent families are less likely to be liquidity constrained and are more likely to spend a larger share of their budget on luxury goods. While it is hard to elicit such a share over the whole consumption basket, most household surveys (including the SHIW) report separate expenditure categories for food consumed at home and away. To the extent that the spending on these food sub-categories bears some correlation with the spending on the broader categories of essential and non-essential goods & services in the whole basket, the share of food purchases spent on eating out can be interpreted as a conservative proxy for the share of non-necessity consumption at

[9] Using high-frequency data from an aggregator of debit and credit card spending in the U.S., Chetty, Friedman and Stepner (2021) find that: (i) the MPC increases with household income for the larger stimulus payments disbursed by the U.S. government in April 2020 via the CARES Act; (ii) the MPC decreases with household income for the smaller stimulus payments disbursed in January 2021; (iii) among affluent households, the MPC out of the larger payment of April 2020 is significantly higher than the MPC out of the smaller payment of January 2021. We discuss their analysis and estimates in Appendix C.

the household-level.[10]

The working hypothesis is that: (i) affluent households spend a higher budget share on non-necessity goods; (ii) a higher share of non-necessity consumption predicts a higher MPC out of large gains (and a higher MPC out of small gains after controlling for cash-on-hand). Evidence on the first leg of this hypothesis is provided in Figure 3 and Appendix Table F.1. The figure reports the median share of eating out (as percent of total spending on food) by fifty equally sized bins of the cash-on-hand distribution. Low-income households display much lower shares, whose median value is zero for the bottom 40%. After that, the shares of eating out spending increase significantly with cash-on-hand, reaching a value around 20% at the top of the distribution.[11]

The second leg of our hypothesis is that the share of non-essential consumption (as proxied by food spending on eating out) is positively correlated with individual MPCs and that this relationship can be more easily identified for large income gains where differences in liquid wealth are less likely to drive variation in the MPCs. Evidence on this is reported in Figure 4, which displays the relationship between eating out shares and MPCs for small shocks (left column) and large shocks (right column), with no controls (top row) and controlling for cash-on-hand and demographics (bottom row). Interestingly, and in line with our working hypothesis, the top row reveals that a higher share of non-necessity consumption predicts a higher MPC only out of the large income gains in the right column. In contrast, there is virtually no unconditional correlation between MPCs and luxury spending for the small windfalls in the left column.

A possible explanation for this lack of correlation between MPCs and non-necessity shares is that liquidity considerations are likely to dominate the unconditional variation in the MPCs out of the small income changes. To verify this intuition, the bottom row of Figure 4 depicts the MPC gradient with respect to eating out shares conditional to the household position in the cash-on-hand distribution (and demographic characteristics). The two charts reveal that controlling for the liquidity deciles in the specification for small income changes unleashes the

[10]It is conservative because the share of food spending on eating out is likely to be a lower bound for the share of non-essential consumption among high-earners. The reason is twofold. First, for affluent households, also the spending on food at home is likely to contain a significant share either of non-necessity goods or of necessity goods of higher quality and price. Second, unlike food, several other spending categories, including entertainment, hospitality, travelling and insurance, may not have a necessity counterpart at all but are likely to be featured more prominently in the basket of families at the top of the cash-on-hand distribution.

[11]A similar information by deciles of cash-on-hand is reported in Appendix Table F.1.

underlying relationship between MPCs and non-necessity spending shares, which now looks remarkably similar across the two shock sizes. In contrast, for large income gains, which are likely to make liquidity considerations less important, adding the cash-on-hand deciles as regressors makes little difference. These two panels also point out that non-necessity shares make a significant contribution to explain the differences in MPCs: for both small and large gains, going from the lowest to the highest share of eating out adds about 5 cents of spending out of every euro of windfall.

A more formal way of appreciating the relationship between MPCs and non-essential spending is provided in Table 3, which is nothing but the counterpart of Figure 4 using the same tobit models behind Table 2. The first pair of columns report the slope of the MPC on eatout share with no controls; the second pair includes the deciles of the cash-on-hand distribution as regressors and the third pair also adds demographics. In the first pair on the left, with no control, a higher eatout share predicts a higher MPC only for the large income gains of the second column. However, adding the deciles of the cash-on-hand distribution in the middle pair uncovers a very significant positive relationship between MPC and non-necessity spending. This latter finding is robust to adding demographic controls in the last two columns on the right, and the significance and monotonicity (or lack of it) of the liquidity decile dummies for the MPC is not sensitive to adding eating out shares to the specification for small (large) income gains.

In summary, this section has shown that households with higher cash-on-hand tend to spend a higher share of their budget on non-necessity purchases. Furthermore, a higher share of spending on non-necessities predicts a higher MPC. For large income gains, the MPCs vary little with liquidity and thus the relationship between the shares of non-necessity consumption and the MPCs is visible both unconditionally and conditional to the household position in the cash-on-hand distribution. In contrast, for small income gains, the variation in the MPCs is dominated by variation in liquidity, and therefore the relationship between the shares of non-necessity consumption and the MPCs can be uncovered only after controlling for a proxy of borrowing constraints. In the next section, we will bring the empirical findings of this section to the theory by deriving the theoretical predictions of a model with non-homothetic preferences on luxury goods.

In Appendix D, we verify that the relationship between MPCs, cash-on-hand, and non-necessity purchases shown in Table 2 and Table 3 are robust to a number of sensitivity checks. First, we split consumption into durable and non-durable purchases. Then, we condition on understanding well the questions, degree of patience and risk aversion, being financially literate and the presence of household debt. We also look into potential error non-normality, selection issues, income versus financial wealth, alternative samples.[12] Finally, in Appendix E, we explore regional heterogeneity between South and North of Italy. None of these robustenss analyses overturn our main findings.

4 A model with non-homothetic preferences

In Section 3, we have discussed the intuition for why models with a borrowing constraint and idiosyncratic risk á la Aiyagari (1994) would have hard time to explain the empirical finding that affluent households exhibit a higher MPC out of large income gains.[13] Moreover, we have shown that (i) affluent households spend a higher budget share on non-necessity goods and services, and (ii) a higher share of non-necessity consumption is associated with a higher MPC, especially for large income gains. To explain these empirical findings, in this section we derive the predictions of a tractable model with non-homothetic preferences on luxury goods. We show that, despite its simplicity, this framework predicts that the MPC is an increasing and convex function of household income, with the slope that becomes arbitrarily steep at the top end of the income distribution. All proofs are contained in Appendix F.

4.1 Set-up and derivations

We propose a novel theoretical mechanism that can generate a positive link between household income and MPC via non-necessity spending. To highlight this channel in a transparent way, we layout a parsimonious model with non-homothetic preferences that can be solved analytically. This is an infinite horizon variant of the specification proposed by Browning and Crossley (2000). The key feature is that agents face a instantaneous felicity function that is separable in two goods, a and b, with power utility on each good.

[12] We replicate our analysis with the 2016 wave, where we have the same question as in the 2010 wave, to assuage the concern that our results are driven by the particular wave years.

[13] In Section 5, we will corroborate this intuition with a quantitative evaluation of Aiyagari (1994)'s model.

$$u(c_{a,t}, c_{b,t}) = \frac{c_{a,t}^{1-\frac{1}{\gamma_a}}}{1-\frac{1}{\gamma_a}} + \frac{c_{b,t}^{1-\frac{1}{\gamma_b}}}{1-\frac{1}{\gamma_b}}$$

where $\gamma_i > 0$. The power utility is standard and allows us to obtain analytical results. To retain tractability, we work in a perfect foresight partial equilibrium model where agents are price takers and financial markets are frictionless. The price of each good (from the standpoint of period 0) is $p_{i,t}$ for $i = a, b$.[14] Constructing a measure of deflated expenditure at time t as $X_t = p_{a,t}c_{a,t} + p_{b,t}c_{b,t}$, the household optimization problem can be written as:

$$\max_{\{c_{a,t}, c_{b,t}\}_{t=0}^{\infty}} U(\{c_{a,t}, c_{b,t}\}_{t=0}^{\infty}) = \sum_{t=0}^{\infty} \beta^t \left[\frac{c_{a,t}^{1-\frac{1}{\gamma_a}}}{1-\frac{1}{\gamma_a}} + \frac{c_{b,t}^{1-\frac{1}{\gamma_b}}}{1-\frac{1}{\gamma_b}} \right] \tag{1}$$

$$s.t.$$

$$Y = \sum_{t=0}^{\infty} \sum_{i=a,b} p_{i,t} c_{i,t} = \sum_{t=0}^{\infty} X_t$$

with $Y > 0$ and where the budget shares can be defined in terms of permanent income or current expenditures: $s_{i,t}^{Y} \equiv \frac{p_{i,t}c_{i,t}}{Y}$ and $s_{i,t}^{X} \equiv \frac{p_{i,t}c_{i,t}}{X_t}$.

Before presenting our main theoretical result on the relationship between MPC and household income in section 4.2, it is useful to lay out the groundwork in the three lemmata.

Lemma 1 *In the problem defined in (1), the income elasticity of demand for good i, e_i^Y, is given by*

$$e_i^Y \equiv \frac{\partial c_{i,t}}{\partial Y} \frac{Y}{c_{i,t}} = \frac{\gamma_i}{\gamma_a \left(\sum_{\tau=0}^{\infty} s_{a,\tau}^{Y}\right) + \gamma_b \left(\sum_{\tau=0}^{\infty} s_{b,\tau}^{Y}\right)} \tag{2}$$

Proof. See Appendix F ■

[14] This implies that the real interest rate for good i is $R_{i,t,t-j} \equiv \frac{p_{i,t}}{p_{t-j}}$. Alternatively, if there exists a numeraire money good with rate $R_{t,t-j}$, then the interest rate for good i can be written as $R_{i,t,t-j} = R_{t,t-j}\frac{\tilde{p}_{i,t}}{\tilde{p}_{t-j}}$ where $\tilde{p}_{i,t}$ is the price of good i in period t in terms of money in that period.

It is worth noting that, in this class of models, the income elasticity depends on both the curvature of the utility function and the average share of income spent on good a versus good b. With the expression for the income elasticity in hand, we are now in the position to verify whether a good is a necessity or a non-necessity.

Lemma 2 *In the problem defined in (1), good a is a non-necessity and good b is a necessity iff $\gamma_a > \gamma_b$.*

Proof. See Appendix F ■

By definition, necessity (luxury) goods are characterized by an income elasticity below (above) one. In the case of homothetic preferences, which in our context corresponds to $\gamma_a = \gamma_b$, all income elasticities are equal to one and therefore the budget shares are constant along the income distribution. In contrast, under non-homothetic preferences, which is $\gamma_a \neq \gamma_b$, affluent households devote a larger budget share to non-necessity consumption. Without loss of generality, in what follows we will define good a as the non-necessity good and good b as the necessity good.

We now turn to the object of interest: the MPC. In this frictionless environment, the effect of a (properly discounted) income change is the same independently of its timing: one Euro increase in current household income has an equivalent effect to a one Euro increase in permanent income. Accordingly, we can define the MPC in period t as the derivative of expenditures in period t with respect to the permanent income: $MPC_t \equiv \frac{\partial X_t}{\partial Y}$.

Lemma 3 *In the problem defined in (1), the MPC is fully characterized by the income elasticities of the two goods and the current budget shares according to the formula:*

$$MPC_t = s^Y_{a,t} e^Y_a + s^Y_{b,t} e^Y_b \tag{3}$$

Proof. See Appendix F ■

It is useful to note that not only the MPC is positive, given that all its constituent elements are, but also that is bounded by one from above. In the homothetic case, the MPC simply corresponds to the expenditure shares in period t over the permanent income, which by construction does not vary with current income. In contrast, under non-homothetic preferences, the MPC becomes a weighted average of period t expenditures, with weights equal to their income elasticities. As both expenditures shares and income elasticities depend on the income level, *Lemma* 3 proves that the irrelevance result of income for the MPC under homothetic preferences does not carry through to the non-homothetic case.

4.2 Theoretical predictions

Endowed with the three lemmas above, we can now present our first main theoretical result, namely under what conditions the MPC is an increasing function of income.

Proposition 1 *In the problem defined in (1), with $\gamma_a > \gamma_b$, the derivative of the MPC in period t with respect to income is positive if*

$$\frac{\beta^{t\gamma_a} p_{a,t}^{1-\gamma_a}}{\beta^{t\gamma_b} p_{b,t}^{1-\gamma_b}} > \frac{\left(\sum_{\tau=0}^{\infty} \beta^{\tau\gamma_a} p_{a,\tau}^{1-\gamma_a}\right)}{\left(\sum_{\tau=0}^{\infty} \beta^{\tau\gamma_b} p_{b,\tau}^{1-\gamma_b}\right)} \tag{4}$$

Furthermore, the sign does not depend on the income level, but only on prices and preference parameters.

Proof. See Appendix F ■

Proposition 1 chimes with the finding in Browning and Crossley (2000) that luxury spending is easier to postpone (anticipate) than essential purchases in the face of a negative (positive) income shock. The intuition is that, whenever the relative price makes today consumption of non-necessity goods relatively more attractive than their future consumption, households with higher income (and thus more luxury spending) will tilt their budget even more towards non-essentials.[15]

[15]For tractability, we have assumed that the instantaneous felicity is separable in both goods. It should be noted, however, that if necessity and luxury goods were substitutes (as arguably may be the case for eating out and at home), then the MPC would be an even steeper function of income, as affluent households would also substitute away from non-necessity consumption.

To build intuition for the condition under which the MPC in an increasing function of income in *Proposition* 1, we make the simplifying assumption that prices, once discounted by the market interest rate R, grow at a constant rate, g_a and g_b. Under this scenario, we show in Appendix F that the inequality in *Proposition* 1 simplifies to the sufficient condition $g_a > g_b > 1$ for a wide range of empirically plausible configuration of the parameter space. This simplified condition states that households with higher income exhibit a higher MPC as long as the inflation rate on non-essential goods & services is higher than the inflation rate on essential purchases.

To verify whether this simplified condition is satisfied in the data, we would like to compare the Consumer Price Indeces (CPI) on necessity goods with the one on non-necessity goods. While these are not readily available in a consistent and comparable format across time and space, national statistical agencies in many advanced economies do provide price indeces for several categories (and sub-categories) of household expenditure. Among those, in Figure G.1, we compare the evolution of: (i) the price index on food spending at home with the price index on eating out (top row), (ii) the price index on the whole consumption basket with the price indeces in specific sectors such as health, finance, insurance, culture and recreation (bottom row). To the extent that those categories feature a higher share of non-essentials relative to the whole consumption basket, the comparison between their price indeces and the CPI for all items will carry information about the relative price of necessity and non-necessity goods.

The evidence in Figure G.1 refers to Italy (left column) and the United States (right column). All indeces are normalized to 100 in 1996, when most Italian series start. The top row reveals that in both countries the price index on eating out spending (dashed line) has been consistently higher than the price index on food at home (solid line). Similarly, the bottom row shows that the inflation rate on all items of the consumption basket (solid line) has been systematically lower than the inflation rate on spending categories dominated by non-essential purchases (dashed lines). Taken at face value, the evidence in Figure G.1 suggests that the condition $g_a > g_b > 1$ is likely met in the data. In the context of our model, this implies that households find it is optimal to anticipate non-necessity spending in the face of a positive income shock.

In addition to the empirical support detailed above, there is also a theoretical justification for why the simplified condition $g_a > g_b > 1$ is likely to hold. In a general equilibrium model with trend growth and decreasing return to scale in the production of necessity and non-necessity goods, the relative price of non-essentials should increase in equilibrium. This relative price appreciation would tilt the household budget toward consuming more luxury goods and services today.[16]

Having proved that the MPC is increasing in income, we ned to show now that is also convex. This is crucial to rationalize the empirical finding that the MPC is higher in the face of large gains than small gains. This is the focus of the following proposition.

Proposition 2 *In the problem defined in* (1)*, with condition (4) met as in Proposition 1, the MPC is convex in income* $\forall$ *income* $Y < \bar{Y} < \infty$*, if*

$$\gamma_a > 2\gamma_b \tag{5}$$

Proof. See Appendix F ■

Proposition 2 states that a necessary and sufficient condition for the MPC to be an increasing and convex function of income is that the elasticity of demand for luxury goods be sufficiently higher than for essential consumption.[17] To verify this condition in the data, it is useful to note that in the class of models with non-homothetic preferences such as the utility function in (1), the income elasticities are proportional to the Elasticities of Intertemporal Substitution (EIS) for each good (Deaton, 1992, Browning and Crossley, 2000). This implies that evidence of heterogeneity in the latter can be interpreted as informative of any heterogeneity in the former.

Four independent pieces of evidence provide strong empirical backing for condition (5). First, Blundell, Browning and Meghir (1994) estimate an income elasticity above 2 for services, which are characterized by a higher share of non-essential consumption, but report an elasticity below 1 for the demands on food, fuel and transportation, which are dominated by

[16] The model in Comin, Lashkari and Mestieri (2021) is an example that features this in equilibrium.

[17] The permanent income threshold $\bar{Y}$ below which the MPC is convex maps into an estimated share of non-necessity spending, $\bar{s}^X_{a,0}$ around 58%, or to a cash-on-hand value of 2 million euros. This roughly corresponds to the largest observation in our sample. We obtain these estimates by running the following projection: $\ln(\textit{cash-on-hand}_i) = \alpha + \beta * \textit{eatoutshare}_i + \varepsilon_i$ on the regression sample and then computing the predicted value for cash-on-hand at $\bar{s}^X_{a,0}$. Details on the algorithm to obtain $\bar{s}^X_{a,0}$ are reported in Appendix F.

more essential purchases. Second, Attanasio, Banks and Tanner (2002) show that affluent households (who spend more on non-necessity goods and services) participate far more in financial markets than households with low cash-on-hand and that the EIS for stock market participants is an order of magnitude higher than the EIS for non-shareholders. Third, Aït-Sahalia, Parker and Yogo (2004) derive the implications of non-homothetic preferences for asset prices and estimate that γ_a for luxury goods is an order of magnitude larger than γ_b for non-durable consumption from NIPA. Fourth, Calvet et al. (2021) find that the empirical distribution of the EIS across households is bi-modal, with peaks at 0.1 and 2.5, respectively; furthermore, they report a strongly significant and positive correlation between EIS and the wealth-to-income ratio.[18]

In summary, this section has shown that —under empirically plausible restrictions of the parameter space— a framework with non-homothetic preferences and non-essential consumption generates the prediction that the MPC is an increasing and convex function of household resources. These novel theoretical results can provide a rationale for two main empirical findings documented in Section 3. First, among affluent households, the larger gain equal to one year of income is associated with a higher MPC than the smaller gain equal to one month of income; second, for the case of large income gains, there exists a positive correlation between MPC and cash-on-hand. This latter result provides theoretical support for the empirical evidence in Kueng (2018), who shows that —in the face of a large income gain— the MPC increases with income, driven by top earners with sizable liquid assets.

5 Bridging Theory and Empirics

In Section 3, we have shown that households with low cash-on-hand exhibit higher MPCs out of the small income gains whereas the opposite is true for affluent households. Furthermore, we have argued that while the finding at the bottom of the income distribution could be accounted for by a model with credit frictions, the empirical result among top earners was most likely inconsistent with it. In Section 4, we have therefore characterize the equilibrium

[18] Attanasio and Browning (1995) document that the EIS increases with the level of household consumption. Crossley and Low (2011) reject the null hypothesis of a constant EIS by exploiting variation in spending on individual consumption categories across households. While Crossley and Low (2011) do not estimate an EIS for each spending category, their Figure 1 strongly suggests that the income elasticity for non-essentials such as leisure services is much higher than the income elasticity for essentials such as food, fuel and light.

of a model with non-homothetic preferences to show that it predicts a MPC that is increasing and convex in income.

In this section, we bring the theoretical models closer to the empirical analysis in three steps. First, we assess the ability of a calibrated Aiyagari (1994)'s model with a borrowing constraint and income uncertainty to account for the positive difference in MPCs across small and large gains among households with low cash-on-hand. Second, we evaluate the extent to which a calibrated version of the model with non-homothetic preferences on non-essentials in Section 4 could explain the negative difference in MPCs across small and large gains among affluent families. Third, we propose a simple strategy to bring the predictions of the two models together and verify whether the mixture of models can replicate quantitatively the pattern of MPC differences along the entire income distribution.

5.1 The role of borrowing constraints

In this part, we solve a partial equilibrium version of the model proposed by Aiyagari (1994). Households face idiosyncratic risk on both the persistent and transitory components of their income and solve a standard intertemporal optimization problem with CRRA instantaneous felicity function, subject to the constraint that wealth cannot be negative. In Appendix H, we provide further details of the model, a discussion of the parameter values and the derivations of the MPC as a function of both the level of cash-on-hand and the size of the temporary income shock.[19]

To ensure consistency between the theoretical exercise of this section and the empirical analysis of Section 3, we proceed in four steps. First, for each level of cash-on-hand in the model, we compute the MPCs out of positive shocks equal to one month and one year of income, respectively, by using the expressions for the MPCs in Appendix H. Second, to match the model scale, we normalize the empirical distribution of per-capita cash-on-hand by the average per-capita income in the sample. Third, for each shock size, we compute the MPC for everyone in the economy and then sort them by cash-on-hand as is done in the empirical analysis and then we compute the average MPCs within each decile of the empirical

[19] In an unconstrained model, as the non-homothetic one in Section 4, there is no conceptual distrinction between the marginal propensities to consume out of a temporary and out of a permanent income shock. However, these two MPCs are not the same concept in the Aiyagari (1994) model and therefore, in line with the framing of the survey questions, for this model we compute the MPC out of a temporary income shock.

distribution of normalized per-capita cash-on-hand. Finally, consistent with the analysis on actual data, we run a smoother across the average MPCs implied by the model.

The results are reported in the upper panel of Figure 5 and can be summarized as follows. First, the MPC is a decreasing function of household resources, with a steeper gradient for small gains. Second, the MPC out of the small gains is always higher than out the large gains, but the gap decreases monotonically with cash-on-hand. Third, while the level of these theoretical MPCs is systematically lower than their empirical counterparts at the top of Figure 2, the differences in theoretical MPCs across small and large shocks are quantitatively similar to the empirical MPC differences that can be seen among the bottom 60% of the cash-on-hand distribution in the lower panel of Figure 2.

In summary, the results of this section provide support for the notion that a model with a borrowing constraint and income risk can account for the empirical finding in Section 3 that, among households with low cash-on-hand, smaller income gains trigger a higher MPC than larger gains. The intuition is that larger gains are more likely to loosen the borrowing constraint. Despite its simplicity, the model yields a positive MPC gap between small and large shocks that decreases with cash-on-hand, ranging from 0.17 in the first decile to virtually zero after the 60^{th} percentile. These quantitative predictions are remarkably close to the estimates in the last column of Table 2 for the bottom half of the cash-on-hand distribution.

5.2 The role of non-homothetic preferences

In the previous section, we have shown that a Aiyagari-type of model can account for the difference in MPCs across shock sizes among families with low cash-on-hand. In this section, we focus on the spending behaviour of affluent households. The model with non-homothetic preferences of Section 4 predicts that the MPC is increasing and convex in income and therefore families with higher cash-on-hand should exhibit a higher MPC than households with lower cash-on-hand, especially for large shocks. This finding relies on three features of the model (which are confirmed in the data). First, the consumption basket of wealthier families contains a higher share of non-essentials than the basket of poorer households. Second, luxury consumption is much easier to postpone/anticipate. Third, the prices of non-necessity goods and services tend to grow faster than the prices of essentials. These three features imply that, in the face of a temporary income gain, wealthier households prefer to bring their luxury spending forward, with the size of their earlier purchases that increase with the size of the income gain.

To bring the model to the data, we need to confront the additional feature of non-homothetic preference models that they are not scale invariant: for instance, normalizing the average permanent income to 1 rather than 100 would produce significantly different quantitative results. To overcome this issue, we focus on shares, which by construction do not depend on the scale of numerator or denominator, and use the fraction of food spending that goes to eating out (eating at home) as a proxy for the share of current expenditures on non-necessities, $s_{a,t}^X$ (on necessities, $s_{b,t}^X$). Furthermore, we note that, according to Figure 3, the share of non-essential spending increases non-linearly with cash-on-hand. This suggests that one could approximate the shares of non-essential spending by the median values of the eating out shares in each decile of the empirical distribution of cash-on-hand (Table F.1). Endowed with these spending shares, we can compute the income implied by the model and, through that, obtain the theoretical MPCs for small and large shocks using the expressions in Appendix F.[20]

The lower panel of Figure 5 reports the MPCs as a function of household resources in the non-homothetic preference model. Three main results stand out. First, for both shocks, the MPCs are positively related to the level of cash-on-hand and exhibit a steeper slope for the case of large shocks. Second, the MPCs out of the large income gains are uniformally higher than the MPCs out of the small gains. Third, the difference of MPCs across shock sizes increases monotonically with cash-on-hand, ranging from virtually zero among poor families to -0.12 among top earners, consistent with the estimates for the higher deciles in the last column of Table 2. In summary, a model with non-homothetic preferences on consumption can reproduce two (otherwise puzzling) findings from the empirical analysis of Section 3: affluent households would spend a higher share of their windfall when the income gain is large (lower panel of Figure 2); the MPC increases with the share of non-essential spending and this correlation is more visible for large income gains (Figure 3).

[20]In Appendix F, we report a detailed description of the calibration strategy and the procedure to bridge the model of this section and the data. In keeping with the approach in the previous section, for consistency with the analysis on actual data, for each shock size, we run a smoother across the average MPCs implied by the non-homothetic preference model within each decile of the cash-on-hand distribution.

5.3 Interpretation

In Section 5.1, we have verified that a theoretical framework with idiosyncratic risk and a borrowing constraint can account for two of our main empirical findings: (i) the MPC decreases with cash-on-hand for small income gains; (ii) households with low income have a higher MPC when the windfall is small. In Section 5.2, we have shown that a theoretical set-up with non-homothetic preferences on non-essential consumption generate predictions that are consistent with the the other two results of our empirical analysis: (iii) the MPC does not decrease with cash-on-hand for large income gains; (iv) affluent families have a higher MPC when the windfall is large.

Our favourite interpretation of the empirical evidence in (i) to (iv) is that the spending behaviour of households with low cash-on-hand can be more accurately described by the presence of borrowing constraints and uninsurable income risk whereas the spending behaviour of affluent households could be better understood through the lenses of non-homothetic preferences on non-essential goods and services. Consistent with this interpretation, in this section we bring the two models together and assess their ability to replicate the estimates in Section 3 about the average difference in MPCs across shock sizes along the the distribution of cash-on-hand.

A simple way to blend the predictions of the two models (about the heterogeneity in the MPC across shock size as a function of households resources) is to compute, for each decile of cash-on-hand and for each shock size, a weighted average of the MPC in Ayiagari's model and the MPC in the non-homothetic preferences set up. In selecting the appropriate weighting scheme, we want to fulfil a desire of giving more prominence to borrowing constraints at the bottom of the income distribution and more prominence to non-essential spending at the top. Accordingly, the weights on the non-homothetic preference model are defined as the difference between the average cash-on-hand in each decile and the average cash-on-hand in the bottom decile *over* the difference between the average cash-on-hand in the top decile and the average cash-on-hand in the bottom decile. The weights on the borrowing constraint model are the complement to one of the weight on the non-homothetic preference model and, therefore, —by construction— will be equal to one at the first decile of cash-on-hand and zero at the tenth decile.

In Figure 6, we display the theoretical predictions about the MPC difference across shock size as a function of household resources in the mixture of models. For comparability with the empirical results, we also report the estimated average latent MPCs (and 95% confidence bands) across cash-on-hand deciles obtained by regressing the household-level MPC difference on the decile dummies and the demographic controls (as in the column 6 of Table 2). The main take away is that theoretical predictions and empirical estimates align remarkably well. First, the mixture of models is able to replicate the significantly negative relationship between MPC differences and cash-on-hand deciles, with the models predictions being in most cases within the confidence bands of the estimates on actual data. Second, the mixture of models delivers a main feature of our empirical analysis, namely that the difference in MPCs switches sign when moving from the lower to the upper part of the liquid wealth distribution. Third, the magnitude of the theoretical gap in MPCs (black dotted line) is close to the magnitude of its empirical counterpart (blue solid line), both on average and across the cash-on-hand distribution, especially at the lowest and highest deciles. Consistent with the findings in Tables 1, the mixture of models predicts that the average MPC out of the small gains should be 0.02 higher than the average MPC out of the large gains whereas, at the bottom (top) of the cash-on-hand distribution, the MPC gap should be around 0.17 (-0.12), in line with the estimates in Table 2.[21]

It is worth noting that to illustrate the theoretical mechanisms in a transparent way, each model (as well as their mixture) has been kept deliberately simple and distinct from the other model.[22] Yet, this does not seem to have affected significantly the ability of their combined theoretical predictions to match several qualitative and quantitative features of our empirical analysis. More specifically, a mixture of theoretical models that gives more weight to borrowing constraints (to non-essential spending) at the bottom (at the top) of the distribution of household resources can account for our main finding that families with low cash-on-hand are characterized by a higher MPC out of smaller income gains (whereas affluent households exhibit a higher MPC when the income gains are larger).[23]

[21] Our analysis has been calibrated to the Italian survey data where the share of (wealthy) hand-to-mouth households is relatively small (Surico and Trezzi, 2018). If we were to give more weight to the Aiyagari model, the difference in MPCs generated by the mixture of models would go to zero from above as cash-on-hand increases, consistently with the findings on Dutch household survey data by Christelis et al. (2019).

[22] Another simplification is the absence of taxes. Therefore, the computed MPCs are for after-tax income shocks. This is consistent with the empirically measured MPCs. The survey question enforces the sum of the share of spending and saving to be 100, so that, the windfall is after-tax as in the model.

[23] In Appendix I.1, we show that this simple mixture of models can also match the shape of the level of the

5.4 Other mechanisms

While the results above suggest an important role for borrowing constraints and non-homothetic preferences to account for the correlation between MPC and shock size along the cash-on-hand distribution, other mechanisms may also influence the spending response to unanticipated windfalls of different size, especially at the top of income distribution. This includes the Permanent Income Hypothesis (PIH), uninsurable income risk and borrowing constraints, transaction costs on accessing illiquid wealth, inattention and heterogeneity in risk aversion and the discount factor. In this section, we discuss the extent to which each of them may account for certain features of our empirical findings.

Permanent income hypothesis. In a frictionless world, households adjust spending by as much as the change in their lifetime resources implied by the temporary windfall. This implies that the MPC varies with neither income nor shock size. It follows that while the PIH can explain why the MPC is relatively flat when the income gain is large, it cannot account for the differences in MPCs across shock size among affluent households.

Borrowing constraints only. In the face of uninsurable income risk, an occasionally binding constraint or sufficient curvature in the marginal utility could generate MPC heterogeneity across shock size (Krueger and Perri, 2006). A main prediction is that the MPC out of small gains is higher than out of large gains, as the latter are likely to make the borrowing constraint slack and the precautionary motive stronger. As these considerations appear more relevant for low cash-on-hand families, this mechanism can explain our empirical findings at the bottom of the liquid wealth distribution but seems unlikely to help with the spending of top earners, for which the higher MPC is actually associated with the larger gains.

Portfolio adjustment costs. If agents face transaction costs to adjust their portfolio, then small income gains (below such an adjustment cost) may trigger a different spending response than large gains (in excess of such a value) among holders of sizable illiquid assets but little cash-on-hand (Kaplan and Violante, 2014).[24] This class of models suggests that

MPCs, over and above matching the shape of the difference in MPCs presented in Figure 6.

[24] Models with temptation preferences and an endogenous demand for commitment (Attanasio, Kovacs and Moran, 2020) or with bounded rationality on long-term consumption and saving plans (Boutros, 2021) do also generate a negative correlation between MPC and the size of transitory and income shocks.

the MPC out of small shocks may be higher than out of large shocks for the wealthy hand-to-mouth. The prediction of a higher MPC for small gains is consistent with the evidence among households with low cash-on-hand but does not fit well our findings at the top of the income distribution. Furthermore, in Appendix D, we show that our results are robust to excluding households with debt, which is a group that is likely to include the wealthy hand-to-mouth (Surico and Trezzi, 2018, Cloyne, Ferreira and Surico, 2019).

Inattention. Another possible rationale for the empirical finding of MPC heterogeneity across shock size among top earners is that households may pay far less attention to income changes that are not salient in value, as in Reis (2006), and therefore may respond to those much less, if any, than what they would have done if the income change was large. It should be noted, however, that the two hypothetical windfalls that we consider are not fixed in Euro amount but are proportional to household resources. Furthermore, even the relatively smaller gain is actually salient in absolute terms as it equals to one month of household income (i.e. around 4300€ or 5000$ in the top decile of the cash-on-hand distribution).[25] Finally, inattention and non-convex consumption adjustment costs would imply a higher MPC out of large gains also for households in the rest of the income distribution and also would not fit easily the evidence on regional heterogeneity in Appendix E.

Heterogeneity in risk-aversion and the discount factor. The heterogeneity in MPCs that we have document across both shock size and liquidity may reflect (omitted) heterogeneity in preferences (Aguiar, Bils and Boar, 2020). For instance, households with lower cash-on-hand may have higher risk-aversion and higher discount factor, which in turn could lead to a lower and a higher MPC, respectively, in a way that could vary with shock size. In Appendix D, we describe another set of questions in the SHIW that allow us to elicit these preference parameters. Indeed, we show that these measures of risk aversion and impatience display a strongly negative and significant correlation with cash-on-hand (Appendix Figure D.3). To verify whether preference heterogeneity may explain our MPC heterogeneity, in Appendix Table D.4, we add as controls to our baseline regressions (i.e. behind the last three

[25] As shown by Fuster, Kaplan and Zafar (2021) in the more general case of lumpy consumption adjustment costs, this class of models generates the predictions that —conditional to a positive spending response— the MPC decreases with the shock size. While on average this is true also in our data, we find that affluent households exhibit a higher MPC|MPC>0 for large income gains (see Appendix Figure B.2).

columns of Table 2) two dummies that take the value of one if a household is either risk-averse or impatient, respectively, and zero otherwise. The main take away from Appendix Table D.4 is that more risk-averse families tend to have a lower MPC, especially out of the large income gains while more impatient households exhibit a higher MPC out of the small income gains. Interestingly, however, controlling for heterogeneity in risk aversion and discounting, either individually as in the first six columns of Appendix Table D.4 or jointly as in the last triplet of the same table, our main empirical finding is not overturned: it is still the case that households with low cash-on hand are characterized by a higher MPC out of the small gain and that affluent families are associated instead with a higher MPC out of the large gain.

Non-homothetic preferences on bequests. In a series of influential papers, De Nardi (2004), De Nardi, Fella and Yang (2015), De Nardi and Fella (2017), Straub (2019), Mian, Straub and Sufi (2020) show that non-homothetic preferences on bequests can account for a number of facts on wealth accumulation, including the higher saving rates among affluent families, especially at retirement, the rise in wealth inequality and the secular decline in interest rates. As for the consumption responses to temporary and unanticipated income changes, this class of models generates two main predictions that we can evaluate against our empirical findings: (i) high earners display a lower MPC than households with low cash-on-hand, as the bequest motive implies that the rich save a larger share of their income gain; (ii) among affluent families, the MPC decreases with the size of the income gain.[26] While the former prediction is consistent with the empirical findings on MPC heterogeneity out of the small gains, the latter implication is at odds with the evidence in Section 3 that high-income households exhibit a higher MPC when the income gains are larger.

In summary, while the theoretical channels described in this section provide a significant contribution to a number of facts about heterogeneity in consumption/saving decisions, a model with non-homothetic preferences on consumption can explain two key features of the empirical evidence in Section 3 that other frameworks cannot easily reconcile: (i) the MPC increases with the budget share spent on luxury goods, which is higher among high earners; (ii) only households with high cash-on-hand exhibit a higher MPC out of the larger gain.

[26] A main difference between non-homothetic preferences on bequests and on goods is that bequests cannot be anticipated or postponed and therefore they cannot make the MPC a convex function of income.

6 Fiscal Experiments

In the previous sections, we have shown pervasive evidence of MPC heterogeneity across both households resources and the size of the income gains. In particular, we have shown that families with low cash-on-hand display a higher MPC out of small gains whereas affluent households exhibit a higher MPC out of large gains. In this section, we look at the policy implications of our findings by exploring the extent to which a government could exploit both dimensions of MPC heterogeneity to maximise the impact of its policies on the aggregate economy (or minimize the costs for public finances). We consider fiscal stimulus packages of three sizes, equal to 0.5%, 1% and 2% of GDP respectively. These are reported in the three panels of Table 4.

For each stimulus package, we consider three policy experiments: (i) a *payment* equal to *one month* of income for as many households as possible at the bottom of the cash-on-hand distribution, financed by debt; (ii) a *payment* equal to *one year* of income for as many families as possible at the bottom of the cash-on-hand distribution, financed by debt; (iii) a payment equal to one month of income for as many households as possible at the bottom of the cash-on-hand distribution, financed by a *tax* disbursement equal to *one month* of income for as few households as possible at the top of the cash-on-hand distribution.

Before discussing our policy results, it is useful to emphasize that the experiments in this section refer to the partial equilibrium responses to the economic stimulus payments and therefore they do not capture the effects of changes in prices, other household' decisions such as labour supply, or, in the debt finance case, debt financing costs. Accordingly, our simulated aggregate effects are best interpreted as the direct, first-round impulse of fiscal policy, before any general equilibrium effect. Moreover, we note that a transfer equal to one year of income in favour of poor families is not only a plausible amount but is also in line with current government policies in several advanced economies. For instance, the median annual income in the first two deciles of the liquid wealth distribution are around 5000€ and 10000€ respectively (See Table F.1).[27]

[27]The Universal Basic Income (UBI) policy introduced in 2019 by the Italian government, *Reddito di Cittadinanza*, has generated monthly payments up to 780€ for a single adult and up to 1180€ for a family of four, consistent with the annual income at the bottom of the cash-on-hand distribution. While a UBI policy might be perceived as permanent, we note that those policies can be repealed, as it was the case with the *Reddito di Cittadinanza* in 2023, which has been replaced by a scheme which is both more stringent in terms of conditionality and has a lower monthly payment. Similarly, a UBI policy in Finland lasted only from 2017

The top panel of Table 4 presents the case of a stimulus package as large as 0.5% of GDP. The first row reveals that a package of this size would allow the government to pay *one month* of income to the bottom 27%, for an average transfer value of 775€ in the second column. As households in this group exhibit an average MPC of 0.52 (out of the small income gain) and the economic stimulus payment is financed by debt, the last column indicates that policy (i) would boost aggregate consumption by 0.43%. In the second row, we consider an alternative policy that uses the 0.5% GDP stimulus package to pay *one year* of income to the bottom 7% of the cash-on-hand distribution, for an average transfer of 3744€. Policy (ii), which is also financed by debt, has a smaller effect on aggregate consumption than policy (i), around 0.37%, as the third column shows that it is associated with a lower average MPC of 0.46 (out of the large income gain). Finally, the third row considers a policy that is all alike (i) except that the stimulus package is now funded by a tax increase for the top 4% as large as one month of their income, for an average disbursement of 6058€. As policy (iii) is funded by raising taxes rather than debt, it is not surprising that it has a smaller aggregate impact. Yet, because of the significant gap between the average MPCs at each end of the cash-on-hand distribution (i.e. 0.52 for transfers in the third column versus 0.31 for taxes in the fifth column), also policy (iii) would provide a significant stimulus to aggregate consumption, around 0.17%.[28]

In Panel B of Table 4, we consider a 1% GDP stimulus package. This makes it possible for the government: to pay one month income transfer to the bottom 41% (average payment of 997€) under policies (i) and (iii); to disburse one year income transfer to the bottom 27% (average payment of 4891€) under policy (ii); to levy one month income on the top 10% (average tax of 4618€) under policy (iii). The last column reveals that, also in Panel B, the payment of a smaller transfer to a larger share of disadvantaged families under policy (i) is associated with a larger increase in aggregate consumption than the payment of a larger transfer to a smaller pool of low cash-on-hand households. The gap between the effects of the two policies is now even larger, as the average MPC for the bottom 7% under policy (ii)

to 2018. Another example of a temporary and large income gain is the furlough scheme introduced in the UK as a response to the pandemic, paying up to 80% of the furloughed worker wage. In Italy, *cassa integrazione ordinaria* represents a large and temporary subsidy to furloughed workers.
In terms of salience of the large income changes, we note that about 14% of households in the sample experience either a doubling or a halving of their income from one survey to the next.

[28]While the hypothetical questions in the SHIW refer to income gains only, Christelis et al. (2019) find that affluent households report very similar MPCs across income gains and income losses of equal size.

and a 0.5% GDP stimulus package is 0.46 in Panel A, as opposed to 0.41 for the bottom 10% when the aggregate stimulus is 1% of GDP in Panel B. Similarly, it is still the case that redistributing resources from rich to poor citizens has a significantly positive net effect under policy (iii), though a comparison with Panel A reveals that the aggregate effect is smaller relative to the size of the stimulus package, as the average MPC of the top 10% households is higher in Panel B than the average MPC of the top 4% who are taxed under the 0.5% GDP package in Panel A.

The results in the top and middle panels are corroborated by simulating a larger stimulus package, of 2% of GDP, in Panel C. Smaller payments to a larger share of households with low cash-on-hand are more effective in boosting consumer spending, both in absolute terms and relative to the size of the stimulus package, than larger transfers in favour of a smaller share of poor families. Furthermore, extending payments to the bottom 64% and taxes to the top 26% makes policy (iii) less attractive relative to the 1% GDP fiscal intervention in Panel B (i.e. the gap between average MPCs now shrinks to $0.13 = 0.50 - 0.37$), though the net effect on aggregate consumption is still an economically significant 0.42%.

In Appendix J and the associated Table J.1, we further show that the distortionary effects of taxation on aggregate consumption are minimized by levying a smaller tax on a larger pool of affluent households rather than imposing a higher tax burden on a smaller group of top earners, with the relative advantage of the lower taxation peaking with a stimulus package equal to 2% of GDP. Finally, it is worth noting that the Ayiagari model —on its own— could generate the qualitative prediction that 'less is more' when it comes to transfer to (a larger share of) low income households. However, only the non-homothetic preference model seems able to generate the qualitative prediction that 'less is more' when it comes to (possibly heterogenous) taxation of (a larger share of) high income households.

In summary, the fiscal experiments simulated in this section suggest a simply policy lesson: 'less is more'. An economic stimulus payment of smaller size, targeted to a larger share of disadvantaged families would provide a stronger boost to aggregate consumption than a larger transfer towards a smaller share of poor households. While debt-financed interventions are associated with the largest aggregate impact, a higher tax hike for a smaller pool of very top earners has more detrimental effect on consumer spending than a lower tax increase levied on a larger pool of affluent households. It is still strongly the case, however, that a fiscal policy that redistributes resources from the top to the bottom of the income distribution would deliver an economically significant stimulus to the aggregate economy, but only as long as the amount transferred to and from each household is small relative to their resources.

7 Conclusions

What stimulate most consumer spending: small or large fiscal transfers? While academics and policy-makers have laid out theoretical arguments on both sides of the debate, the empirical evidence has been so far overlooked. In this paper, we address this important issue by exploiting a unique set of questions from the Italian SHIW that ask how much households would spend out of temporary and unanticipated income changes equal to one month and one year of their income.

Our main finding is that among households with low cash-on-hand, the MPC out of the smaller income gains is higher than the MPC out of the larger income gains. In contrast, among affluent families, the larger windfalls are associated with higher MPCs. We show that the behaviour of low-income households is consistent with the presence of borrowing constraints and idiosyncratic risk whereas the MPCs of high-income respondents across small and large income gains can be accounted for by a model with non-homotethic preferences and non-essential expenditure.

As for policy implications, our analysis suggests that —for a stimulus package of a given size— a smaller transfer paid to a larger pool of low-income households would have a significantly larger impact on aggregate consumption than a larger transfer paid to a smaller group of poorer families. In this specific sense, fiscal policy may achieve ‘more’ by doing ‘less’.

References

Agarwal, Sumit, and Wenlan Qian. 2014. "Consumption and Debt Response to Unanticipated Income Shocks: Evidence from a Natural Experiment in Singapore." *American Economic Review*, 104(12): 4205–30.

Aguiar, Mark A, Mark Bils, and Corina Boar. 2020. "Who Are the Hand-to-Mouth?" National Bureau of Economic Research Working Paper 26643.

AIPB-Censis. 2019. "Gli Italiani e la Ricchezza." Secondo rapporto AIPB-Censis.

Aiyagari, S Rao. 1994. "Uninsured idiosyncratic risk and aggregate saving." *The Quarterly Journal of Economics*, 109(3): 659–684.

Ampudia, Miguel, Russell Cooper, Julia Le Blanc, and Guozhong Zhu. 2018. "MPC Heterogeneity in Europe: Sources and Policy Implications." National Bureau of Economic Research Working Paper 25082.

Andreolli, Michele, Natalie Rickard, and Paolo Surico. 2024. "Non-Essential Business Cycles." Mimeographed, London Business School.

Aït-Sahalia, Yacine, Jonathan A. Parker, and Motohiro Yogo. 2004. "Luxury Goods and the Equity Premium." *The Journal of Finance*, 59(6): 2959–3004.

Attanasio, Orazio, Agnes Kovacs, and Patrick Moran. 2020. "Temptation and Commitment: Understanding Hand-to-Mouth Behavior." National Bureau of Economic Research Working Paper 27944.

Attanasio, Orazio, and Martin Browning. 1995. "Consumption over the Life Cycle and over the Business Cycle." *The American Economic Review*, 1118–1137.

Attanasio, Orazio, James Banks, and Sarah Tanner. 2002. "Asset holding and consumption volatility." *Journal of Political Economy*, 110: 771–792.

Banca d'Italia. 2015. "La Ricchezza delle Famiglie Italiane." Supplemento al Bolletino Statistico.

Banca d'Italia. 2020. "Relazione Annuale."

Barnichon, Regis, Davide Debortoli, and Christian Matthes. 2021. "Understanding the Size of the Government Spending Multiplier: It's in the Sign." *Review of Economic Studies*, Forthcoming.

Blundell, Richard, Martin Browning, and Costas Meghir. 1994. "Consumer demand and the life-cycle allocation of household expenditures." *The Review of Economic Studies*, 61(1): 57–80.

Boutros, Michael. 2021. "Bounded Intertemporal Rationality and the Marginal Propensity to Consume." *Mimeographed*, Duke University.

Browning, Martin, and Thomas F Crossley. 2000. "Luxuries are easier to postpone: A proof." *Journal of political Economy*, 108(5): 1022–1026.

Calvet, Laurent E, John Y Campbell, Francisco J Gomes, and Paolo Sodini. 2021. "The cross-section of household preferences." *Mimeographed, Harvard University, London Business School and Stockholm School of Economics.*

Cameron, A Colin, and Pravin K Trivedi. 2005. *Microeconometrics: methods and applications.* Cambridge university press.

Chetty, Raj, John N Friedman, Nathaniel Hendren, Michael Stepner, and The Opportunity Insights Team. 2020. "The Economic Impacts of COVID-19: Evidence from a New Public Database Built Using Private Sector Data." National Bureau of Economic Research Working Paper 27431.

Chetty, Ray, John Friedman, and Michael Stepner. 2021. "Effects of January 2021 Stimulus Payments on Consumer Spending." *Opportunity Insights Economic Tracker.*

Christelis, Dimitris, Dimitris Georgarakos, Tullio Jappelli, and Geoff Kenny. 2022. "Wealth Shocks and Portfolio Choice." Centre for Studies in Economics and Finance (CSEF), University of Naples, Italy.

Christelis, Dimitris, Dimitris Georgarakos, Tullio Jappelli, Luigi Pistaferri, and Maarten van Rooij. 2019. "Asymmetric Consumption Effects of Transitory Income Shocks." *Economic Journal*, 129(622): 2322–41.

Ciani, E., and R. Torrini. 2019. "The geography of Italian income inequality: recent trends and the role of employment." Banca d'Italia, Questioni di economia e Finanza 492.

Cloyne, James, Clodomiro Ferreira, and Paolo Surico. 2019. "Monetary Policy when Households have Debt: New Evidence on the Transmission Mechanism." *The Review of Economic Studies*, 87(1): 102–129.

Coibion, Olivier, Yuriy Gorodnichenko, and Michael Weber. 2020. "How Did US Consumers Use Their Stimulus Payments?" National Bureau of Economic Research.

Comin, Diego, Danial Lashkari, and Martí Mestieri. 2021. "Structural change with long-run income and price effects." *Econometrica*, 89(1): 311–374.

Cox, Natalie, Diana Farrell, Fiona Greig, Peter Ganong, Pascal Noel, and Arlene Wong. 2020. "Initial Impacts of the Pandemic on Consumer Behavior: Evidence from Linked Income, Spending, and Savings Data." *Brookings Papers on Economic Activity*, June.

Crawley, Edmund, and Andreas Kuchler. 2023. "Consumption heterogeneity: Micro drivers and macro implications." *American Economic Journal: Macroeconomics*, 15(1): 314–341.

Crossley, Thomas F, and Hamish W Low. 2011. "Is the elasticity of intertemporal substitution constant?" *Journal of the European Economic Association*, 9(1): 87–105.

Deaton, Angus. 1974. "A reconsideration of the empirical implications of additive preferences." *The Economic Journal*, 84(334): 338–348.

Deaton, Angus. 1992. *Understanding consumption.* Oxford University Press.

De Nardi, Mariacristina. 2004. "Wealth Inequality and Intergenerational Links." *The Review of Economic Studies*, 71(3): 743–768.

De Nardi, Mariacristina, and Giulio Fella. 2017. "Saving and wealth inequality." *Review of Economic Dynamics*, 26: 280–300.

De Nardi, Mariacristina, Giulio Fella, and Fang Yang. 2015. "Piketty's Book and Macro Models of Wealth Inequality." National Bureau of Economic Research Working Paper 21730.

Fagereng, Andreas, Martin Blomhoff Holm, and Gisle James James Natvik. 2021. "MPC heterogeneity and household balance sheets." *American Economic Journal: Macroeconomics*, Forthcoming.

Ferraro, Domenico, and Vytautas Valaitis. 2020. "Wealth and Hours." *Available at SSRN 3740240.*

Fortunato, Giustino. 1911. "Il Mezzogiorno e lo stato italiano: volume secondo." *Laterza, Bari*, 311: 312.

Fuster, Andreas, Greg Kaplan, and Basit Zafar. 2021. "What Would You Do with $500? Spending Responses to Gains, Losses, News, and Loans." *Review of Economic Studies*, Forthcoming.

Guvenen, Fatih. 2006. "Reconciling conflicting evidence on the elasticity of intertemporal substitution: a macroeconomic perspective." *Journal of Monetary Economics*, 53(7): 1451–1472.

Jappelli, Tullio, and Luigi Pistaferri. 2010. "The consumption response to income changes." *Annual Review of Economics*, 2: 479–506.

Jappelli, Tullio, and Luigi Pistaferri. 2014. "Fiscal Policy and MPC Heterogeneity." *American Economic Journal: Macroconomics*, 6(4): 107–36.

Jappelli, Tullio, and Luigi Pistaferri. 2020. "Reported MPC and Unobserved Heterogeneity." *American Economic Journal: Economic Policy*, 12(4): 275–97.

Johnson, David, Jonathan A Parker, and Nicholas Souleles. 2006. "Household Expenditure and the Income Tax Rebates of 2001." *American Economic Review*, 96: 1589–1610.

Kaplan, Greg, and Giovanni Luca Violante. 2014. "A Model of the Consumption Response to Fiscal Stimulus Payments." *Econometrica*, 82(4): 1199–1239.

Kreiner, Claus Thustrup, David Dreyer Lassen, and Søren Leth-Petersen. 2019. "Liquidity constraint tightness and consumer responses to fiscal stimulus policy." *American Economic Journal: Economic Policy*, 11(1): 351–79.

Krueger, Dirk, and Fabrizio Perri. 2006. "Does Income Inequality Lead to Consumption Inequality? Evidence and Theory." *The Review of Economic Studies*, 73(1): 163–193.

Kueng, Lorenz. 2018. "Excess sensitivity of high-income consumers." *The Quarterly Journal of Economics*, 133(4): 1693–1751.

Maestas, Nicole, Kathleen J. Mullen, David Powell, Till von Wachter, and Jeffrey B. Wenger. 2023. "The Value of Working Conditions in the United States and the Implications for the Structure of Wages." *American Economic Review*, 113(7): 2007–47.

Mas, Alexandre, and Amanda Pallais. 2019. "Labor Supply and the Value of Non-work Time: Experimental Estimates from the Field." *American Economic Review: Insights*, 1(1): 111–26.

Mian, Atif, and Amir Sufi. 2010. "Household Leverage and the Recession of 2007–09." *IMF Economic Review*, 58(1): 74–117.

Mian, Atif, Ludwig Straub, and Amir Sufi. 2020. "Indebted Demand." *Quarterly Journal of Economics*, Forthcoming.

Misra, Kanishka, and Paolo Surico. 2014. "Consumption, Income changes and Heterogeneity: Evidence from two fiscal stimulus programmes." *American Economic Journal: Macroconomics*, 6(4): 84–106.

Parker, Jonathan, and Nicholas Souleles. 2019. "Reported Effects versus Revealed-Preference Estimates: Evidence from the Propensity to Spend Tax Rebates." *American Economic Review Insights*, 1(3): 273–90.

Parker, Jonathan, Nicholas Souleles, David Johnson, and Robert McClelland. 2013. "Consumer Spending and the Economic Stimulus Payments of 2008." *American Economic Review*, 103(6): 2530–53.

Reis, Ricardo. 2006. "Inattentive consumers." *Journal of Monetary Economics*, 53(8): 1761–1800.

Romer, Christina D. 2021. "The Fiscal Policy Response to the Pandemic." *Brookings Papers on Economic Activity.*

Straub, Ludwig. 2019. "Consumption, Savings, and the Distribution of Permanent Income." Mimeographed, Harvard University.

Surico, Paolo, and Riccardo Trezzi. 2018. "Consumer Spending and Property Taxes." *Journal of the European Economic Association*, 17(2): 606–649.

Wiswall, Matthew, and Basit Zafar. 2017. "Preference for the Workplace, Investment in Human Capital, and Gender*." *The Quarterly Journal of Economics*, 133(1): 457–507.

Table 1: Summary statistics for households observed in both waves

	2010						2012					
	mean	p10	p25	p50	p75	p90	mean	p10	p25	p50	p75	p90
Cash-on-hand	53.72	10.00	17.80	30.82	56.55	104.00	52.62	9.00	16.16	27.41	51.44	104.21
Net disposable income	23.48	7.30	13.00	20.42	29.03	40.07	21.85	6.38	12.08	18.79	26.86	38.21
Financial assets	30.24	0.00	1.63	8.23	28.30	68.69	30.77	0.00	1.42	6.89	25.29	69.07
Male	0.57	0.00	0.00	1.00	1.00	1.00	0.54	0.00	0.00	1.00	1.00	1.00
Married	0.65	0.00	0.00	1.00	1.00	1.00	0.63	0.00	0.00	1.00	1.00	1.00
Years of education	9.35	5.00	5.00	8.00	13.00	17.00	9.52	5.00	5.00	8.00	13.00	17.00
Family size	2.53	1.00	2.00	2.00	3.00	4.00	2.47	1.00	1.00	2.00	3.00	4.00
Resident in the South	0.34	0.00	0.00	0.00	1.00	1.00	0.34	0.00	0.00	0.00	1.00	1.00
Unemployed	0.03	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
City size less then 20,000	0.28	0.00	0.00	0.00	1.00	1.00	0.28	0.00	0.00	0.00	1.00	1.00
City size 20.000-40,000	0.18	0.00	0.00	0.00	0.00	1.00	0.19	0.00	0.00	0.00	0.00	1.00
City size 40,000-500,000	0.47	0.00	0.00	0.00	1.00	1.00	0.46	0.00	0.00	0.00	1.00	1.00
City size larger than 500,000	0.07	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00
Marginal Propensity to Consume	0.47	0.00	0.10	0.50	0.80	1.00	0.44	0.00	0.10	0.50	0.70	1.00
Change in MPC: 2010 less 2012							0.03	-0.50	-0.30	0.00	0.35	0.60
Eating outside share							0.11	0.00	0.00	0.06	0.20	0.33
Change in cash-on-hand: 2010 less 2012							-8.49	-84.01	-39.71	-6.08	23.66	66.03
Observations	4524						4524					

Notes: The first 6 columns show 2010 data and the second 6 columns show 2012 data. Each variable is displayed with its mean and the 10th, 25th, 50th, 75th, and 90th percentiles. The exact same households are present in both years. Cash-on-hand, net disposable income, and financial assets are expressed in 2010 thousands of Euros. Cash-on-hand is the sum of disposable income and financial assets. Change in cash-on-hand is the log-real change from 2010 to 2012. Eating outside share is the share of food budget spent on food away from home. Marginal Propensity to Consume in 2010 represents the MPC out of a one month income transitory shock, in 2012 out of a one year income transitory shock. The change in MPC between 2010 less 2012 represents how much more a household would spend out of a one month shock rather than a one year shock.

Table 2: Baseline Tobit regression results

VARIABLES	(1) Small	(2) Large	(3) Diff	(4) Small	(5) Large	(6) Diff
I cash-on-hand decile	0.745***	0.394***	0.229***	0.651***	0.368***	0.184***
	(0.027)	(0.025)	(0.023)	(0.030)	(0.028)	(0.027)
II cash-on-hand decile	0.589***	0.393***	0.130***	0.546***	0.375***	0.116***
	(0.026)	(0.024)	(0.023)	(0.027)	(0.025)	(0.024)
III cash-on-hand decile	0.534***	0.359***	0.115***	0.519***	0.357***	0.109***
	(0.027)	(0.025)	(0.023)	(0.026)	(0.025)	(0.023)
IV cash-on-hand decile	0.515***	0.390***	0.086***	0.506***	0.381***	0.086***
	(0.025)	(0.024)	(0.022)	(0.025)	(0.024)	(0.022)
V cash-on-hand decile	0.499***	0.381***	0.080***	0.500***	0.381***	0.081***
	(0.026)	(0.024)	(0.022)	(0.025)	(0.024)	(0.022)
VI cash-on-hand decile	0.437***	0.369***	0.050**	0.440***	0.375***	0.049**
	(0.025)	(0.023)	(0.022)	(0.024)	(0.023)	(0.022)
VII cash-on-hand decile	0.365***	0.427***	-0.037*	0.389***	0.432***	-0.025
	(0.025)	(0.023)	(0.022)	(0.025)	(0.023)	(0.022)
VIII cash-on-hand decile	0.322***	0.412***	-0.058***	0.356***	0.425***	-0.044**
	(0.025)	(0.023)	(0.021)	(0.024)	(0.023)	(0.022)
IX cash-on-hand decile	0.289***	0.423***	-0.087***	0.333***	0.438***	-0.070***
	(0.025)	(0.023)	(0.021)	(0.025)	(0.023)	(0.022)
X cash-on-hand decile	0.270***	0.406***	-0.082***	0.306***	0.415***	-0.069***
	(0.025)	(0.023)	(0.021)	(0.026)	(0.025)	(0.024)
Age in[18,30]				-0.003	0.003	0.002
				(0.056)	(0.053)	(0.050)
Age in(30,45]				0.023	-0.018	0.032
				(0.025)	(0.024)	(0.022)
Age in(45,60]				0.067***	-0.019	0.057***
				(0.021)	(0.019)	(0.018)
Male				0.000	-0.016	0.009
				(0.018)	(0.017)	(0.016)
Married				-0.010	-0.016	0.009
				(0.022)	(0.021)	(0.019)
Years of education				0.005**	0.009***	-0.002
				(0.002)	(0.002)	(0.002)
Family size				0.003	-0.003	0.005
				(0.009)	(0.008)	(0.008)
Resident in the South				0.249***	0.137***	0.079***
				(0.018)	(0.017)	(0.016)
Unemployed				0.036	-0.008	0.025
				(0.048)	(0.045)	(0.043)
City size less then 20,000				-0.161***	0.122***	-0.188***
				(0.034)	(0.032)	(0.030)
City size 20.000-40,000				-0.162***	0.132***	-0.196***
				(0.035)	(0.033)	(0.031)
City size 40,000-500,000				-0.098***	0.091***	-0.128***
				(0.032)	(0.030)	(0.028)
Observations	4,524	4,524	4,524	4,524	4,524	4,524

Notes: Standard errors in parentheses. P-values correspond to: *** p<0.01, ** p<0.05, * p<0.1. All variables except cash-on-hand deciles are demeaned. Cash-on-hand is the sum of disposable income and financial assets. No constant is included. The last column also adds the real log change in household cash-on-hand between 2012 and 2010. All other controls are measured in 2010. The left hand side in columns 1 and 4 is the MPC out of a small (one month) shock, measured in the 2010 survey; in column 2 and 5 is the MPC out of large (one year) shock, measured in the 2012 survey; in columns 3 and 6 is the difference in MPCs, the MPC out of a small shock less the MPC out of a large shock. The sample consists of households present in both surveys.

Table 3: Tobit regression results with shares of non-essentials

VARIABLES	(1) Small	(2) Large	(3) Small	(4) Large	(5) Small	(6) Large
Eating outside share	-0.002	0.186***	0.228***	0.173***	0.116*	0.126**
	(0.060)	(0.054)	(0.060)	(0.055)	(0.061)	(0.058)
I cash-on-hand decile			0.755***	0.402***	0.675***	0.376***
			(0.027)	(0.025)	(0.031)	(0.029)
II cash-on-hand decile			0.597***	0.399***	0.556***	0.380***
			(0.026)	(0.024)	(0.027)	(0.026)
III cash-on-hand decile			0.542***	0.366***	0.527***	0.362***
			(0.027)	(0.025)	(0.027)	(0.025)
IV cash-on-hand decile			0.521***	0.395***	0.505***	0.387***
			(0.025)	(0.024)	(0.025)	(0.024)
V cash-on-hand decile			0.502***	0.383***	0.503***	0.384***
			(0.026)	(0.024)	(0.025)	(0.024)
VI cash-on-hand decile			0.437***	0.370***	0.444***	0.374***
			(0.025)	(0.023)	(0.024)	(0.023)
VII cash-on-hand decile			0.361***	0.424***	0.380***	0.433***
			(0.025)	(0.023)	(0.025)	(0.023)
VIII cash-on-hand decile			0.315***	0.407***	0.347***	0.421***
			(0.025)	(0.023)	(0.025)	(0.023)
IX cash-on-hand decile			0.281***	0.417***	0.322***	0.431***
			(0.025)	(0.023)	(0.025)	(0.024)
X cash-on-hand decile			0.258***	0.396***	0.292***	0.401***
			(0.025)	(0.023)	(0.027)	(0.026)
Observations	4,524	4,524	4,524	4,524	4,524	4,524
Demographic Controls	NO	NO	NO	NO	YES	YES

Notes: Standard errors in parentheses. P-values correspond to: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. All variables except cash-on-hand deciles are demeaned. Cash-on-hand is the sum of disposable income and financial assets. No constant is included in columns 3 to 6. Demographic controls are: age in[18,30], age in(30,45], age in(45,60], male, married, years of education, family size, resident in the South, unemployed, and the real log change in household cash-on-hand between 2012 and 2010. All other controls are measured in 2010. The left hand side in columns 1, 3, and 5 is the MPC out of a small (one month) shock, measured in the 2010 survey; in columns 2, 4, and 6 is the MPC out of large (one year) shock, measured in the 2012 survey. The sample consists of households present in both surveys.

Table 4: Fiscal experiments

Panel A - Stimulus Package equal to 0.5% of GDP

Policy Experiments	Average Transfer		Average Taxes		Aggregate
	Value(€)	MPC	Value(€)	MPC	Consumption
i) One month income to bottom 27% financed by debt	775	0.52	–	–	+ 0.43%
ii) One year income to bottom 7% financed by debt	3744	0.46	–	–	+ 0.37%
iii) One month income to bottom 27% funded by top 4% one month income	775	0.52	6058	0.31	+ 0.17%

Panel B - Stimulus Package equal to 1% of GDP

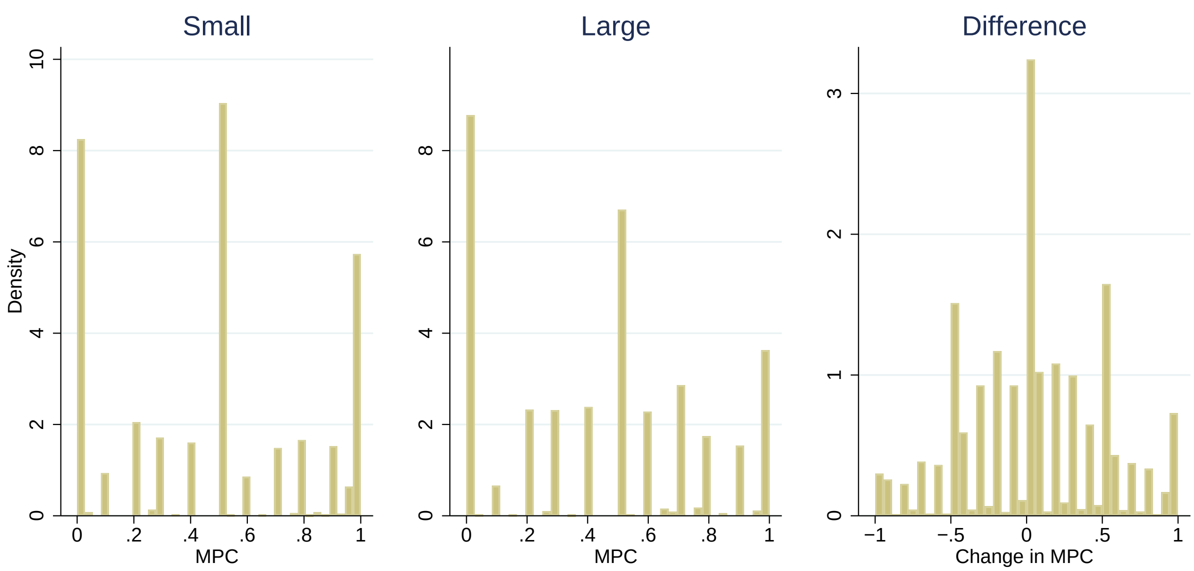
Policy Experiments	Average Transfer		Average Taxes		Aggregate
	Value(€)	MPC	Value(€)	MPC	Consumption
i) One month income to bottom 41% financed by debt	997	0.52	–	–	+ 0.85%
ii) One year income to bottom 10% financed by debt	4891	0.41	–	–	+ 0.68%
iii) One month income to bottom 41% funded by top 10% one month income	997	0.52	4618	0.35	+ 0.27%

Panel C - Stimulus Package equal to 2% of GDP

Policy Experiments	Average Transfer		Average Taxes		Aggregate
	Value(€)	MPC	Value(€)	MPC	Consumption
i) One month income to bottom 64% financed by debt	1290	0.50	–	–	+ 1.63%
ii) One year income to bottom 14% financed by debt	6284	0.44	–	–	+ 1.43%
iii) One month income to bottom 64% funded by top 26% one month income	1290	0.50	3385	0.37	+ 0.42%

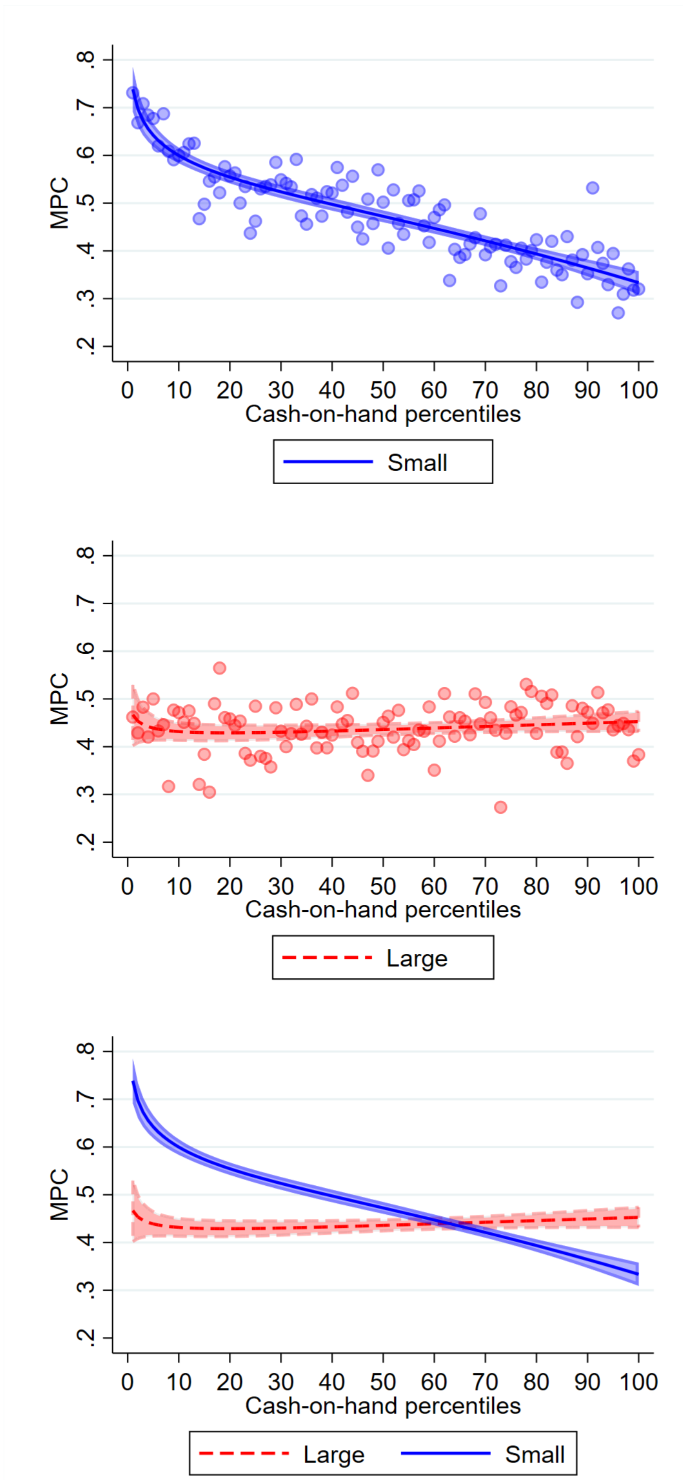
Notes: The aggregate stimulus package amount is constant in each panel. In the first and second rows of each panel, the transfer increase is financed by an increase in debt to GDP. The aggregate increase in tax revenues in the third row of each panel is, by construction, as large as the increase in debt to GDP under the debt financing scenarios. In first and third (second) rows of each panel, the transfer is equal to one month (year) of income for the households at the bottom of the cash-on-hand distribution as indicated in the first column. The average amount of the transfer is specified in the second column and the average MPC resulting from this transfer is specified in the third column. In the third row of each panel, the tax disbursement is equal to one month of income for households at the top of the cash-on-hand distribution as indicated in the first column. The average tax payment is presented in the fourth column, and the resulting average MPC is in the fifth column. All variables are weighted by the population weights to be representative of the Italian population. Cash-on-hand is the sum of disposable income and financial assets. In the first and second rows of each panel, the change in aggregate consumption is computed as the ratio between the sum of the spending increases by the households who received a transfer and the level of total aggregate consumption by all households. In the third row of each panel, the change in aggregate consumption is net, as the (negative) change in spending for the households who paid more taxed is subtracted from the (positive) change in spending for the households who received a transfer.

Figure 1: MPC distribution out of a one year and one month shock



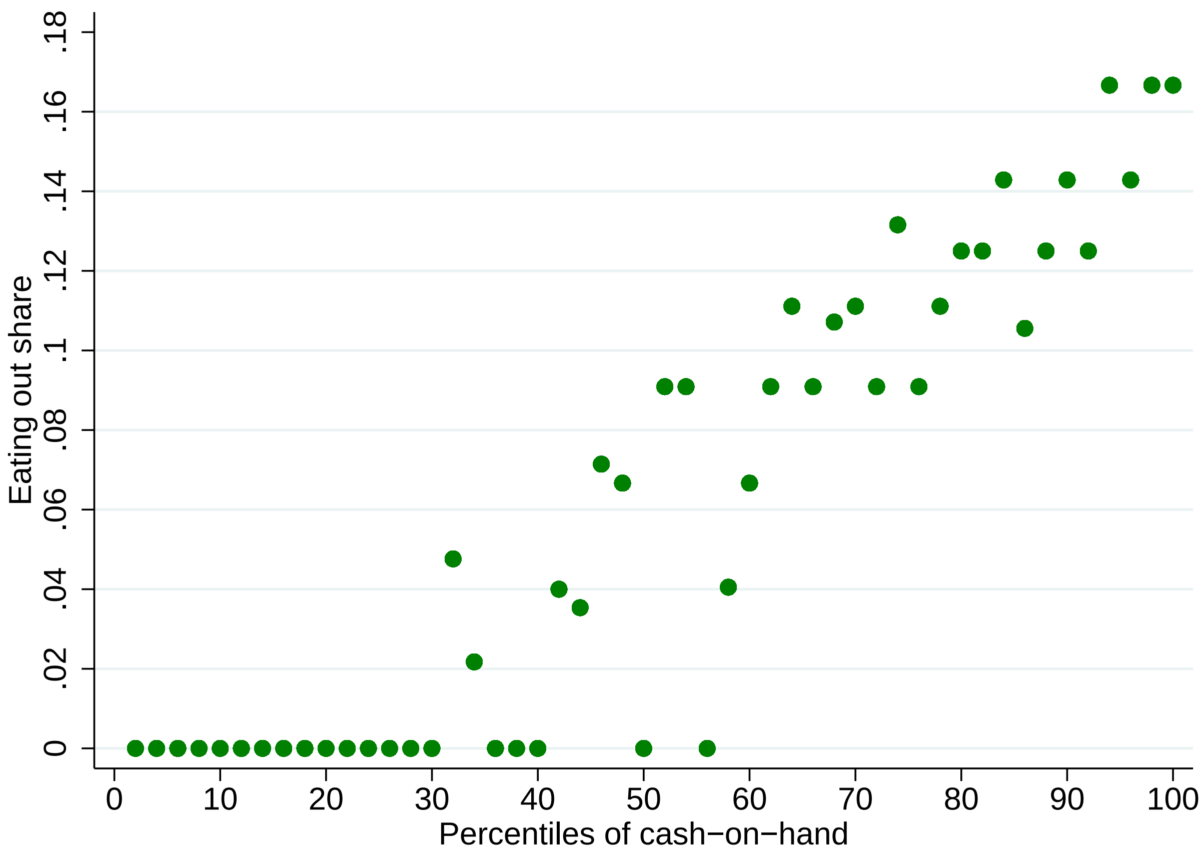
Notes: The small shock MPC (one month gain, in the first panel) comes from the 2010 SHIW wave and the large shock MPC (one year gain, in the second panel) from 2012. The difference is the small gain MPC less the large gain MPC. Only households who are present in both years are included.

Figure 2: The distribution of MPC by cash-on-hand percentiles for small income gains (in blue) and large income gains (in red)



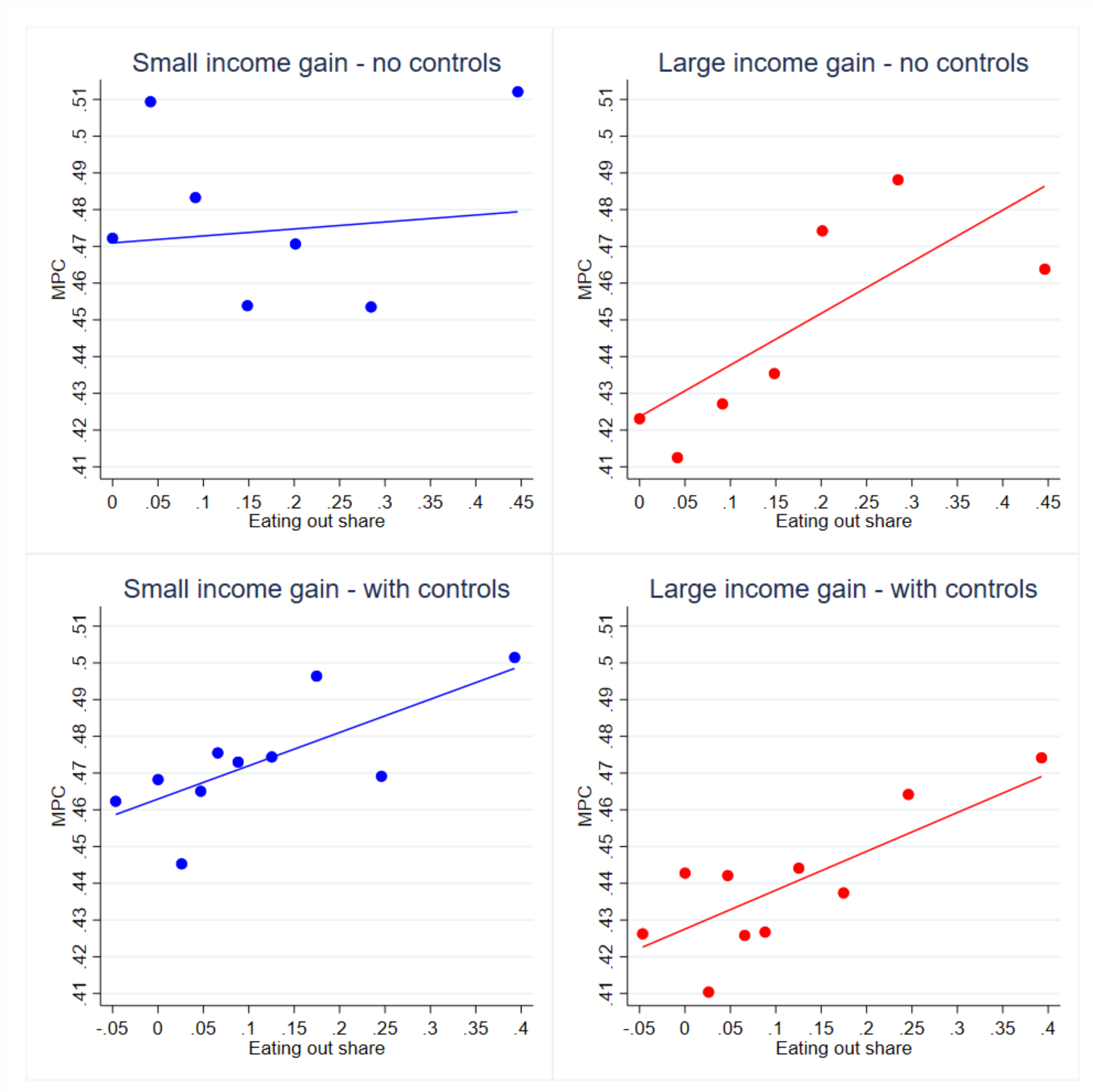
Notes: The plot shows the MPC by each cash-on-hand percentile in 2010 and fit a fractional polynomial with 95% confidence bands based on the percentile bins. The first panel plots the MPC out of a small gain, the second one out of a large gain, the third one plots both fractional polynomials together. Cash-on-hand is the sum of disposable income and financial assets.

Figure 3: Non-essential spending and cash-on-hand



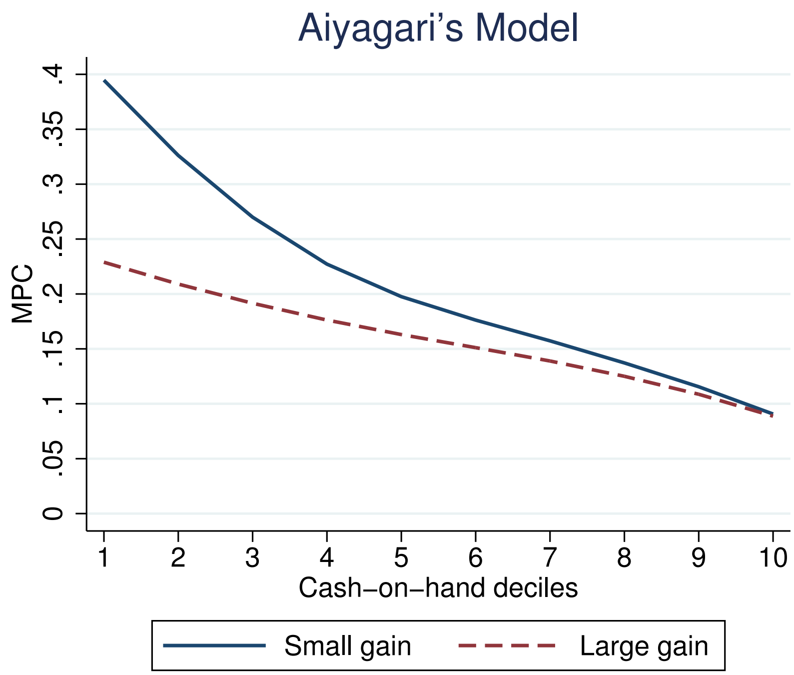
Notes: The plot shows 50 equal sized bins of cash-on-hand in 2010 and presents the median for eating out share for each bin. Each bin corresponds to 2 percentiles. Eating out share is the share of food expenditures made outside from home over total food expenditures, measured in 2012. Cash-on-hand is the sum of disposable income and financial assets.

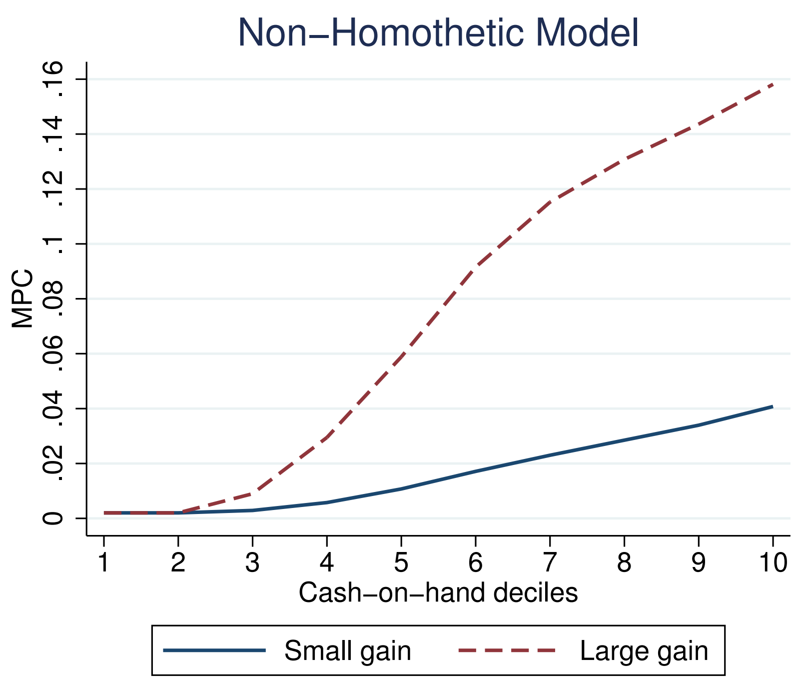
Figure 4: MPC and non-essential spending



Notes: In this plot we relate eating out share (the share of food expenditures made outside from home over total food expenditures, measured in 2012) with different measures of the MPC. The first row of the plot shows the result from a binscatter with 10 bins on the MPC out of a small gain (first panel) and out a large shock (second panel) unconditionally without controls. The second row performs the same exercise with controls for cash-on-hand deciles and demographics characteristics. The first row displays 7 points as many households have an eating out share equal to zero. All controls are demeaned and are measured in 2010. Demographic controls are: age in[18,30], age in(30,45], age in(45,60], male, married, years of education, family size, resident in the South, unemployed, and the real log change in household cash-on-hand between 2012 and 2010. Only households who are present in both years are included. The lines are OLS regression lines.

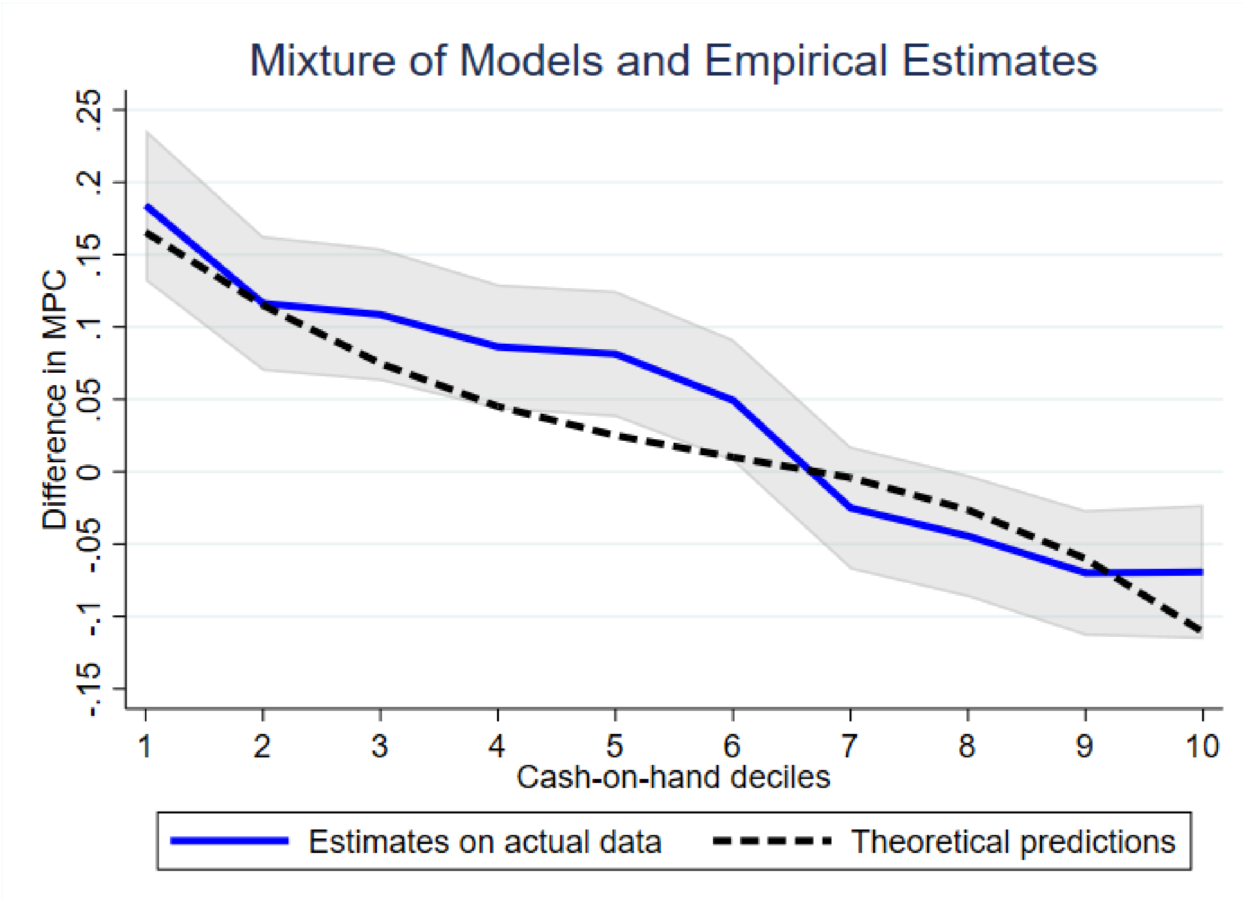
Figure 5: MPC out of large income gains (in red, one year) and small income gains (in blue, one month) in the theoretical models





Notes: The upper panel plots the MPCs from a Aiyagari model, the lower panel plots the MCPs from the non-homothetic model. Both panels show the MPCs out of a small (one month, in blue) and of a large (one year, in red) temporary income shocks. Each line is plotted with a lowess smoother. The x-axis moves along the theoretical counterpart to the empirical cash-on-hand distribution for 2010. The detailed explanation of this mapping for both model is described in Section 5.

Figure 6: MPC differences across shock size by cash-on-hand deciles — models and estimates.



Notes: The MPC differences are calculated as the difference between the MPC out of the small gain (equal to one month of income) less the MPC out of the large gain (equal to one year of income). The empirical estimates and the 95% confidence interval refer to the Tobit regression displayed in column 6 of Table 2 and represent the marginal effects of the deciles of cash-on-hand on the latent uncensored MPC difference controlling for demographic characteristics. The theoretical predictions are obtained combining the quantitative results of the models with borrowing constraints and non-homothetic preferences about the MPC difference for shocks of size equal to one month and one year of income, respectively. The models are mixed such that the probability that the observed spending behaviour is generated by the non-homothetic preference model in each decile of the cash-on-hand distribution is equal to the average individual cash-on-hand of that decile over the average in the tenth decile.

ONLINE APPENDIX

A Survey Questions

The question asked for the one month temporary shock in the SHIW wave of 2010 is:

> *Suppose you suddenly receive a reimbursement equal to how much your household earns in one month. Which part of this sum would you save and how much would you spend? Give the percentage that would be saved and the percentage what would be spent.*

Notice that the sum of both percentages must add to 100 in order to enforce consistency.

The question asked for the one year temporary shock in the SHIW wave of 2012 is:

> *Suppose you receive an unexpected inheritance equal to how much your family earns in one year. In the next 12 months, how would you use this unexpected sum? Consider 100 to be the total, divide it in these three types of possible uses:*
>
> - *Amount saved for future expenses or to repay debts*
> - *Amount used within the year in goods or services that last in time (precious items, cars or other transport means, home renovation, furniture, dentist, et cetera) that otherwise you would not have bought or that you were waiting to buy*
> - *Amount used within the year in goods or services that do not last in time (food expenses, clothing, travel, vacations, etc) that usually you would not have bought*

We calculate the MPC in this question by summing the durable and non durable purchases. All expenses must add to 100. We do a number of sensitivity checks in Section **??** to ameliorate concerns regarding the different wordings between the different questions. To construct the measure of non-essential consumption we take the spending in food consumed at home and away from home and construct the share of food spending on food away from home. The two questions are:

> *What was the average monthly expense for food consumption only at home? Consider the expense for food staples in supermarkets and similar establishments.*
> *Average monthly expense for food consumption at home ___€per month in 2012*

> *What was the average monthly expense for food consumption only away from home? Consider the expense for meals eaten regularly away from home.*
> *Average monthly expense for food consumption away from home ___€per month in 2012*

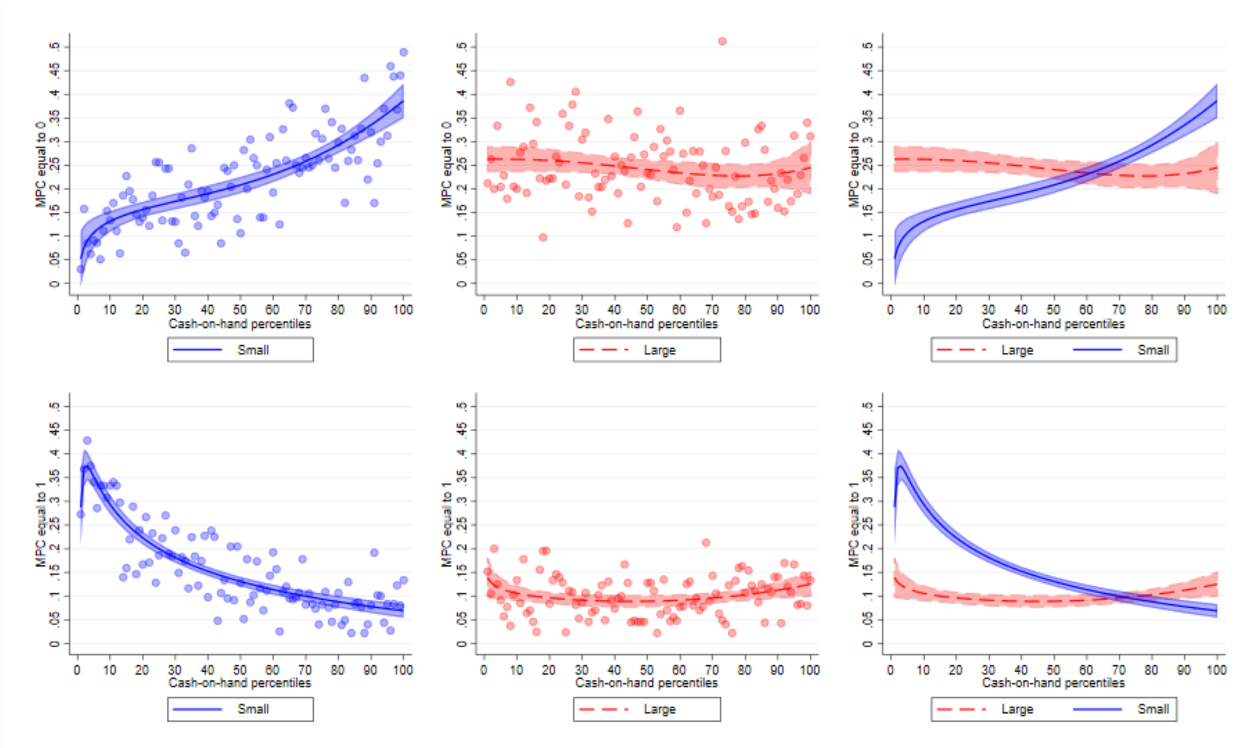
B Further empirical results

In this Appendix, we present additional empirical results on our MPC measures.

Extensive margins. In Figure B.1, we present the shares of households with MPC equal to zero (top panels) and with MPC equal to zero (bottom panels) along the cash-on-hand distribution for both small and large shocks. This figure is the counterpart of Figure 2. The first column reveals that both extensive margins help to explain the response to small shocks: among poorer households, the fraction of households spending nothing is low, about 10%, the share of those spending all is large, around 35%. The opposite pattern appears among affluent households, with a large share (up to 50%) spending nothing and a small share spending everything (about 10%). On the other hand, we do not find a particular pattern on the extensive margin for the large shock in the second column. That is, the fraction of household spending nothing or everything is constant across the cash-on-hand distribution. If anything, it is interesting to note a slightly higher fraction of households spending everything at the top of the distribution, in line with the non-homothetic preference model. As it is the case for the MPC values in Figure 2, the two lines for shocks of different size cross: the number of affluent households that spend nothing out of the large shock is lower than its small shock counterpart. Similarly, we note a larger fraction of affluent households who spend everything out of the large shock. These results point to the fact that the extensive margins in MPC responses behave similarly to the overall response.

Intensive margin. Figure B.2 presents the complementary analysis to Figures 2 and B.1 for the intensive margin of MPC responses. It plots the average MPC conditioning on the answer being strictly greater than zero. The first panel plots the MPC out of a small (one month) shock, the second out of a large (one year) shock, and the third plots the fitted line of both MPCs together for comparison. The chart reveals that for a small shock, low cash-on-hand households exhibit a high MPC, almost 0.8 for the first decile. The MPC declines up to 0.53 for households with the highest cash-on-hand. On the other hand, the MPC out of a large shock does not vary much across the liquid wealth distribution, hovering around 0.59. The main result in Figure 2 carries through when conditioning to strictly positive MPCs:

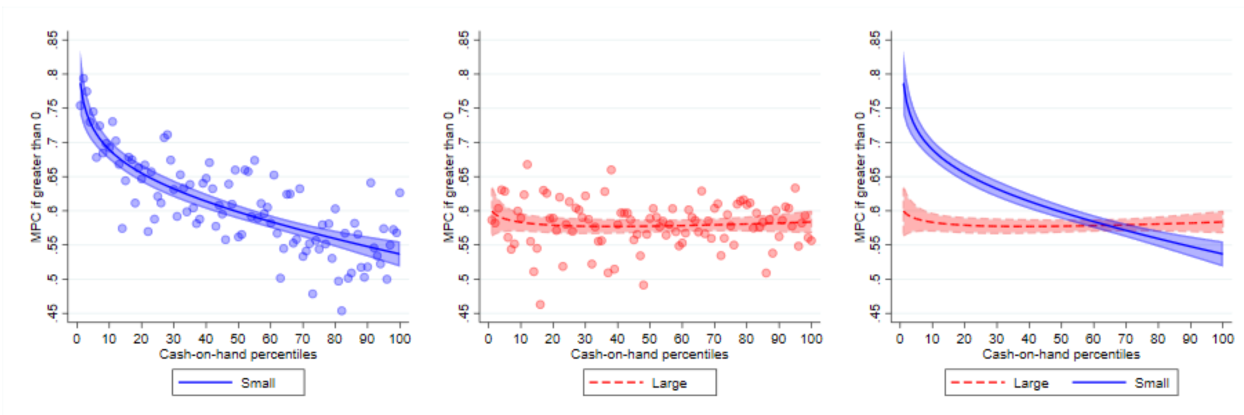
Figure B.1: The distribution of MPC equal to 0 or 1 by cash-on-hand percentiles for small income gains (in blue) and large income gains (in red)



Notes: The plot shows the proportion of MPC equal to 0 and 1 by each cash-on-hand percentile in 2010 and fit a fractional polynomial with 95% confidence bands based on the percentile bins. Cash-on-hand is the sum of disposable income and financial assets. The first column plots the MPC out of a small gain, the second one out of a large gain, the third one plots both fractional polynomials together. The first row plots the results for the fraction of MPCs being equal to 0 and the second row for being equal to 1. The sample consists of households present in both surveys.

poor households have a higher MPC out of the small shock while the opposite is true for rich households. In particular, among affluent households, the $MPC|MPC > 0$ increases with the shock size, consistent with a model with non-homothetic preferences and non-essential spending. This compares favourably with theories of non-convex adjustment costs, which predict that, conditional to a positive response, the MPC should decrease with shock size, independently of household resources.

Figure B.2: The distribution of MPC conditioned on the MPC being greater than 0 by cash-on-hand percentiles for small income gains (in blue) and large income gains (in red)



Notes: The plot shows the average MPC conditioned on the MPC being strictly greater than 0 by each cash-on-hand percentile in 2010 and fit a fractional polynomial with 95% confidence bands based on the percentile bins. Cash-on-hand is the sum of disposable income and financial assets. The first column plots the MPC out of a small gain, the second one out of a large gain, the third one plots both fractional polynomials together. The sample consists of households present in both surveys.

C MPC across U.S. economic payments of different size: April 2020 versus January 2021

Our empirical results are based on questions asked to a representative sample of Italian households about their spending under hypothetical scenarios that vary the size of their income gain. A possible concern is that our estimates may not apply to the actual spending decisions of families in other countries. While it is always hard to ameliorate external validity concerns of this kind, we report here the estimates on actual spending by Chetty, Friedman and Stepner (2021) about the MPCs of American households along the income distribution for payments of different sizes.

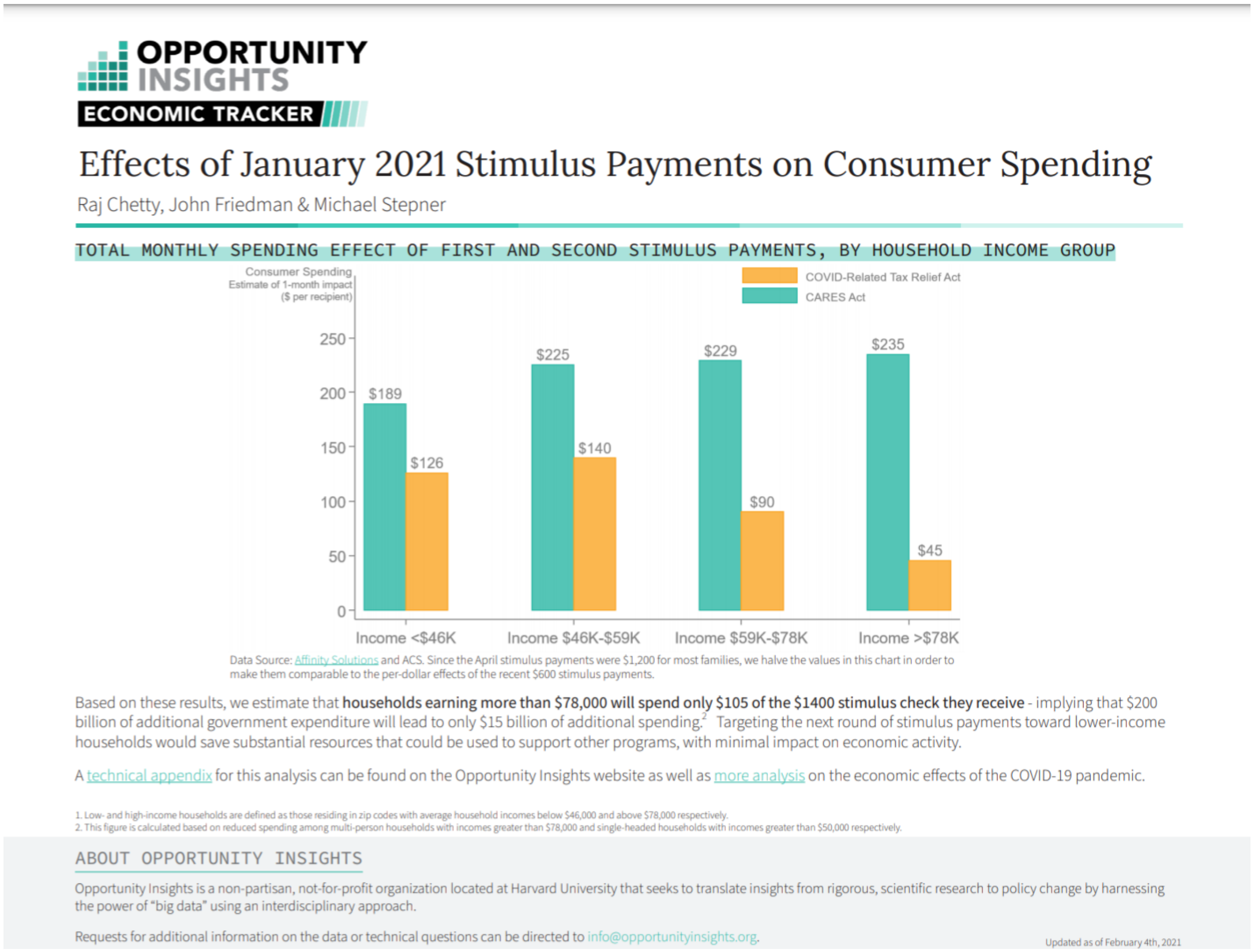
The two temporary income shocks refer to the economic payments disbursed by the U.S. government in April 2020 as part of the CARES Act and in January 2021 through the COVID-related Tax Relief Act, respectively. The size of the April 2020 payment (in green in Appendix Figure C.1) was around 1200$ per household while the one of January 2021 (in yellow) was about 600$. The vertical axis reports the average amount spent out of each payment, normalized by its amount for comparability across shock size. The horizontal axis refers to different income groups, from lowest to highest. A main result of the analysis in Chetty, Friedman and Stepner (2021) is that, consistent with our empirical findings, the MPC tends to decrease with income when the gain is small but it increases with income when the gain is large. Furthermore, also among affluent households in the U.S., the MPC out of the larger gain (of April 2020) is significantly larger than the MPC out of the smaller gain (of January 2021).[29]

Admittedly, this comparison can only be suggestive and it is worth mentioning two caveats. First, the evidence in Chetty, Friedman and Stepner (2021) hints that the MPC may not vary significantly with shock size among poor American families, while we document a larger MPC out of the smaller gains among Italian households with low cash-on-hand.

[29] As detailed in Section II.A and Appendix B of Chetty et al. (2020), their evidence on MPC heterogeneity out of the April 2020 U.S. payments is based on daily national consumer spending series constructed using Affinity Solutions Inc, an aggregator of consumer credit and debit card data capturing nearly 10% of debit and credit card spending across U.S. zip codes. Chetty, Friedman and Stepner (2021) show that their estimated MPCs across zip code income groups align remarkably well with the MPC heterogeneity on household-level spending documented by Cox et al. (2020) using high-frequency household-level bank account data.

Second, the larger gain in our sample is 12 times as large as the smaller gain whereas the ratio of the two U.S. ESPs is only about 2. While it is hard to identify what size of income gain may trigger a different spending behaviour on actual data, we interpret our evidence as potentially indicative of a broader pattern across shocks of different size and conjecture that the large gain difference simulated in the SHIW questions has probably been instrumental to elicit a different spending behaviour under the hypothetical scenarios, for which is key that the same household clearly understands that one shock is significantly larger than the other.

Figure C.1: MPC differences across U.S. economic payments of different sizes.



Notes: Full description of the data, research design and estimates in Chetty, Friedman and Stepner (2021) can be found here: https://opportunityinsights.org/wp-content/uploads/2021/02/secondstimulus_tech_appendix.pdf

D Sensitivity Analysis

In this Appendix, we assess the sensitivity of our empirical findings to a wide array of robustness exercises.

Extended samples summary statistics. Table D.1 displays the same summary statistics as in Table 1 expect that here we do not restrict the sample to only households whom we observe in both waves. Rather, we focus on all respondents in each wave, independently on whether they also participated in the other wave. A comparison of the means and distributions across the two tables reveals that the characteristics of the households in the restricted sample are very similar to those in the full sample.

Durables vs non-durables. Of independent interest is whether our results may be driven by a specific sub-category of spending. Unfortunately, the question about non-durables and durables was only asked in the 2012 wave and therefore in this section we will be able to report results only for the case of large shocks. In Figure D.1, we present the MPC distributions by cash-on-hand percentiles. The first panel reproduces the MPC for total expenditure as in the second panel of Figure 2. The second (third) panel shows the MPC only for non-durable (durable) expenditure. The chart shows that the average MPC out of durables is higher than for non-durables, with the former hovering around 0.26 and the latter around 0.19. Furthermore, the overall patterns in each sub-categories is similar to the one for total spending: the MPC does not vary much with cash-on-hand and, if anything, it mildly increases along this distribution.

The split between durable and non-durable spending can also be used to gauge our mechanism with non-homothetic preferences if durable expenditures are more tilted towards non-necessities than durable expenditures. To this aim, we first establish that durable spending is a good proxy of non-essential spending. in Figure D.2, we show how the probability of having positive spending on durables is positively related to the cash-on-hand distribution, in a parallel to Figure 2 for eating out share. Moving from the lowest percentiles of cash-on-hand to the highest ones, we move from a probability of about 25% to above 60%.[30] Having

[30]The SHIW asks for durable purchases as valuables, cars, other means of transport, furniture, furnishings,

established that durable spending can used as a further proxy for non essential spending, we now turn to see if it can have an effect on MPCs. In Table D.2, we show two sets of regressions that are parallel to Table 3. In columns 1 to 4 we show how the dummy that takes value one for durable spending is related to MPCs unconditionally. In columns 4 to 8 we do the same regressions with cash-on-hand deciles and demographic controls. The MPCs we explore pertain to the 2012 question for large gains, as it has the split between durables and non-durables. Columns 1 and 5 use the total MPC used in the main specifications. Columns 2 and 6 present the results for the MPC on non-durables. Columns 3 and 7 show the results for the MPC on durables. Finally, columns 4 and 8 present the results for the difference of these MPCs: durables MPC less non-durable MPC.

First of all, we can see that households who spend on durables have higher MPCs, with similar point estimates irrespective of whether we include or not controls. The total expenditure MPC is 0.058 higher for those who spend on durables (column 5). We can see this pattern especially for the MPC on durables, there the durables MPC is 0.046 higher for those who spend anything on durables. The non-durables MPC is also higher for those how spend on non-durables, but less so in terms of magnitudes. This implies that the difference between the two MPCs is positive at 0.018, although not strongly significant. This exercise shows that we can use durable expenditures as an additional proxy for non-essential expenditures and that results are particularly important for the MPCs of durables spending.

Understanding the questions. A potential problem with survey data is that households might misinterpret the question they are asked. A benefit of the SHIW is that at the end of each questionnaire the interviewer must assess what he or she judges to be the general level of understanding of the interviewee. The SHIW asks the interviewer *what is your judgment on the level of comprehension of the questions by the interviewee?* on a scale from 1 to 10, with 1 being the worst level of understanding and 10 the maximum. Armed with this useful feature of the SHIW, we rerun the specifications of the last three columns of Table 2, conditioning on households who have a very good understanding the the questions, as measured by a grade at least as high as 8. The first three columns of Table D.3 present the results of this exercise.

household appliances, and sundry equipment. We take a value of one is a household has purchased any durable.

Column 3 mirrors column 6 of Table 2: it shows the coefficients on the decile of cash-on-hand in a regression where the dependent variable is the difference in MPCs between a small and large shock and the controls include demographic variables as well as the change in log real cash-on-hand between 2012 and 2010. The results are very similar to the baseline in Table 2, if not stronger for the top deciles of cash-on-hand distribution.

Financial literacy. A related question is whether households may struggle with some of the questions because they are not financially literate. Here again, we benefit from the richness of the SHIW questionaire. In the 2010 wave, the interview contains three questions on financial literacy. The questions check if the interviewee understands the difference between a fixed or variable rate mortgage, the effect of inflation on savings, and the effects of diversification on risks. In the next exercise, we condition on households who answered correctly to at least two of these questions. Columns 4 to 6 of Table D.3 presents the results with this cut of the data. The specifications are the same as in the previous three columns of Table 2. In column 6, we note that also among financially literate households it emerges the same pattern that we have documented for unrestricted sample: poorer households exhibit a higher MPC out of the small shock (a difference of 0.19 in the first decile), whereas the opposite is true for affluent household (a difference of -0.07 in the highest decile of cash-on-hand). These are comparable with values of 0.18 and -0.07 we have obtained in the baseline specification of Table 2 column 6.

Household debt. Two potential issues regarding our results concern the role of household debt. First of all, the literature on the wealthy hand-to-mouth points to the fact that households with high level illiquid wealth (e.g. mortgage debt) can display high MPCs. It is worth noting that the wealthy hand-to-mouth mechanism cannot explain our main results as this theory predicts a higher MPC out of the smaller shocks. The reason is that a bigger shock makes it more likely to overcome the cost of portfolio rebalancing and thus leads to a reoptimization of the household consumption plans. The second reason for excluding debtors pertains to the wording of the survey questions that elicit the MPC. In the 2010 wave (for a one month shock), the question asks the fraction of the disbursement that would be spent and that would be saved. On the other hand, in the 2012 wave (for a one year shock), the question makes explicit that saving includes also repaying debts.[31] One might worry that households did not fully understand that in the 2010 question saving included also debt repayments. To ameliorate this concern, we run our baseline regressions excluding households who have any debt. It is useful to point out that relatively low share of households have debt in Italy: in our main regression sample, this is around a quarter. Columns 7 to 9 of Table D.3 present the results conditioning on household with no debt. The specification is the same as the columns 4 to 6 of Table 2, that is, we include demographic controls and the log real change in cash-on-hand between 2012 and 2010 in the regression with the difference in MPCs as dependent variable. Excluding debtors does not alter our main results.[32] Households on the first and second cash-on-hand deciles exhibit a higher MPC out of the small shock than out of the large one, with 0.19 and 0.12 point estimates, respectively (these compare to 0.18 and 0.11 in column 6 of Table 2). At the other side of the liquid wealth distribution, households in the ninth and tenth deciles exhibit a value for the difference in MPC of −0.09 and −0.05, respectively (these compare to −0.07 and −0.07 in column 6 of Table 2). We can conclude that the presence of wealthy hand-to-mouth or any possible misunderstanding of the question on debt repayments does not affect our conclusions.

Heterogeneity in risk-aversion and discount factor. Households differ in many ways and one important dimension if their tolerance for risk and discount factor. This is important in our context as this preference heterogeneity can be related to the MPCs and horizons of households and it could potentially alter our conclusions. Moreover, the time horizon for spending out of the large shock is one year, no spending reference period is specified in the question about the one month income gain. Therefore, households with higher discount factor and higher risk aversion could be more likely to interpret the 2010 question on the small shock as pertaining to a shorter horizon than a year. While we do find that risk aversion and the discount factor are related to affluence levels and to MPC the overall results on the relationship between cash-on-hand and the MPC of different sizes remain present and strong. We measure risk aversion and impatience with two dummy variables which take

[31] The framing for the amount saved is: *Amount saved for future expenses or to repay debts.*

[32] As an additional experiment, we tried to control for whether an household has debt rather than excluding debtors and the results are very similar to the baseline presented in Figure 2. They are available upon request.

value one for more risk averse households and more impatient households, respectively. In Figure D.3, we show how cash-on-hand varies with the two measures risk aversion. We show the share of households who are risk averse and impatient by decile of cash-on-hand and plot a fit linear of these shares. Poorer households are more risk averse and more impatient. Both measure decline strongly with cash-on-hand. More than 55% of households are risk averse by our measure at the first decile of cash-on-hand, whereas less than 30% are among the richest households. Table D.4 presents the counterpart of Table 2 with these controls. Specifically, we replicate columns 4 to 6 of Table 2 in 3 sets. Columns 1 to 3 add the control for risk aversion, columns 4 to 6 add the control for impatience, and columns 7 to 9 add both controls in the same regression. First of all, notice that more risk averse households have a lower MPC, in line with the predictions of a non-homothetic model with risk: households who have their necessities covered are less risk averse and have a higher MPC. Furthermore, notice how the effect is negative for both MPCs, but is higher for the large shock. Turning to impatience, we can see how more impatient households have a higher MPC for a small shock. The coefficient for the large shock is insignificant. By looking at columns 3, 6, and 9 we can see how our results on the differential response of rich to poor people to shocks of different magnitude: poor people have a higher MPC out of a small shock, whereas the opposite is true for rich households. Table D.5 presents the same results as Table 2 where we condition on households who are not very risk averse or very impatient. Again, we replicate columns 4 to 6 of Table 2 with the two different cuts. In columns 1 to 3 we condition on households who do not exhibit high risk aversion and in columns 4 to 6 we condition on those households who do not exhibit high impatience. In line with the results of Table D.4, both the small and large MPCs are lower for these households, either with low risk aversion in columns 1 and 2 or with low impatience in columns 4 and 5. More interestingly in this experiment, the difference in MPCs exhibit a similar behavior to the overall sample. For the case of no high risk aversion in column 3, the difference goes from 0.17 in the first decile to -0.07 in the highest decile. Similarly, for no high impatience in column 6 the difference goes from 0.16 to -0.09. Both these results are quite close with 0.18 to -0.7 in the baseline regression in column 6 of Table 2. This implies that it is unlikely that the question of a small shock has a significantly different reference period than the question of a large shock. If it were the case, one would have expected to see a change in the difference between responses, when we condition on households who are more likely to have a longer reference period (the ones without high risk aversion or high impatience).

Errors non-normality. In the baseline specification of Table 2, we used a Tobit estimator as the MPC variable is censored from below, at 0, and from above, at 1, and the change in MPC variable is censored at -1 and 1. However, the Tobit model relies on the error being normal and homoskedastic for the estimates to be consistent. For this reason, Table D.6 shows the same specification as in Table 2, except that we use OLS with heteroskedasticity robust standard errors. It is reassuring that the results are almost identical to the Tobit case. In the sixth column, where we regress the change in MPC across the two shocks with the deciles of cash-on-hand and with all the controls we can see how from the 8^{th} decile the difference is negative and statistically significant. We move from a difference of 0.17 for the first decile and arrive to -0.07 for the tenth. This compares to coefficients in the same specification that move from 0.18 to -0.07 from the first to the tenth decile with the Tobit estimator. As a side note on coefficient interpretation, with the Tobit estimator the coefficients can be directly interpreted as marginal effects on the latent variable (here the difference in MPC if it were not censored). Therefore, a 0.18 coefficient for the first decile implies that the poorest household have an uncensored MPC 18% higher for small shocks than for large shocks. This is what a researcher is actually interested when interpreting results and when comparing the reduced form estimates with structural models that do not embed censoring. Furthermore, if one were interested in the marginal effects on the censored variable (here the observed censored difference in MPC), for a specific household, we would be scaling all coefficients by the same factor depending on the probability of being at the cutoffs. This implies that we would not be able to interpret directly the absolute magnitude of each coefficient, but we can still interpret the sign, the significance, and, most importantly, the relative magnitude of the different coefficients directly.[33]

Income versus financial wealth. Cash-on-hand conveniently summarizes financial resources readily available to households. As it is constructed by summing income and financial

[33] For a textbook treatment see chapter 16 of Cameron and Trivedi (2005).

assets, it is interesting to study separately the role of each component. This is relevant, as in a recent paper, Crawley and Kuchler (2023) show on Danish data that liquid wealth is a stronger predictor than income for the cross-section of MPCs out of small income gains. To study separately the role of financial assets and income, we proceed with a two way crossing between the two variables: conditioning on each financial asset quintile, we study the MPCs across each income quintile; and vice-versa, conditioning on each income quintile, we study the MPCs across each financial asset.[34] In Table D.7, we show the results of this experiment. The top panel shows the MPC out of a small shock, the middle panel reports the MPC out of a large shock, and the bottom panel displays the difference. In columns 1 to 5, we condition on each financial asset quintile while in columns 6 to 10 we control for each income quintile. A few results stand out. First, for the small shock MPC, we corroborate the result in Crawley and Kuchler (2023): most of the variation in MPCs occurs across financial asset quintiles conditioning on a given income quintile. In other words, a household with more financial assets has a lower MPC out of a small income shock than a household with less financial assets, even if they belong to the same income bin (columns 6 to 10 in the top panel). However, our results also show a role for income, especially for the large shock. Columns 1 to 5 in the middle panel reveal that conditioning on a given financial asset quintile, a household with more income has a higher MPC out of a large shock. We find this result consistent with our non-homothetic preferences explanation as income might be a better proxy for lifetime wealth than financial assets. Finally, when we look at the difference across MPCs in the bottom panel, we find that both dimensions of income and financial assets are important: the top left corner (low income/low financial assets) exhibit positive coefficients, whereas the bottom right corner (high income/high financial assets) display negative point estimates.

Extended samples - all households present in each wave. We address issues related to the sample selection in Table D.8, where we present results for a Tobit regressions on the whole sample for both MPCs. In odd columns we regress the MPC out of a one month shock measured in 2010 on the cash-on-hand deciles and the demographic controls measured in 2010 for all households present in the SHIW in 2010 for whom we have data. Similarly,

[34]We report each of the two splits because both sets of regressions include demographic controls, and we want to make sure that the choice of the conditioning variables is not driving our results.

in even columns we perform the same regressions on the MPC out of a one year shock measured in 2012 with controls measured in 2012 for all households present in the SHIW in 2012 for whom we have data. This set of regressions does not allow to compare directly for the same household what they responded to the two different questions, but allows us to see if households present in both samples responded differently to the overall population. First of all, we see a negative slope for the small shock from the first to the tenth decile of cash-on-hand both without (column 1) and with (column 3) controls. The magnitudes are similar to those in Table 2, we move from 0.74 to 0.28 without controls here and from 0.74 to 0.27 in the restricted sample and with controls from 0.65 to 0.31 here and from 0.65 to 0.31 in the restricted sample. Similarly, when we compare the large shock we can also see a flat pattern across deciles of the cash-on-hand distribution in this broad sample and in the restricted sample. When we look at demographic controls, most are quite similar in sign, size, and significance; the only ones that stand out are the controls on city size for large shocks (column 4 of Table D.8 and column 5 of Table 2); in the restricted sample these coefficients are all strongly positive, implying that residents in smaller cities have a higher MPC out of large shocks than residents in cities above $500,000$ inhabitants.

Extended samples - 2016 data instead of 2010. A possible issue is whether the results are driven by the particular years, 2010 and 2012, in which the question were asked. With respect to 2012 we cannot do anything as the question on the MPC out of a large shock was asked only that year; however, we can swap 2010 with 2016. In 2016, the exact same question on the MPC out of a small shock was asked as in 2010. This allows us to use 2016 as a robustness check. The wave in 2016 has the additional benefit of having the same question on budget devoted to eating food away from home and at home, allowing us to also assess the robustness of the measure of non-homotheticity in consumption. In Tables D.9 and D.10 we replicate Tables 2 and 3 with 2016 data. The main drawback from this exercise is that the sample size shrinks substantially. The reason is that 2012 and 2016 are two waves apart, with 2014 being in between, increasing attrition. We move from 4524 to 2978 observations. The results from this exercise are very similar to the baseline specification in Table 2, the difference in MPCs goes from positive for low cash-on-hand households to negative for high cash-on-hand households. The magnitude is also quite similar, in column 6, in the first decile we move from 0.18 to 0.09 with the second decile being quite similar from 0.12 to 0.13. The new results on wealthier households remain with the same magnitude, from -0.07 to a even lower -0.09, both significant at the 99% level. The magnitude for other households with a negative coefficient (7th, 8th, and 9th deciles) is quite similar, but we lose significance on a few of these coefficients, possibly due to the lower sample size. In Table D.10 we have even stronger results than in Table 3 as support for the non-homotheticity. Coefficients are higher, with the same pattern emerging. With a small shock, we still cannot detect non homotheticity when we do not control for financial constraints (column 1), we already can with a large shock, where financial constraint matter less (column 2). When we control for the cash-on-hand distribution and for demographic controls we can see that both are positive and statistically significant, with the coefficient for the small shock (column 5) being smaller than the one for the large shock (column 6), in line with the non-homothetic model.

Table D.1: Summary statistics for all households observed in any wave

	2010						2012					
	mean	p10	p25	p50	p75	p90	mean	p10	p25	p50	p75	p90
Cash-on-hand	52.85	9.51	16.98	29.16	53.80	100.96	49.94	8.51	15.14	25.66	47.90	96.65
Net disposable income	23.11	7.05	12.74	19.81	28.07	39.52	21.26	6.38	11.66	18.21	26.01	36.85
Financial assets	29.41	0.00	1.45	7.00	25.68	64.49	28.30	0.00	0.76	5.68	20.97	62.14
Male	0.55	0.00	0.00	1.00	1.00	1.00	0.55	0.00	0.00	1.00	1.00	1.00
Married	0.62	0.00	0.00	1.00	1.00	1.00	0.61	0.00	0.00	1.00	1.00	1.00
Years of education	9.28	5.00	5.00	8.00	13.00	17.00	9.39	5.00	5.00	8.00	13.00	17.00
Family size	2.49	1.00	1.00	2.00	3.00	4.00	2.46	1.00	1.00	2.00	3.00	4.00
Resident in the South	0.32	0.00	0.00	0.00	1.00	1.00	0.33	0.00	0.00	0.00	1.00	1.00
Unemployed	0.04	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00
City size less then 20,000	0.26	0.00	0.00	0.00	1.00	1.00	0.25	0.00	0.00	0.00	0.00	1.00
City size 20.000-40,000	0.18	0.00	0.00	0.00	0.00	1.00	0.18	0.00	0.00	0.00	0.00	1.00
City size 40,000-500,000	0.47	0.00	0.00	0.00	1.00	1.00	0.48	0.00	0.00	0.00	1.00	1.00
City size larger than 500,000	0.09	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00
Marginal Propensity to Consume	0.48	0.00	0.10	0.50	0.80	1.00	0.45	0.00	0.10	0.50	0.70	1.00
Eating outside share							0.11	0.00	0.00	0.05	0.20	0.33
Observations	7940						8138					

Notes: The first 6 columns show 2010 data and the second 6 columns show 2012 data. Each variable is displayed with its mean and the 10th, 25th, 50th, 75th, and 90th percentiles. All households in each wave are present, even if some are not observed in both waves. Cash-on-hand, net disposable income, and financial assets are expressed in 2010 thousands of Euros. Cash-on-hand is the sum of disposable income and financial assets. Eating outside share is the share of food budget spent on food away from home. Marginal Propensity to Consume in 2010 represents the MPC out of a one month income transitory shock, in 2012 out of a one year income transitory shock.

Table D.2: Tobit regression results split by durable and non-durables expenditures.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Total	Non-Dur	Dur	DiffDND	Total	Non-Dur	Dur	DiffDND
Spending on durables	0.055***	0.025**	0.046***	0.018*	0.058***	0.022*	0.046***	0.019*
	(0.015)	(0.011)	(0.012)	(0.011)	(0.016)	(0.011)	(0.012)	(0.011)
I cash-on-hand decile					0.379***	0.055***	0.173***	0.087***
					(0.029)	(0.021)	(0.022)	(0.021)
II cash-on-hand decile					0.383***	0.059***	0.180***	0.078***
					(0.026)	(0.019)	(0.020)	(0.018)
III cash-on-hand decile					0.366***	0.069***	0.161***	0.068***
					(0.025)	(0.019)	(0.020)	(0.018)
IV cash-on-hand decile					0.387***	0.068***	0.195***	0.093***
					(0.024)	(0.017)	(0.018)	(0.017)
V cash-on-hand decile					0.383***	0.065***	0.198***	0.095***
					(0.024)	(0.018)	(0.018)	(0.017)
VI cash-on-hand decile					0.372***	0.074***	0.183***	0.080***
					(0.023)	(0.017)	(0.018)	(0.017)
VII cash-on-hand decile					0.432***	0.108***	0.216***	0.088***
					(0.023)	(0.017)	(0.018)	(0.017)
VIII cash-on-hand decile					0.419***	0.117***	0.195***	0.060***
					(0.023)	(0.017)	(0.018)	(0.017)
IX cash-on-hand decile					0.430***	0.106***	0.221***	0.094***
					(0.024)	(0.017)	(0.018)	(0.017)
X cash-on-hand decile					0.400***	0.096***	0.197***	0.087***
					(0.025)	(0.018)	(0.020)	(0.018)
Observations	4,524	4,524	4,524	4,524	4,524	4,524	4,524	4,524
Demographic Controls	NO	NO	NO	NO	YES	YES	YES	YES

Notes: Standard errors in parentheses. P-values correspond to: *** p<0.01, ** p<0.05, * p<0.1. All variables except cash-on-hand deciles are demeaned. Cash-on-hand is the sum of disposable income and financial assets. No constant is included in columns 5 to 8. Demographic controls are: age in[18,30], age in(30,45], age in(45,60], male, married, years of education, family size, resident in the South, unemployed, and the real log change in household cash-on-hand between 2012 and 2010. All other controls are measured in 2010. The left hand side variables all pertain to the MPC out of a large (one year) shock. For columns 1 and 5 the MPC is for total expenditures; in columns 2 and 6 is the MPC for non-durable expenditures; in columns 3 and 7 is the MPC for durables expenditures; and finally, in columns 4 and 8 the LHS is the difference in MPC for durable less the MPC for non-durable expenditures. The sample consists of households present in both surveys.

Table D.3: Tobit regression results sensitivity

VARIABLES	(1) Small	(2) Large	(3) Diff	(4) Small	(5) Large	(6) Diff	(7) Small	(8) Large	(9) Diff
I cash-on-hand decile	0.612***	0.342***	0.172***	0.665***	0.375***	0.195***	0.663***	0.362***	0.195***
	(0.042)	(0.038)	(0.037)	(0.040)	(0.038)	(0.036)	(0.033)	(0.033)	(0.031)
II cash-on-hand decile	0.567***	0.326***	0.157***	0.572***	0.350***	0.152***	0.566***	0.386***	0.120***
	(0.039)	(0.036)	(0.034)	(0.038)	(0.036)	(0.034)	(0.029)	(0.029)	(0.027)
III cash-on-hand decile	0.497***	0.330***	0.113***	0.470***	0.334***	0.089***	0.562***	0.367***	0.127***
	(0.036)	(0.033)	(0.032)	(0.034)	(0.032)	(0.030)	(0.029)	(0.030)	(0.027)
IV cash-on-hand decile	0.497***	0.379***	0.085***	0.476***	0.407***	0.048*	0.542***	0.386***	0.100***
	(0.032)	(0.029)	(0.028)	(0.031)	(0.029)	(0.028)	(0.028)	(0.029)	(0.026)
V cash-on-hand decile	0.482***	0.385***	0.067**	0.473***	0.347***	0.091***	0.525***	0.450***	0.048*
	(0.030)	(0.028)	(0.027)	(0.030)	(0.029)	(0.027)	(0.029)	(0.029)	(0.027)
VI cash-on-hand decile	0.401***	0.371***	0.027	0.418***	0.373***	0.036	0.465***	0.397***	0.051*
	(0.029)	(0.027)	(0.025)	(0.028)	(0.027)	(0.025)	(0.028)	(0.028)	(0.026)
VII cash-on-hand decile	0.401***	0.415***	-0.000	0.392***	0.398***	-0.003	0.416***	0.435***	-0.010
	(0.028)	(0.026)	(0.025)	(0.028)	(0.026)	(0.025)	(0.028)	(0.028)	(0.026)
VIII cash-on-hand decile	0.348***	0.433***	-0.053**	0.345***	0.421***	-0.048**	0.359***	0.412***	-0.043*
	(0.027)	(0.025)	(0.024)	(0.027)	(0.025)	(0.024)	(0.027)	(0.027)	(0.025)
IX cash-on-hand decile	0.311***	0.444***	-0.085***	0.344***	0.418***	-0.050**	0.347***	0.469***	-0.089***
	(0.027)	(0.025)	(0.024)	(0.027)	(0.025)	(0.024)	(0.028)	(0.028)	(0.026)
X cash-on-hand decile	0.295***	0.415***	-0.072***	0.302***	0.405***	-0.066***	0.319***	0.399***	-0.054*
	(0.029)	(0.026)	(0.025)	(0.028)	(0.026)	(0.025)	(0.029)	(0.029)	(0.028)
Age in[18,30]	0.003	0.031	-0.018	-0.001	0.014	-0.001	0.092	-0.016	0.069
	(0.068)	(0.062)	(0.059)	(0.067)	(0.063)	(0.060)	(0.070)	(0.072)	(0.066)
Age in(30,45]	0.020	-0.017	0.031	0.026	-0.030	0.042	0.084***	0.026	0.042
	(0.030)	(0.027)	(0.026)	(0.029)	(0.028)	(0.026)	(0.030)	(0.030)	(0.028)
Age in(45,60]	0.059**	-0.015	0.050**	0.061**	-0.028	0.060***	0.104***	0.008	0.063***
	(0.025)	(0.022)	(0.021)	(0.024)	(0.023)	(0.021)	(0.023)	(0.023)	(0.021)
Male	-0.011	-0.024	0.004	-0.007	-0.014	0.002	-0.012	-0.015	0.001
	(0.021)	(0.020)	(0.019)	(0.021)	(0.020)	(0.019)	(0.020)	(0.020)	(0.018)
Married	-0.005	-0.023	0.017	0.020	-0.023	0.032	0.006	0.000	0.008
	(0.027)	(0.024)	(0.023)	(0.026)	(0.025)	(0.023)	(0.025)	(0.025)	(0.023)
Years of education	0.005*	0.008***	-0.002	0.002	0.008***	-0.003	0.007***	0.010***	-0.001
	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Family size	-0.006	-0.006	0.002	-0.011	-0.009	0.001	-0.002	-0.009	0.006
	(0.011)	(0.010)	(0.009)	(0.010)	(0.010)	(0.009)	(0.010)	(0.010)	(0.010)
Resident in the South	0.265***	0.146***	0.078***	0.271***	0.131***	0.098***	0.249***	0.142***	0.081***
	(0.023)	(0.021)	(0.020)	(0.022)	(0.021)	(0.020)	(0.020)	(0.021)	(0.019)
Unemployed	0.010	0.015	-0.025	-0.028	-0.036	0.004	-0.033	-0.002	-0.033
	(0.065)	(0.058)	(0.056)	(0.057)	(0.053)	(0.051)	(0.058)	(0.057)	(0.053)
City size less then 20,000	-0.137***	0.149***	-0.191***	-0.155***	0.104***	-0.167***	-0.161***	0.156***	-0.212***
	(0.039)	(0.036)	(0.034)	(0.039)	(0.037)	(0.035)	(0.038)	(0.039)	(0.035)
City size 20.000-40,000	-0.146***	0.151***	-0.191***	-0.137***	0.138***	-0.180***	-0.158***	0.169***	-0.224***
	(0.041)	(0.038)	(0.036)	(0.041)	(0.039)	(0.037)	(0.040)	(0.040)	(0.037)
City size 40,000-500,000	-0.101***	0.099***	-0.129***	-0.115***	0.051	-0.107***	-0.092**	0.117***	-0.146***
	(0.037)	(0.034)	(0.032)	(0.037)	(0.035)	(0.033)	(0.036)	(0.037)	(0.034)
Observations	3,266	3,266	3,266	3,151	3,151	3,151	3,351	3,351	3,351
Conditioning on Understanding Questions	YES	YES	YES	NO	NO	NO	NO	NO	NO
Conditioning on High Financial Literacy	NO	NO	NO	YES	YES	YES	NO	NO	NO
Conditioning on No Debt	NO	NO	NO	NO	NO	NO	YES	YES	YES

Notes: Standard errors in parentheses. P-values correspond to: *** p<0.01, ** p<0.05, * p<0.1. All variables except cash-on-hand deciles are demeaned. Cash-on-hand is the sum of disposable income and financial assets. No constant is included. Columns 3, 6, and 9 also adds the real log change in household cash-on-hand between 2012 and 2010. All other controls are measured in 2010. The left hand side in columns 1, 4, and 7 is the MPC out of a small (one month) shock, measured in the 2010 survey; in column 2, 5, and 8 is the MPC out of large (one year) shock, measured in the 2012 survey; in columns 3, 6, and 9 is the difference in MPCs, the MPC out of a small shock less the MPC out of a large shock. The sample consists of households present in both surveys. Columns 1 to 3 condition only on households who the interviewer deemed that understood very well the survey overall (grade 8 or higher in a scale that goes from 1 to 10). Columns 4 to 6 condition only on households who are financially literate (answered correctly at least 2 of the 3 questions asked to gauge it). Columns 7 to 9 condition on household who do not have any debt.

Table D.4: Tobit regression results with controls for risk aversion and impatience.

VARIABLES	(1) Small	(2) Large	(3) Diff	(4) Small	(5) Large	(6) Diff	(7) Small	(8) Large	(9) Diff
Risk Aversion	-0.043***	-0.125***	0.064***				-0.050***	-0.125***	0.059***
	(0.016)	(0.015)	(0.014)				(0.016)	(0.015)	(0.014)
Impatience				0.113***	-0.018	0.091***	0.118***	-0.004	0.085***
				(0.021)	(0.020)	(0.019)	(0.021)	(0.020)	(0.019)
I cash-on-hand decile	0.655***	0.380***	0.178***	0.635***	0.371***	0.171***	0.639***	0.380***	0.166***
	(0.030)	(0.028)	(0.027)	(0.030)	(0.028)	(0.027)	(0.030)	(0.028)	(0.027)
II cash-on-hand decile	0.548***	0.381***	0.112***	0.537***	0.376***	0.109***	0.539***	0.382***	0.106***
	(0.027)	(0.025)	(0.024)	(0.027)	(0.025)	(0.024)	(0.027)	(0.025)	(0.024)
III cash-on-hand decile	0.522***	0.364***	0.105***	0.511***	0.358***	0.102***	0.513***	0.364***	0.099***
	(0.026)	(0.025)	(0.023)	(0.026)	(0.025)	(0.023)	(0.026)	(0.025)	(0.023)
IV cash-on-hand decile	0.507***	0.385***	0.084***	0.505***	0.381***	0.085***	0.506***	0.385***	0.083***
	(0.025)	(0.023)	(0.022)	(0.025)	(0.024)	(0.022)	(0.025)	(0.023)	(0.022)
V cash-on-hand decile	0.501***	0.382***	0.081***	0.503***	0.381***	0.083***	0.503***	0.382***	0.083***
	(0.025)	(0.024)	(0.022)	(0.025)	(0.024)	(0.022)	(0.025)	(0.024)	(0.022)
VI cash-on-hand decile	0.442***	0.381***	0.046**	0.444***	0.375***	0.052**	0.447***	0.381***	0.049**
	(0.024)	(0.023)	(0.022)	(0.024)	(0.023)	(0.022)	(0.024)	(0.023)	(0.022)
VII cash-on-hand decile	0.388***	0.431***	-0.024	0.394***	0.431***	-0.021	0.394***	0.431***	-0.020
	(0.025)	(0.023)	(0.022)	(0.025)	(0.023)	(0.022)	(0.025)	(0.023)	(0.022)
VIII cash-on-hand decile	0.354***	0.419***	-0.041*	0.364***	0.423***	-0.038*	0.362***	0.418***	-0.035
	(0.024)	(0.023)	(0.022)	(0.024)	(0.023)	(0.022)	(0.024)	(0.023)	(0.022)
IX cash-on-hand decile	0.331***	0.431***	-0.066***	0.340***	0.437***	-0.065***	0.337***	0.431***	-0.061***
	(0.025)	(0.023)	(0.022)	(0.025)	(0.023)	(0.022)	(0.025)	(0.023)	(0.022)
X cash-on-hand decile	0.299***	0.398***	-0.060**	0.312***	0.414***	-0.064***	0.305***	0.397***	-0.056**
	(0.027)	(0.025)	(0.024)	(0.026)	(0.025)	(0.024)	(0.026)	(0.025)	(0.024)
Age in[18,30]	-0.012	-0.024	0.016	0.005	0.002	0.008	-0.006	-0.024	0.020
	(0.056)	(0.052)	(0.050)	(0.056)	(0.053)	(0.050)	(0.056)	(0.052)	(0.050)
Age in(30,45]	0.019	-0.030	0.038*	0.028	-0.019	0.036	0.023	-0.030	0.042*
	(0.025)	(0.024)	(0.022)	(0.025)	(0.024)	(0.022)	(0.025)	(0.024)	(0.022)
Age in(45,60]	0.063***	-0.032	0.063***	0.069***	-0.020	0.058***	0.064***	-0.032	0.064***
	(0.021)	(0.019)	(0.018)	(0.021)	(0.019)	(0.018)	(0.021)	(0.019)	(0.018)
Male	-0.002	-0.021	0.011	-0.001	-0.016	0.008	-0.003	-0.021	0.010
	(0.018)	(0.017)	(0.016)	(0.018)	(0.017)	(0.016)	(0.018)	(0.017)	(0.016)
Married	-0.011	-0.021	0.012	-0.004	-0.017	0.014	-0.006	-0.022	0.016
	(0.022)	(0.020)	(0.019)	(0.022)	(0.021)	(0.019)	(0.022)	(0.020)	(0.019)
Years of education	0.005**	0.007***	-0.001	0.006***	0.009***	-0.002	0.005**	0.007***	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Family size	0.002	-0.004	0.006	0.001	-0.003	0.004	0.001	-0.004	0.005
	(0.009)	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)
Resident in the South	0.245***	0.126***	0.085***	0.243***	0.137***	0.075***	0.239***	0.127***	0.080***
	(0.018)	(0.017)	(0.016)	(0.018)	(0.017)	(0.016)	(0.018)	(0.017)	(0.016)
Unemployed	0.039	-0.000	0.021	0.035	-0.008	0.022	0.038	-0.000	0.019
	(0.048)	(0.045)	(0.042)	(0.048)	(0.045)	(0.042)	(0.048)	(0.045)	(0.042)
City size less then 20,000	-0.159***	0.128***	-0.191***	-0.164***	0.122***	-0.190***	-0.161***	0.128***	-0.193***
	(0.034)	(0.032)	(0.030)	(0.033)	(0.032)	(0.030)	(0.033)	(0.032)	(0.030)
City size 20.000-40,000	-0.162***	0.133***	-0.197***	-0.161***	0.132***	-0.195***	-0.160***	0.133***	-0.196***
	(0.035)	(0.033)	(0.031)	(0.035)	(0.033)	(0.031)	(0.035)	(0.033)	(0.031)
City size 40,000-500,000	-0.096***	0.095***	-0.131***	-0.102***	0.092***	-0.132***	-0.101***	0.095***	-0.134***
	(0.032)	(0.030)	(0.028)	(0.032)	(0.030)	(0.028)	(0.032)	(0.030)	(0.028)
Observations	4,524	4,524	4,524	4,524	4,524	4,524	4,524	4,524	4,524

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors in parentheses. P-values correspond to: *** p<0.01, ** p<0.05, * p<0.1. All variables except cash-on-hand deciles are demeaned. Cash-on-hand is the sum of disposable income and financial assets. No constant is included. Columns 3 and 6 also adds the real log change in household cash-on-hand between 2012 and 2010. All other controls are measured in 2010, including risk aversion and impatience. The left hand side in columns 1 and 4 is the MPC out of a small (one month) shock, measured in the 2010 survey; in column 2 and 5 is the MPC out of large (one year) shock, measured in the 2012 survey; in columns 3 and 6 is the difference in MPCs, the MPC out of a small shock less the MPC out of a large shock. The sample consists of households present in both surveys. To measure risk aversion we use a question asking *in managing financial investments are you a person more oriented to investments that have a profile of: (1) very high returns with a high risk of losing part of the invested capital, (2) good returns with a OK level of security in the invested capital, (3) OK returns with a good level of security in the invested capital, and (4) low returns with a no risk of capital loss.* We classify a household as risk averse (the dummy has value one) if they answer (4) to this question. Impatience is a dummy that takes value one if a household would be willing to give up more than 20% of a lottery win worth one year of income to get it today instead of in one year from now.

Table D.5: Tobit regression results conditioning for low risk aversion or low impatience.

VARIABLES	(1) Small	(2) Large	(3) Diff	(4) Small	(5) Large	(6) Diff
I cash-on-hand decile	0.695***	0.438***	0.172***	0.593***	0.359***	0.159***
	(0.045)	(0.041)	(0.041)	(0.035)	(0.033)	(0.032)
II cash-on-hand decile	0.650***	0.484***	0.101***	0.520***	0.409***	0.081***
	(0.041)	(0.038)	(0.037)	(0.031)	(0.029)	(0.028)
III cash-on-hand decile	0.579***	0.441***	0.087**	0.498***	0.349***	0.100***
	(0.039)	(0.037)	(0.036)	(0.030)	(0.029)	(0.027)
IV cash-on-hand decile	0.545***	0.422***	0.081**	0.483***	0.381***	0.072***
	(0.035)	(0.033)	(0.032)	(0.027)	(0.026)	(0.024)
V cash-on-hand decile	0.529***	0.473***	0.036	0.479***	0.367***	0.080***
	(0.034)	(0.032)	(0.031)	(0.027)	(0.025)	(0.024)
VI cash-on-hand decile	0.503***	0.463***	0.027	0.407***	0.373***	0.027
	(0.034)	(0.032)	(0.031)	(0.026)	(0.024)	(0.023)
VII cash-on-hand decile	0.423***	0.487***	-0.041	0.357***	0.440***	-0.052**
	(0.033)	(0.030)	(0.030)	(0.026)	(0.024)	(0.023)
VIII cash-on-hand decile	0.346***	0.492***	-0.104***	0.335***	0.431***	-0.065***
	(0.031)	(0.029)	(0.028)	(0.025)	(0.023)	(0.022)
IX cash-on-hand decile	0.342***	0.473***	-0.086***	0.324***	0.439***	-0.079***
	(0.031)	(0.029)	(0.029)	(0.026)	(0.024)	(0.023)
X cash-on-hand decile	0.301***	0.423***	-0.074***	0.291***	0.420***	-0.089***
	(0.031)	(0.029)	(0.028)	(0.027)	(0.025)	(0.024)
Age in[18,30]	-0.065	-0.014	-0.030	0.017	0.002	0.012
	(0.068)	(0.063)	(0.062)	(0.060)	(0.056)	(0.054)
Age in(30,45]	0.013	-0.073**	0.065**	0.022	-0.015	0.029
	(0.033)	(0.031)	(0.030)	(0.027)	(0.025)	(0.024)
Age in(45,60]	0.053*	-0.057**	0.074***	0.055**	-0.018	0.049**
	(0.027)	(0.026)	(0.025)	(0.022)	(0.021)	(0.020)
Male	0.003	-0.034	0.024	-0.018	-0.028	0.007
	(0.024)	(0.022)	(0.022)	(0.019)	(0.018)	(0.017)
Married	0.015	-0.020	0.029	0.010	-0.011	0.019
	(0.030)	(0.028)	(0.027)	(0.024)	(0.022)	(0.021)
Years of education	0.006**	0.007**	0.000	0.005**	0.009***	-0.002
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Family size	-0.001	0.003	-0.001	-0.002	-0.010	0.007
	(0.012)	(0.011)	(0.011)	(0.010)	(0.009)	(0.009)
Resident in the South	0.197***	0.060**	0.104***	0.272***	0.167***	0.073***
	(0.025)	(0.024)	(0.023)	(0.020)	(0.019)	(0.018)
Unemployed	0.084	0.095	-0.013	-0.012	-0.004	-0.010
	(0.069)	(0.062)	(0.062)	(0.055)	(0.052)	(0.050)
City size less then 20,000	-0.181***	0.180***	-0.246***	-0.132***	0.159***	-0.195***
	(0.044)	(0.041)	(0.040)	(0.036)	(0.034)	(0.032)
City size 20.000-40,000	-0.214***	0.161***	-0.251***	-0.144***	0.171***	-0.209***
	(0.045)	(0.042)	(0.041)	(0.037)	(0.035)	(0.033)
City size 40,000-500,000	-0.111***	0.075*	-0.124***	-0.077**	0.125***	-0.135***
	(0.041)	(0.038)	(0.037)	(0.034)	(0.032)	(0.030)
Observations	2,378	2,378	2,378	3,710	3,710	3,710
Conditioning on Low Risk Aversion	YES	YES	YES	NO	NO	NO
Conditioning on Low Impatience	NO	NO	NO	YES	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors in parentheses. P-values correspond to: *** p<0.01, ** p<0.05, * p<0.1. All variables except cash-on-hand deciles are demeaned. Cash-on-hand is the sum of disposable income and financial assets. No constant is included. Columns 3 and 6 also adds the real log change in household cash-on-hand between 2012 and 2010. All other controls are measured in 2010, including risk aversion and impatience. The left hand side in columns 1 and 4 is the MPC out of a small (one month) shock, measured in the 2010 survey; in column 2 and 5 is the MPC out of large (one year) shock, measured in the 2012 survey; in columns 3 and 6 is the difference in MPCs, the MPC out of a small shock less the MPC out of a large shock. The sample consists of households present in both surveys. To measure risk aversion we use a question asking *in managing financial investments are you a person more oriented to investments that have a profile of: (1) very high returns with a high risk of losing part of the invested capital, (2) good returns with a OK level of security in the invested capital, (3) OK returns with a good level of security in the invested capital, and (4) low returns with a no risk of capital loss.* We classify a household as risk averse (the dummy has value one) if they answer (4) to this question. In columns 1 to 3 we condition on households who we do not classify as risk averse. Impatience is a dummy that takes value one if a household would be willing to give up more than 20% of a lottery win worth one year of income to get it today instead of in one year from now. In columns 4 to 6 we condition on households who we do not classify as impatient.

Table D.6: Baseline OLS regression results

VARIABLES	(1) Small	(2) Large	(3) Diff	(4) Small	(5) Large	(6) Diff
I cash-on-hand decile	0.655***	0.439***	0.215***	0.591***	0.423***	0.172***
	(0.017)	(0.017)	(0.021)	(0.019)	(0.019)	(0.026)
II cash-on-hand decile	0.559***	0.436***	0.123***	0.530***	0.423***	0.109***
	(0.017)	(0.016)	(0.021)	(0.017)	(0.017)	(0.022)
III cash-on-hand decile	0.524***	0.418***	0.106***	0.514***	0.416***	0.099***
	(0.018)	(0.017)	(0.023)	(0.017)	(0.017)	(0.023)
IV cash-on-hand decile	0.514***	0.435***	0.079***	0.508***	0.428***	0.080***
	(0.016)	(0.015)	(0.021)	(0.016)	(0.015)	(0.021)
V cash-on-hand decile	0.506***	0.429***	0.077***	0.507***	0.429***	0.079***
	(0.016)	(0.016)	(0.021)	(0.016)	(0.015)	(0.021)
VI cash-on-hand decile	0.471***	0.425***	0.046**	0.474***	0.429***	0.045**
	(0.016)	(0.015)	(0.020)	(0.015)	(0.015)	(0.020)
VII cash-on-hand decile	0.421***	0.458***	-0.037*	0.437***	0.462***	-0.026
	(0.016)	(0.015)	(0.020)	(0.016)	(0.015)	(0.020)
VIII cash-on-hand decile	0.393***	0.452***	-0.058***	0.417***	0.461***	-0.045**
	(0.015)	(0.015)	(0.021)	(0.015)	(0.015)	(0.021)
IX cash-on-hand decile	0.369***	0.453***	-0.083***	0.399***	0.463***	-0.066***
	(0.015)	(0.015)	(0.020)	(0.015)	(0.016)	(0.021)
X cash-on-hand decile	0.365***	0.444***	-0.080***	0.387***	0.451***	-0.067***
	(0.016)	(0.015)	(0.021)	(0.017)	(0.017)	(0.023)
Age in[18,30]				0.003	0.005	-0.003
				(0.034)	(0.034)	(0.048)
Age in(30,45]				0.017	-0.014	0.030
				(0.016)	(0.016)	(0.021)
Age in(45,60]				0.042***	-0.013	0.054***
				(0.013)	(0.013)	(0.017)
Male				-0.003	-0.010	0.007
				(0.011)	(0.011)	(0.015)
Married				-0.003	-0.011	0.008
				(0.014)	(0.014)	(0.018)
Years of education				0.004***	0.006***	-0.002
				(0.001)	(0.001)	(0.002)
Family size				0.003	-0.003	0.006
				(0.005)	(0.005)	(0.007)
Resident in the South				0.170***	0.092***	0.078***
				(0.012)	(0.011)	(0.015)
Unemployed				0.020	-0.008	0.028
				(0.029)	(0.028)	(0.038)
City size less then 20,000				-0.096***	0.083***	-0.178***
				(0.021)	(0.020)	(0.029)
City size 20.000-40,000				-0.098***	0.086***	-0.183***
				(0.022)	(0.021)	(0.030)
City size 40,000-500,000				-0.059***	0.061***	-0.120***
				(0.020)	(0.019)	(0.027)
Change in Cash on Hand						-0.000
						(0.000)
Observations	4,524	4,524	4,524	4,524	4,524	4,524
R-squared	0.662	0.635	0.048	0.684	0.643	0.070

Notes: Robust standard errors in parentheses. P-values correspond to: *** p<0.01, ** p<0.05, * p<0.1. All regressions are ran with OLS. All variables except cash-on-hand deciles are demeaned. Cash-on-hand is the sum of disposable income and financial assets. No constant is included. All controls are measured in 2010 except Change in Cash on Hand, which is the real log change in household cash-on-hand between 2012 and 2010. The left hand side in columns 1 and 4 is the MPC out of a small (one month) shock, measured in the 2010 survey; in column 2 and 5 is the MPC out of large (one year) shock, measured in the 2012 survey; in columns 3 and 6 is the difference in MPCs, the MPC out of a small shock less the MPC out of a large shock. The sample consists of households present in both surveys.

Table D.7: Tobit regression results by income and and financial assets with demographic controls

VARIABLES	(1) Small	(2) Small	(3) Small	(4) Small	(5) Small	(6) Small	(7) Small	(8) Small	(9) Small	(10) Small
I income quintile	0.738***	0.571***	0.447***	0.341***	0.276***					
	(0.044)	(0.041)	(0.044)	(0.057)	(0.090)					
II income quintile	0.620***	0.477***	0.455***	0.431***	0.390***					
	(0.044)	(0.034)	(0.035)	(0.044)	(0.069)					
III income quintile	0.582***	0.522***	0.470***	0.371***	0.353***					
	(0.054)	(0.034)	(0.034)	(0.036)	(0.055)					
IV income quintile	0.562***	0.473***	0.422***	0.388***	0.311***					
	(0.070)	(0.042)	(0.036)	(0.032)	(0.040)					
V income quintile	0.541***	0.508***	0.431***	0.398***	0.295***					
	(0.093)	(0.063)	(0.046)	(0.037)	(0.038)					
I financial asset quintile						0.682***	0.602***	0.590***	0.608***	0.597***
						(0.042)	(0.040)	(0.047)	(0.060)	(0.090)
II financial asset quintile						0.586***	0.469***	0.510***	0.495***	0.526***
						(0.046)	(0.037)	(0.035)	(0.043)	(0.072)
III financial asset quintile						0.510***	0.484***	0.465***	0.405***	0.392***
						(0.050)	(0.038)	(0.034)	(0.037)	(0.053)
IV financial asset quintile						0.395***	0.433***	0.353***	0.375***	0.383***
						(0.061)	(0.046)	(0.035)	(0.034)	(0.042)
V financial asset quintile						0.234***	0.374***	0.370***	0.342***	0.294***
						(0.090)	(0.067)	(0.049)	(0.037)	(0.038)
Observations	833	846	909	973	963	865	879	879	920	981
Income Quintile	.	.	.	.	.	1	2	3	4	5
Financial Assets Quintile	1	2	3	4	5	.	.	.	.	.

VARIABLES	(1) Large	(2) Large	(3) Large	(4) Large	(5) Large	(6) Large	(7) Large	(8) Large	(9) Large	(10) Large
I income quintile	0.369***	0.353***	0.350***	0.382***	0.343***					
	(0.041)	(0.041)	(0.043)	(0.053)	(0.080)					
II income quintile	0.364***	0.393***	0.346***	0.327***	0.286***					
	(0.042)	(0.034)	(0.034)	(0.041)	(0.064)					
III income quintile	0.328***	0.439***	0.387***	0.373***	0.463***					
	(0.052)	(0.034)	(0.032)	(0.034)	(0.050)					
IV income quintile	0.373***	0.389***	0.387***	0.427***	0.475***					
	(0.066)	(0.042)	(0.035)	(0.030)	(0.036)					
V income quintile	0.459***	0.386***	0.489***	0.473***	0.504***					
	(0.088)	(0.062)	(0.044)	(0.035)	(0.034)					
I financial asset quintile						0.330***	0.384***	0.352***	0.423***	0.509***
						(0.038)	(0.039)	(0.046)	(0.060)	(0.077)
II financial asset quintile						0.286***	0.399***	0.438***	0.395***	0.450***
						(0.042)	(0.036)	(0.035)	(0.044)	(0.062)
III financial asset quintile						0.283***	0.343***	0.381***	0.402***	0.542***
						(0.046)	(0.037)	(0.034)	(0.038)	(0.046)
IV financial asset quintile						0.329***	0.319***	0.355***	0.417***	0.527***
						(0.055)	(0.044)	(0.035)	(0.034)	(0.036)
V financial asset quintile						0.350***	0.287***	0.438***	0.407***	0.494***
						(0.080)	(0.066)	(0.048)	(0.038)	(0.032)
Observations	833	846	909	973	963	865	879	879	920	981
Income Quintile	.	.	.	.	.	1	2	3	4	5
Financial Assets Quintile	1	2	3	4	5	.	.	.	.	.

VARIABLES	(1) Diff	(2) Diff	(3) Diff	(4) Diff	(5) Diff	(6) Diff	(7) Diff	(8) Diff	(9) Diff	(10) Diff
I income quintile	0.224***	0.162***	0.067	-0.026	-0.030					
	(0.037)	(0.039)	(0.043)	(0.050)	(0.077)					
II income quintile	0.166***	0.072**	0.079**	0.087**	0.060					
	(0.036)	(0.033)	(0.034)	(0.038)	(0.061)					
III income quintile	0.163***	0.062*	0.055*	0.000	-0.067					
	(0.044)	(0.033)	(0.032)	(0.031)	(0.048)					
IV income quintile	0.124**	0.073*	0.029	-0.026	-0.111***					
	(0.056)	(0.040)	(0.035)	(0.029)	(0.035)					
V income quintile	0.045	0.074	-0.038	-0.049	-0.131***					
	(0.075)	(0.059)	(0.044)	(0.032)	(0.033)					
I financial asset quintile						0.224***	0.144***	0.161***	0.130**	0.061
						(0.036)	(0.036)	(0.043)	(0.058)	(0.075)
II financial asset quintile						0.197***	0.050	0.049	0.063	0.039
						(0.038)	(0.033)	(0.032)	(0.043)	(0.060)
III financial asset quintile						0.160***	0.095***	0.057*	0.004	-0.101**
						(0.041)	(0.034)	(0.031)	(0.036)	(0.044)
IV financial asset quintile						0.057	0.089**	-0.001	-0.026	-0.098***
						(0.050)	(0.041)	(0.032)	(0.033)	(0.035)
V financial asset quintile						-0.059	0.047	-0.047	-0.039	-0.135***
						(0.074)	(0.060)	(0.047)	(0.037)	(0.032)
Observations	833	846	909	973	963	865	879	879	920	981
Income Quintile	.	.	.	.	.	1	2	3	4	5
Financial Assets Quintile	1	2	3	4	5	.	.	.	.	.

Notes: Standard errors in parentheses. P-values correspond to: *** p<0.01, ** p<0.05, * p<0.1. All variables except income quintiles are demeaned. This table splits the results of cash-on-hand in its components: disposable income and financial assets. All the regressions include demographic controls: age in[18,30], age in(30,45], age in(45,60], male, married, years of education, family size, resident in the South, unemployed, city size less then 20,000, city size 20,000-40,000, city size 40,000-500,000, and the real log change in household cash-on-hand between 2012 and 2010. All other controls are measured in 2010. No constant is included. All other controls are measured in 2010. The left hand side in the first sub-table is the MPC out of a small (one month) shock, measured in the 2010 survey; in the second sub-table is the MPC out of large (one year) shock, measured in the 2012 survey; in the third sub-table is the difference in MPCs, the MPC out of a small shock less the MPC out of a large shock. Going from column 1 to 5 we condition only on household in the financial asset quintile going from 1 to 5. Going from column 6 to 10 we condition only on household in the income quintile going from 1 to 5. The sample consists of households present in both surveys.

Table D.8: Tobit regression results with extended sample

VARIABLES	(1) Small	(2) Large	(3) Small	(4) Large
I cash-on-hand decile	0.742***	0.423***	0.648***	0.412***
	(0.020)	(0.018)	(0.022)	(0.020)
II cash-on-hand decile	0.580***	0.396***	0.544***	0.391***
	(0.020)	(0.018)	(0.020)	(0.019)
III cash-on-hand decile	0.523***	0.408***	0.514***	0.413***
	(0.020)	(0.018)	(0.019)	(0.018)
IV cash-on-hand decile	0.484***	0.409***	0.480***	0.410***
	(0.019)	(0.018)	(0.019)	(0.018)
V cash-on-hand decile	0.489***	0.410***	0.489***	0.413***
	(0.019)	(0.018)	(0.019)	(0.018)
VI cash-on-hand decile	0.432***	0.408***	0.440***	0.411***
	(0.020)	(0.018)	(0.019)	(0.018)
VII cash-on-hand decile	0.366***	0.413***	0.393***	0.415***
	(0.020)	(0.018)	(0.019)	(0.018)
VIII cash-on-hand decile	0.320***	0.398***	0.364***	0.405***
	(0.020)	(0.018)	(0.019)	(0.018)
IX cash-on-hand decile	0.279***	0.431***	0.326***	0.432***
	(0.020)	(0.018)	(0.020)	(0.019)
X cash-on-hand decile	0.276***	0.393***	0.311***	0.390***
	(0.020)	(0.018)	(0.021)	(0.020)
Age in[18,30]			0.011	0.023
			(0.036)	(0.038)
Age in(30,45]			0.036*	-0.025
			(0.019)	(0.018)
Age in(45,60]			0.044***	-0.030**
			(0.016)	(0.015)
Male			0.015	-0.001
			(0.013)	(0.013)
Married			-0.037**	-0.026*
			(0.016)	(0.015)
Years of education			0.006***	0.010***
			(0.002)	(0.002)
Family size			0.008	-0.006
			(0.007)	(0.006)
Resident in the South			0.271***	0.129***
			(0.014)	(0.013)
Unemployed			0.021	-0.009
			(0.036)	(0.030)
City size less then 20,000			-0.188***	0.039*
			(0.023)	(0.023)
City size 20.000-40,000			-0.170***	0.022
			(0.024)	(0.024)
City size 40,000-500,000			-0.119***	0.025
			(0.022)	(0.021)
Observations	7,853	8,031	7,853	8,031

Notes: Standard errors in parentheses. P-values correspond to: *** p<0.01, ** p<0.05, * p<0.1. All variables except cash-on-hand deciles are demeaned. Cash-on-hand is the sum of disposable income and financial assets. No constant is included. Controls are measured in 2010 in columns 1 and 3 and in 2012 in columns 2 and 5. The left hand side in columns 1 and 3 is the MPC out of a small (one month) shock, measured in the 2010 survey; in column 2 and 4 is the MPC out of large (one year) shock, measured in the 2012 survey. The sample consists of all households present in either survey for whom there is data, it does not condition to households present in both surveys as in the baseline results.

Table D.9: Tobit regression results with 2016 data

VARIABLES	(1) Small	(2) Large	(3) Diff	(4) Small	(5) Large	(6) Diff
I cash-on-hand decile	0.626***	0.451***	0.109***	0.553***	0.414***	0.090***
	(0.035)	(0.029)	(0.028)	(0.038)	(0.032)	(0.032)
II cash-on-hand decile	0.600***	0.425***	0.110***	0.577***	0.382***	0.129***
	(0.034)	(0.028)	(0.027)	(0.035)	(0.029)	(0.029)
III cash-on-hand decile	0.493***	0.361***	0.092***	0.495***	0.347***	0.106***
	(0.033)	(0.029)	(0.028)	(0.034)	(0.029)	(0.028)
IV cash-on-hand decile	0.482***	0.449***	0.014	0.482***	0.437***	0.024
	(0.035)	(0.030)	(0.029)	(0.035)	(0.030)	(0.029)
V cash-on-hand decile	0.445***	0.440***	-0.001	0.453***	0.440***	0.005
	(0.035)	(0.029)	(0.028)	(0.034)	(0.029)	(0.028)
VI cash-on-hand decile	0.428***	0.411***	0.009	0.420***	0.412***	0.001
	(0.035)	(0.029)	(0.028)	(0.034)	(0.029)	(0.028)
VII cash-on-hand decile	0.427***	0.448***	-0.017	0.435***	0.460***	-0.021
	(0.034)	(0.029)	(0.028)	(0.034)	(0.029)	(0.028)
VIII cash-on-hand decile	0.367***	0.433***	-0.047*	0.400***	0.454***	-0.042
	(0.033)	(0.028)	(0.027)	(0.033)	(0.028)	(0.027)
IX cash-on-hand decile	0.327***	0.407***	-0.043	0.350***	0.442***	-0.056**
	(0.032)	(0.027)	(0.026)	(0.033)	(0.028)	(0.028)
X cash-on-hand decile	0.281***	0.412***	-0.079***	0.299***	0.438***	-0.086***
	(0.031)	(0.026)	(0.025)	(0.034)	(0.028)	(0.029)
Age in[18,30]				0.089	0.052	0.013
				(0.111)	(0.094)	(0.093)
Age in(30,45]				0.090**	-0.013	0.068**
				(0.039)	(0.033)	(0.032)
Age in(45,60]				0.062**	-0.003	0.042*
				(0.027)	(0.023)	(0.023)
Male				0.005	-0.018	0.019
				(0.023)	(0.019)	(0.019)
Married				-0.039	-0.031	-0.006
				(0.028)	(0.023)	(0.023)
Years of education				0.003	0.007***	-0.002
				(0.003)	(0.003)	(0.002)
Family size				0.030***	-0.014	0.031***
				(0.012)	(0.010)	(0.010)
Resident in the South				0.112***	0.171***	-0.055***
				(0.024)	(0.020)	(0.020)
Unemployed				0.073	-0.003	0.041
				(0.055)	(0.047)	(0.045)
City size less then 20,000				-0.205***	0.037	-0.166***
				(0.045)	(0.039)	(0.038)
City size 20.000-40,000				-0.144***	0.050	-0.133***
				(0.047)	(0.040)	(0.039)
City size 40,000-500,000				-0.118***	0.048	-0.122***
				(0.042)	(0.036)	(0.035)
Observations	2,978	2,978	2,978	2,978	2,978	2,978

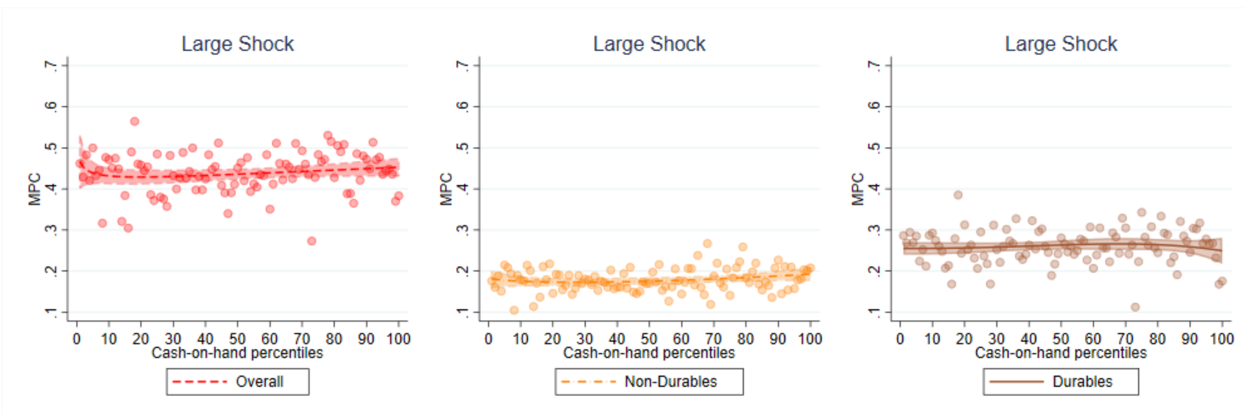
Notes: Standard errors in parentheses. P-values correspond to: *** p<0.01, ** p<0.05, * p<0.1. All variables except cash-on-hand deciles are demeaned. Cash-on-hand is the sum of disposable income and financial assets. No constant is included. The last column also adds the real log change in household cash-on-hand between 2016 and 2012. All other controls are measured in 2016. The left hand side in columns 1 and 4 is the MPC out of a small (one month) shock, measured in the 2016 survey; in column 2 and 5 is the MPC out of large (one year) shock, measured in the 2012 survey; in columns 3 and 6 is the difference in MPCs, the MPC out of a small shock less the MPC out of a large shock. The sample consists of households present in both surveys.

Table D.10: Non-necessity Tobit regression results with 2016 data

VARIABLES	(1) Small	(2) Large	(3) Small	(4) Large	(5) Small	(6) Large
Eating outside share	0.052	0.224***	0.306***	0.253***	0.181**	0.218***
	(0.074)	(0.062)	(0.077)	(0.065)	(0.081)	(0.068)
I cash-on-hand decile			0.647***	0.470***	0.574***	0.439***
			(0.035)	(0.029)	(0.040)	(0.033)
II cash-on-hand decile			0.617***	0.440***	0.589***	0.397***
			(0.034)	(0.028)	(0.035)	(0.030)
III cash-on-hand decile			0.509***	0.373***	0.508***	0.356***
			(0.034)	(0.029)	(0.034)	(0.029)
IV cash-on-hand decile			0.489***	0.455***	0.487***	0.444***
			(0.035)	(0.030)	(0.035)	(0.030)
V cash-on-hand decile			0.444***	0.440***	0.452***	0.439***
			(0.034)	(0.029)	(0.034)	(0.029)
VI cash-on-hand decile			0.419***	0.404***	0.422***	0.408***
			(0.035)	(0.029)	(0.034)	(0.029)
VII cash-on-hand decile			0.419***	0.442***	0.429***	0.453***
			(0.034)	(0.029)	(0.034)	(0.029)
VIII cash-on-hand decile			0.358***	0.426***	0.385***	0.449***
			(0.033)	(0.028)	(0.033)	(0.028)
IX cash-on-hand decile			0.311***	0.395***	0.340***	0.429***
			(0.033)	(0.027)	(0.034)	(0.028)
X cash-on-hand decile			0.261***	0.396***	0.283***	0.419***
			(0.032)	(0.026)	(0.036)	(0.030)
Observations	2,978	2,978	2,978	2,978	2,978	2,978
Demographic Controls	NO	NO	NO	NO	YES	YES

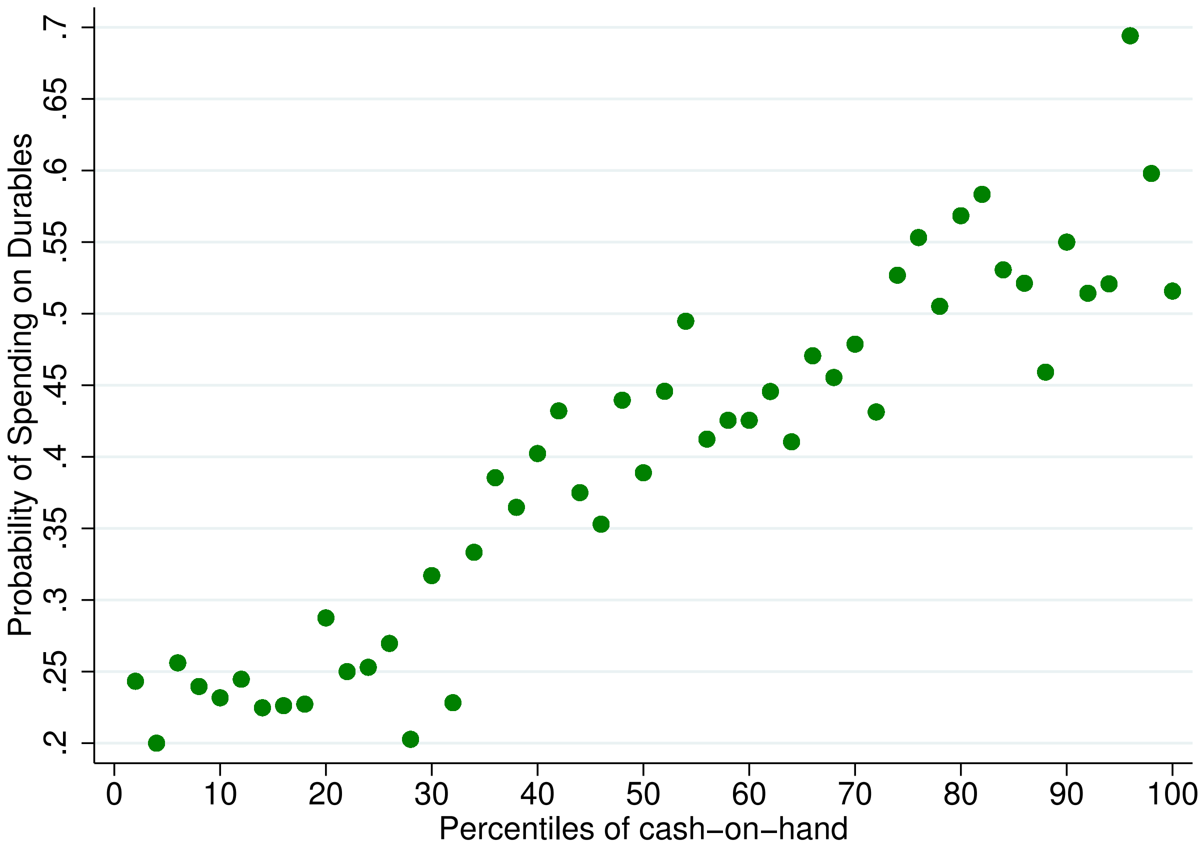
Notes: Standard errors in parentheses. P-values correspond to: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. All variables except cash-on-hand deciles are demeaned. Cash-on-hand is the sum of disposable income and financial assets. No constant is included in columns 3 to 6. Demographic controls are: age in[18,30], age in(30,45], age in(45,60], male, married, years of education, family size, resident in the South, unemployed, and the real log change in household cash-on-hand between 2016 and 2012. All other controls are measured in 2016. The left hand side in columns 1, 3, and 5 is the MPC out of a small (one month) shock, measured in the 2016 survey; in columns 2, 4, and 6 is the MPC out of large (one year) shock, measured in the 2012 survey. The sample consists of households present in both surveys.

Figure D.1: The distribution of MPC out of large income gains by spending category: total expenditure (in red), non-durable goods and services consumption (in orange), and durable goods expenditure (in sienna)



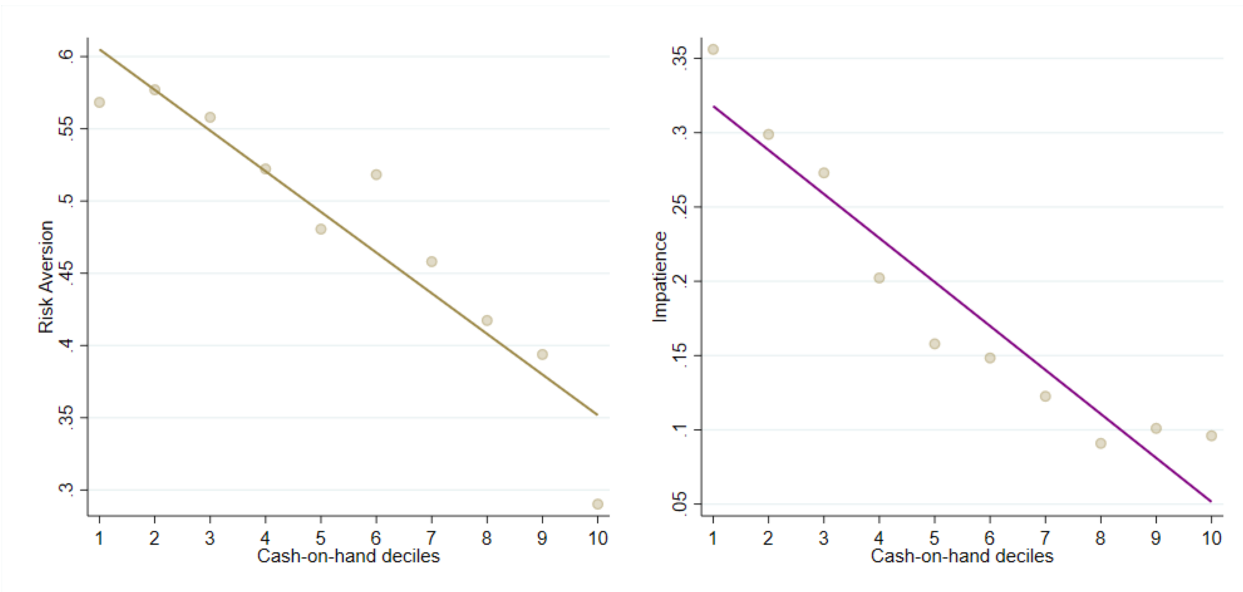
Notes: The figure shows the MPCs out of a large gain along the cash-on-hand distribution in 2010. Cash-on-hand is the sum of disposable income and financial assets. We fit a fractional polynomial with 95% confidence bands based on the percentile bins. The first panel plots the MPC for total expenditure, the second chart displays the MPC for non-durable consumption only, the third column reports the MPC for durable expenditure only. The sample consists of households present in both surveys.

Figure D.2: Probability of spending on durables and cash-on-hand



Notes: The plot shows 50 equal sized bins of cash-on-hand in 2010 and presents the probability for any durable consumption spending share for each bin. Each bin corresponds to 2 percentiles. The probability of spending on durables is the probability that we observe a positive spending on durable goods and services, measured in 2010. Cash-on-hand is the sum of disposable income and financial assets.

Figure D.3: Risk aversion and impatience by cash-on-hand deciles.



Notes: The plot shows how risk aversion and impatience vary by each cash-on-hand deciles in 2010 and fit a linear fit based on the decile bins. Both risk aversion and impatience are dummies so that each scatter point represents the fraction of positive values of each dummy: a higher value implies more risk averse households in the first panel and more impatient households in the second. Cash-on-hand is the sum of disposable income and financial assets. All variables are measured in 2010. The sample consists of households present in both surveys for comparability with other results. To measure risk aversion we use a question asking *in managing financial investments are you a person more oriented to investments that have a profile of: (1) very high returns with a high risk of losing part of the invested capital, (2) good returns with a OK level of security in the invested capital, (3) OK returns with a good level of security in the invested capital, and (4) low returns with a no risk of capital loss.* We classify a household as risk averse (the dummy has value one) if they answer (4) to this question. Impatience is a dummy that takes value one if a household would be willing to give up more than 20% of a lottery win worth one year of income to get it today instead of in one year from now.

E Regional Heterogeneity

This appendix presents results on regional heterogeneity. Table E.1 shows the distribution of cash-on-hand across regional deciles. Tables E.2 and E.3 mirror Tables 2 and 3. Figure E.1 mirrors Figure 2. We assign a household to the South if they live in one of the following regions: Molise, Campania, Apulia, Basilicata, Calabria, Sicily, or Sardinia. Otherwise we assign them to the rest of the country (or North).

As it is well known, the Italian Mezzogiorno (i.e. the South) is different from the rest of the country along a number of social and economic dimensions, spanning from institutions to labor markets, financial constraints, social mobility, and civic capital among many others (Fortunato, 1911).[35] It is therefore, of independent interest to assess whether our results vary across these two macro-regions.

A few result stand out from this exercise. The distribution of cash-on-hand in the South is stochastically dominated from the one in the rest of the country, as shown in Table E.1. A household in the tenth decile of the South has a lower median cash-on-hand than somebody in the ninth decile in the Northern part of the country. Someone on the fifth decile in the South has a lower median cash-on-hand than somebody in the second decile in the Northern part of the country. Moreover, the poor households in the South have a very low cash-on-hand, with those in the first decile having the sum of disposable income and financial assets equal to 3700€per year.

Notice that the southern regions present an MPC unconditionally higher across the cash-on-hand distribution and size of the shock, this can be seen by comparing columns 1 and 2 with column 7 and 8 of Table E.2. Moreover, the South is best explained by a traditionally financial constraint model, as the wealthier households respond similarly to a small and large income shock. We can see this in columns 9 and 12 of Table E.2, where the coefficient associated to the 10th decile is negative but not statistically significant, and on the third panel of the second line of Figure E.1, with both lines crossing at the top of the cash-on-hand distribution.

While the South and the North of Italy differ for many reasons, the South of Italy has

[35]For up to date analyses on the economic divide between South and North, see Ciani and Torrini (2019), AIPB-Censis (2019) and Banca d'Italia (2015, 2020).

lower income and wealth than the Northern half of the country and it is likely that financial constraints are more prevalent with harder access to credit. For these reasons, when we look at the rest of the country we find more evidence calling for a non-homotheticity explanation. In columns 3 and 6 of Table E.2 a negative coefficient from the fifth decile of cash-on-hand and a negative and statistically significant coefficient from the sixth, that is from above the median household. Moreover the coefficient becomes even more negative, with the coefficient associated to the tenth decile being -0.111 from -0.069 from Table 2 (in column 6 for both tables). The widening of the gap makes it even harder for the standard financial constraint model to explain this result.

Additionally, in Table E.3 we see how the columns associated with the Northern part of Italy present stronger results on the measure of non-necessity consumption. The coefficient associated to the share of food expenses on eating outside is now positive and statistically significant (albeit small) also for the small shock without any constraint. Moreover, this coefficient is now higher across specifications with the coefficient being higher for the large than for the small shock (this is present also for the South, see columns 5 and 6 for the Northern regions and 11 and 12 for the Southern ones). Northern regions both display a higher response to a large shock rather than a small shock and a stronger association between non-necessity consumption and the MPC, making the non-homothetic explanation quite promising.

The final result we would like to highlight from the regional heterogeneity can be seen in Figure E.1. If we look at the red lines for both regions, we can see how out of large shocks the MPC is higher for wealthier households than for poorer ones. We could not see this as clearly in the national results, as Southern households are both poorer (even the wealthiest as shown in Table E.1) and have a higher MPC, creating a compositional issue. We do not need this feature to explain our results, as some wealthy households could still be financially constraint (e.g. as wealthy hand to mouth), as discussed in section 5. However, this positive relationship makes it even harder to justify an explanation only based on financial constraint world and points to a model based on non-necessity consumption.

Table E.1: Regional heterogeneity in cash-on-hand

	1	2	3	4	5	6	7	8	9	10
Cash-on-hand South	3.753	7.839	10.55	13.73	17.26	20.85	25.28	31.68	41.12	79.33
Cash-on-hand North	9.500	16.47	21.56	26.47	32.40	39.93	50.41	65.60	94.19	191.4

Notes: The table shows the median value of cash-on-hand for decile of the distribution in each region. Cash-on-hand is the sum of disposable income and financial assets. As in the main regressions, the sample includes only households that we observe in both waves. The values pertain to 2010 in current thousands of Euros.

Table E.2: Regional heterogeneity Tobit regression results

VARIABLES	(1) Small	(2) Large	(3) Diff	(4) Small	(5) Large	(6) Diff	(7) Small	(8) Large	(9) Diff	(10) Small	(11) Large	(12) Diff
I Regional cash-on-hand decile	0.486***	0.273***	0.134***	0.495***	0.287***	0.136***	0.839***	0.490***	0.239***	0.821***	0.515***	0.202***
	(0.035)	(0.032)	(0.030)	(0.037)	(0.034)	(0.033)	(0.040)	(0.040)	(0.037)	(0.044)	(0.044)	(0.042)
II Regional cash-on-hand decile	0.429***	0.329***	0.063**	0.456***	0.341***	0.076**	0.780***	0.472***	0.210***	0.776***	0.485***	0.196***
	(0.036)	(0.033)	(0.030)	(0.036)	(0.034)	(0.031)	(0.040)	(0.040)	(0.038)	(0.042)	(0.041)	(0.039)
III Regional cash-on-hand decile	0.404***	0.323***	0.051*	0.425***	0.332***	0.061**	0.711***	0.358***	0.249***	0.718***	0.370***	0.248***
	(0.034)	(0.031)	(0.029)	(0.034)	(0.031)	(0.029)	(0.038)	(0.038)	(0.036)	(0.039)	(0.039)	(0.037)
IV Regional cash-on-hand decile	0.391***	0.348***	0.027	0.409***	0.351***	0.037	0.639***	0.460***	0.128***	0.658***	0.463***	0.140***
	(0.034)	(0.031)	(0.029)	(0.033)	(0.031)	(0.029)	(0.037)	(0.037)	(0.035)	(0.037)	(0.037)	(0.035)
V Regional cash-on-hand decile	0.315***	0.325***	-0.001	0.319***	0.333***	-0.003	0.657***	0.450***	0.146***	0.665***	0.456***	0.148***
	(0.033)	(0.030)	(0.028)	(0.032)	(0.030)	(0.028)	(0.039)	(0.039)	(0.037)	(0.038)	(0.039)	(0.036)
VI Regional cash-on-hand decile	0.291***	0.378***	-0.052*	0.295***	0.379***	-0.050*	0.674***	0.444***	0.168***	0.684***	0.434***	0.182***
	(0.033)	(0.029)	(0.028)	(0.032)	(0.029)	(0.027)	(0.035)	(0.036)	(0.034)	(0.035)	(0.036)	(0.034)
VII Regional cash-on-hand decile	0.283***	0.387***	-0.062**	0.281***	0.386***	-0.063**	0.646***	0.456***	0.139***	0.645***	0.465***	0.131***
	(0.032)	(0.029)	(0.027)	(0.031)	(0.029)	(0.027)	(0.037)	(0.038)	(0.035)	(0.037)	(0.038)	(0.035)
VIII Regional cash-on-hand decile	0.275***	0.428***	-0.101***	0.259***	0.423***	-0.110***	0.693***	0.482***	0.163***	0.691***	0.472***	0.169***
	(0.032)	(0.028)	(0.027)	(0.032)	(0.029)	(0.027)	(0.037)	(0.037)	(0.035)	(0.037)	(0.037)	(0.035)
IX Regional cash-on-hand decile	0.305***	0.422***	-0.072***	0.298***	0.413***	-0.074***	0.554***	0.484***	0.052	0.548***	0.465***	0.061*
	(0.031)	(0.028)	(0.026)	(0.031)	(0.029)	(0.027)	(0.035)	(0.035)	(0.033)	(0.035)	(0.036)	(0.034)
X Regional cash-on-hand decile	0.183***	0.351***	-0.095***	0.141***	0.328***	-0.111***	0.474***	0.534***	-0.042	0.463***	0.513***	-0.033
	(0.033)	(0.029)	(0.027)	(0.035)	(0.031)	(0.029)	(0.036)	(0.037)	(0.035)	(0.038)	(0.039)	(0.038)
Age in[18,30]				0.012	0.047	-0.023				0.002	-0.083	0.077
				(0.073)	(0.066)	(0.063)				(0.086)	(0.087)	(0.081)
Age in(30,45]				0.041	-0.003	0.037				-0.028	-0.067*	0.028
				(0.032)	(0.030)	(0.028)				(0.039)	(0.040)	(0.037)
Age in(45,60]				0.065**	0.002	0.042*				0.070**	-0.067**	0.092***
				(0.027)	(0.025)	(0.023)				(0.031)	(0.032)	(0.030)
Male				-0.016	-0.012	-0.005				0.020	-0.014	0.023
				(0.023)	(0.021)	(0.020)				(0.027)	(0.027)	(0.026)
Married				0.034	-0.006	0.032				-0.080**	-0.039	-0.028
				(0.029)	(0.026)	(0.024)				(0.033)	(0.033)	(0.031)
Years of education				0.008***	0.010***	-0.001				0.001	0.008**	-0.005
				(0.003)	(0.003)	(0.003)				(0.003)	(0.003)	(0.003)
Family size				-0.020*	-0.020*	0.002				0.033***	0.023*	0.010
				(0.012)	(0.011)	(0.010)				(0.012)	(0.012)	(0.012)
Unemployed				0.042	-0.007	0.017				0.065	-0.019	0.059
				(0.076)	(0.069)	(0.065)				(0.058)	(0.057)	(0.054)
City size less then 20,000				-0.240***	0.039	-0.182***				-0.046	0.272***	-0.213***
				(0.045)	(0.041)	(0.038)				(0.049)	(0.051)	(0.047)
City size 20.000-40,000				-0.285***	0.081*	-0.242***				0.060	0.209***	-0.087*
				(0.046)	(0.042)	(0.040)				(0.053)	(0.054)	(0.050)
City size 40,000-500,000				-0.198***	0.013	-0.134***				0.058	0.227***	-0.121***
				(0.043)	(0.039)	(0.037)				(0.046)	(0.048)	(0.044)
Observations	2,983	2,983	2,983	2,983	2,983	2,983	1,541	1,541	1,541	1,541	1,541	1,541
Area	North	North	North	North	North	North	South	South	South	South	South	South

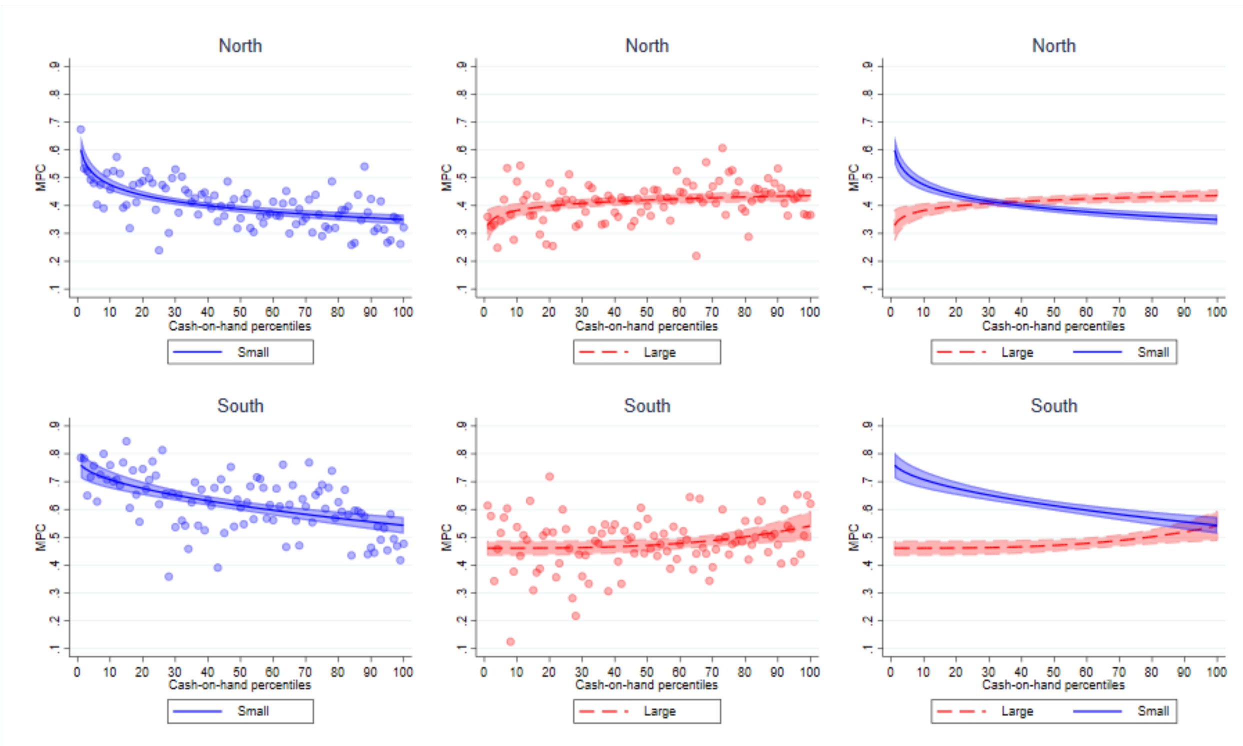
Notes: Standard errors in parentheses. P-values correspond to: *** p<0.01, ** p<0.05, * p<0.1. All variables except cash-on-hand deciles are demeaned. Cash-on-hand is the sum of disposable income and financial assets. No constant is included. The columns 6 and 12 also add the real log change in household cash-on-hand between 2012 and 2010. All other controls are measured in 2010. Columns 1 to 6 pertain to household living in northern regions; column 7 to 12 pertain to household living in southern regions. The left hand side in columns 1, 4, 7, and 10 is the MPC out of a small (one month) shock, measured in the 2010 survey; in column 2, 5, 8, and 11 is the MPC out of large (one year) shock, measured in the 2012 survey; in columns 3, 6, 9, and 12 is the difference in MPCs, the MPC out of a small shock less the MPC out of a large shock. The sample consists of households present in both surveys.

Table E.3: Regional heterogeneity non-necessity Tobit regression results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large
Eating outside share	0.168**	0.373***	0.344***	0.335***	0.285***	0.301***	-0.225***	-0.127	-0.121	-0.160*	-0.183**	-0.159*
	(0.076)	(0.068)	(0.078)	(0.070)	(0.082)	(0.074)	(0.086)	(0.086)	(0.085)	(0.087)	(0.090)	(0.092)
I Regional cash-on-hand decile			0.505***	0.291***	0.524***	0.302***			0.837***	0.486***	0.836***	0.523***
			(0.035)	(0.032)	(0.038)	(0.035)			(0.040)	(0.040)	(0.045)	(0.045)
II Regional cash-on-hand decile			0.449***	0.349***	0.477***	0.359***			0.775***	0.466***	0.777***	0.487***
			(0.036)	(0.033)	(0.037)	(0.034)			(0.041)	(0.040)	(0.042)	(0.042)
III Regional cash-on-hand decile			0.418***	0.337***	0.439***	0.344***			0.710***	0.356***	0.728***	0.374***
			(0.034)	(0.031)	(0.034)	(0.031)			(0.038)	(0.038)	(0.039)	(0.040)
IV Regional cash-on-hand decile			0.400***	0.355***	0.414***	0.360***			0.634***	0.454***	0.653***	0.465***
			(0.033)	(0.031)	(0.034)	(0.031)			(0.037)	(0.037)	(0.037)	(0.038)
V Regional cash-on-hand decile			0.317***	0.328***	0.326***	0.333***			0.658***	0.451***	0.666***	0.464***
			(0.032)	(0.029)	(0.033)	(0.030)			(0.039)	(0.039)	(0.038)	(0.039)
VI Regional cash-on-hand decile			0.287***	0.375***	0.288***	0.378***			0.674***	0.444***	0.675***	0.438***
			(0.032)	(0.029)	(0.032)	(0.029)			(0.035)	(0.036)	(0.035)	(0.036)
VII Regional cash-on-hand decile			0.276***	0.380***	0.271***	0.381***			0.647***	0.458***	0.645***	0.452***
			(0.032)	(0.029)	(0.032)	(0.029)			(0.037)	(0.038)	(0.037)	(0.038)
VIII Regional cash-on-hand decile			0.266***	0.419***	0.253***	0.413***			0.693***	0.483***	0.683***	0.468***
			(0.032)	(0.028)	(0.032)	(0.029)			(0.036)	(0.037)	(0.037)	(0.038)
IX Regional cash-on-hand decile			0.294***	0.410***	0.276***	0.403***			0.557***	0.488***	0.542***	0.467***
			(0.031)	(0.028)	(0.032)	(0.029)			(0.035)	(0.035)	(0.036)	(0.036)
X Regional cash-on-hand decile			0.164***	0.331***	0.125***	0.311***			0.480***	0.543***	0.464***	0.502***
			(0.033)	(0.029)	(0.036)	(0.032)			(0.036)	(0.037)	(0.039)	(0.041)
Observations	2,983	2,983	2,983	2,983	2,983	2,983	1,541	1,541	1,541	1,541	1,541	1,541
Demographic Controls	NO	NO	NO	NO	YES	YES	NO	NO	NO	NO	YES	YES
Area	North	North	North	North	North	North	South	South	South	South	South	South

Notes: Standard errors in parentheses. P-values correspond to: *** p<0.01, ** p<0.05, * p<0.1. All variables except cash-on-hand deciles are demeaned. Cash-on-hand is the sum of disposable income and financial assets. No constant is included in columns 3 to 6 and 9 to 12. Demographic controls are: age in[18,30], age in(30,45], age in(45,60], male, married, years of education, family size, unemployed, and the real log change in household cash-on-hand between 2012 and 2010. All other controls are measured in 2010. Columns 1 to 6 pertain to household living in northern regions; column 7 to 12 pertain to household living in southern regions. The left hand side in odd columns is the MPC out of a small (one month) shock, measured in the 2010 survey; in even columns is the MPC out of large (one year) shock, measured in the 2012 survey. The sample consists of households present in both surveys.

Figure E.1: The distribution of MPC in the North and in the South of Italy by cash-on-hand percentiles for small income gains (in blue) and large income gains (in red)



Notes: The plot shows the MPC by each regional cash-on-hand percentile in 2010 and fit a fractional polynomial with 95% confidence bands based on the percentile bins. Cash-on-hand is the sum of disposable income and financial assets. The first column plots the MPC out of a small gain, the second one out of a large gain, the third one plots both fractional polynomials together. The first row plots the results for the northern part of the country and the second row for the southern one.

F Non-homothetic model detailed derivations

F.1 Proofs

In this part of the appendix we provide the proofs and detailed derivations of the non-homothetic model. The problem of the household can be written as:

$$\max_{\{c_{a,t},c_{b,t}\}_{t=0}^{\infty}} U(\{c_{a,t},c_{b,t}\}_{t=0}^{\infty}) = \sum_{t=0}^{\infty} \beta^t \left[\frac{c_{a,t}^{1-\frac{1}{\gamma_a}}}{1-\frac{1}{\gamma_a}} + \frac{c_{b,t}^{1-\frac{1}{\gamma_b}}}{1-\frac{1}{\gamma_b}} \right]$$

$$s.t.$$

$$Y = \sum_{t=0}^{\infty} \sum_{i=a,b} p_{i,t} c_{i,t} = \sum_{t=0}^{\infty} X_t$$

With budget shares: $s_{i,t}^Y \equiv \frac{p_{i,t}c_{i,t}}{Y}$ and $s_{i,t}^X \equiv \frac{p_{i,t}c_{i,t}}{X_t}$. The Lagrangian of problem is standard:

$$\mathcal{L} = \sum_{t=0}^{\infty} \beta^t \left[\frac{c_{a,t}^{1-\frac{1}{\gamma_a}}}{1-\frac{1}{\gamma_a}} + \frac{c_{b,t}^{1-\frac{1}{\gamma_b}}}{1-\frac{1}{\gamma_b}} \right] + \lambda \left[Y - \sum_{t=0}^{\infty} \sum_{i=a,b} p_{i,t} c_{i,t} \right]$$

The first order condition of the problem:

$$\begin{aligned} \beta^t c_{i,t}^{-\frac{1}{\gamma_i}} &= \lambda p_{i,t} \qquad \forall t, i \\ c_{i,t} &= \beta^{t\gamma_i} \lambda^{-\gamma_i} p_{i,t}^{-\gamma_i} \end{aligned} \tag{6}$$

In order to find the income elasticity, we plug in the FOCs into the budget constraint and find the derivative of the Lagrangian multiplier with respect to a permanent income change by virtue of the implicit function theorem.

$$
\begin{aligned}
Y &= \sum_{t=0}^{\infty} \sum_{i=a,b} p_{i,t} c_{i,t} \\
Y &= \sum_{t=0}^{\infty} \sum_{i=a,b} p_{i,t} \beta^{t\gamma_i} \lambda^{-\gamma_i} p_{i,t}^{-\gamma_i} \\
dY &= \sum_{t=0}^{\infty} \sum_{i=a,b} -\gamma_i p_{i,t} \beta^{t\gamma_i} \lambda^{-\gamma_i - 1} p_{i,t}^{-\gamma_i} d\lambda \\
\frac{d\lambda}{dY} \frac{1}{\lambda} &= -\frac{1}{\sum_{t=0}^{\infty} \sum_{i=a,b} \gamma_i p_{i,t} c_{i,t}}
\end{aligned} \tag{7}
$$

Armed with this relationship we can prove lemma 1.

Proof of Lemma 1. Take the derivative of (6) and use (7) to find the income elasticity of demand e_i^Y:

$$
\begin{aligned}
\frac{\partial c_{i,t}}{\partial Y} &= -\gamma_i \beta^{t\gamma_i} \lambda^{-\gamma_i} p_{i,t}^{-\gamma_i} \frac{\partial \lambda}{\partial Y} \frac{1}{\lambda} \\
\frac{\partial c_{i,t}}{\partial Y} &= -\gamma_i c_{i,t} \frac{\partial \lambda}{\partial Y} \frac{1}{\lambda} \\
\frac{\partial c_{i,t}}{\partial Y} &= \frac{\gamma_i}{\sum_{\tau=0}^{\infty} \sum_{i=a,b} \gamma_i p_{i,\tau} c_{i,\tau}} c_{i,t} \\
e_i^Y = \frac{\partial c_{i,t}}{\partial Y} \frac{Y}{c_{i,t}} &= \frac{\gamma_i}{\sum_{\tau=0}^{\infty} \sum_{i=a,b} \gamma_i s_{i,\tau}^Y}
\end{aligned}
$$

Which is the income elasticity for any good i. ■

With this result we can move to the proof of the next lemma, as by definition, a non-necessity good is a good whose income elasticity is greater than one.

Proof of Lemma 2. Notice that budget shares need to sum to one so, $\sum_t s_{a,t}^Y + \sum_t s_{b,t}^Y = 1$. Plug this into the expression for e_a^Y in (2) and massage it:

$$
\begin{aligned}
e_a^Y - 1 &= \\
\frac{\gamma_a}{\gamma_a \sum_{t=0}^{\infty} s_{a,t}^Y + \gamma_b \sum_{t=0}^{\infty} s_{b,t}^Y} - 1 &= \\
(\gamma_a - \gamma_b) \frac{\left(\sum_{t=0}^{\infty} s_{b,t}^Y\right)}{\gamma_a \sum_{t=0}^{\infty} s_{a,t}^Y + \gamma_b \sum_{t=0}^{\infty} s_{b,t}^Y}
\end{aligned}
$$

Which is greater than zero for $\gamma_a > \gamma_b$. The same argument can let as conclude that $e_b^Y < 1$ for $\gamma_a > \gamma_b$. ■

We can now prove the last lemma.

Proof of Lemma 3. Take the derivative of period t expenditures and plug in (2).

$$\begin{aligned} MPC_t &= \frac{\partial X_t}{\partial Y} \\ &= p_{a,t}\frac{\partial c_{a,t}}{\partial Y} + p_{b,t}\frac{\partial c_{b,t}}{\partial Y} \\ &= p_{a,t}\frac{c_{a,t}}{Y}\frac{Y}{c_{a,t}}\frac{\partial c_{a,t}}{\partial Y} + p_{b,t}\frac{c_{b,t}}{Y}\frac{Y}{c_{b,t}}\frac{\partial c_{b,t}}{\partial Y} \\ &= s_{a,t}^Y e_a^Y + s_{b,t}^Y e_b^Y \end{aligned}$$

■

Before proving the two propositions, a few remarks on the MPC are useful. Notice that MPC is positive as all its elements are. Moreover, due to Engel's aggregation, the sum of all MPCs is one:

$$\begin{aligned} \sum_t MPC_t &= \sum_t s_{a,t}^Y e_a^Y + \sum_t s_{b,t}^Y e_b^Y \\ \sum_t MPC_t &= e_a^Y \sum_t s_{a,t}^Y + e_b^Y \sum_t s_{b,t}^Y \\ \sum_t MPC_t &= \frac{\gamma_a}{\sum_\tau \sum_{i=a,b} \gamma_i s_{i,\tau}^Y} \sum_t s_{a,t}^Y + \frac{\gamma_b}{\sum_\tau \sum_{i=a,b} \gamma_i s_{i,\tau}^Y} \sum_t s_{b,t}^Y \\ \sum_t MPC_t &= 1 \end{aligned}$$

This implies that if that $s_{i,t}^Y$ is equal to $\Xi \sum_t s_{i,t}^Y$ for both $i = a, b$ and for any Ξ (an example could be $\beta^t(1-\beta)$ if share of each good is constant over present expenditures), then MPC_t is a constant and does not vary with income, this predicts the content of proposition 1. Also notice that the MPC is closely related to the average IES:

$$IES_t^Y = s_{a,t}^X \gamma_a + s_{b,t}^X \gamma_b \tag{8}$$

To build intuition we are going to establish the limiting behavior of this model. We are seeing how the MPC and other key metrics behave when permanent income approaches zero and infinity. Start with the Lagrange multiplier. We know that it is decreasing in income and its relationship is governed by :

$$Y = \sum_t \left[\beta^{t\gamma_a}\lambda^{-\gamma_a}p_{a,t}^{1-\gamma_a} + \beta^{t\gamma_b}\lambda^{-\gamma_b}p_{b,t}^{1-\gamma_b}\right] \tag{9}$$

We can see form here that λ approaches zero as Y tends to infinity and vice-versa. Furthermore, we can use this relationship to show what happens to consumption shares.

$$\sum_t s_{a,t}^Y = \frac{\sum_t \beta^{t\gamma_a}\lambda^{-\gamma_a}p_{a,t}^{1-\gamma_a}}{\sum_\tau \left[\beta^{\tau\gamma_a}\lambda^{-\gamma_a}p_{a,\tau}^{1-\gamma_a} + \beta^{\tau\gamma_b}\lambda^{-\gamma_b}p_{b,\tau}^{1-\gamma_b}\right]}$$
$$\sum_t s_{a,t}^Y = \frac{\sum_t \beta^{t\gamma_a}p_{a,t}^{1-\gamma_a}}{\sum_\tau \left[\beta^{\tau\gamma_a}p_{a,\tau}^{1-\gamma_a} + \beta^{\tau\gamma_b}\lambda^{\gamma_a-\gamma_b}p_{b,\tau}^{1-\gamma_b}\right]}$$

As income tends to infinity this share will tend to one, as $\gamma_a > \gamma_b$. By the same token it will tend to zero as income tends to zero. The opposite is true for $\sum_t s_{b,t}^Y$, which tends to 1 as households become poorer and to 0 as they become richer and consume only non-necessities. This results helps as to see what happens to the income elasticities. e_a^Y will tend to one as income tends to infinity and to γ_a as it approaches zero, on the other hand e_b^Y will tend to γ_b as income tends to infinity and to one as it approaches zero. Furthermore, $s_{a,t}^Y$ will tend to zero as income declines as it is weakly positive in each period and its infinite sum tends to zero. On the other hand, as income increases it will tend to a finite number weakly below one: $s_{a,t}^Y \rightarrow_{Y\to\infty} \frac{\beta^{t\gamma_a}p_{a,t}^{1-\gamma_a}}{\sum_\tau\left[\beta^{\tau\gamma_a}p_{a,\tau}^{1-\gamma_a}\right]}$. Similarly. $s_{a,t}^Y$ will tend to $\frac{\beta^{t\gamma_b}p_{b,t}^{1-\gamma_b}}{\sum_\tau\left[\beta^{\tau\gamma_b}p_{b,\tau}^{1-\gamma_b}\right]}$ and zero as income goes to zero and infinity respectively. Finally, we can see that the MPC will tend to $s_{a,t}^Y|_{Y\to\infty} = \frac{\beta^{t\gamma_a}p_{a,t}^{1-\gamma_a}}{\sum_\tau\left[\beta^{\tau\gamma_a}p_{a,\tau}^{1-\gamma_a}\right]}$ as income goes to infinity and to $s_{b,t}^Y|_{Y\to 0} = \frac{\beta^{t\gamma_b}p_{b,t}^{1-\gamma_b}}{\sum_\tau\left[\beta^{\tau\gamma_b}p_{b,\tau}^{1-\gamma_b}\right]}$ as income goes to zero. By this token, notice that the MPC will be higher at $Y\to\infty$ than at $Y\to 0$ when $s_{a,t}^Y|_{Y\to\infty} > s_{b,t}^Y|_{Y\to 0}$, a result that does generalize as we can see in proposition 1, which we now prove.

Proof of Proposition 1.

For ease of exposition we split the proof in several building blocks.

Part 1. To see how the MPC varies with income let us fist find how expenditure shares and income elasticities vary with income.

$$\begin{aligned}\frac{\partial s^Y_{a,t}}{\partial Y} &= \frac{\partial p_{a,t}c_{a,t}/Y}{\partial Y}\\ &= -p_{a,t}c_{a,t}/Y^2 + p_{a,t}/Y\frac{\partial c_{a,t}}{\partial Y}\\ &= -s^Y_{a,t}/Y + s^Y_{a,t}e^Y_a/Y\\ &= \frac{1}{Y}s^Y_{a,t}\left(e^Y_a - 1\right)\end{aligned}$$

That is, expenditure shares increase for non-necessities a and decline for necessities b as income increases in each period . We can make this explicit:

$$\frac{\partial s^Y_{a,t}}{\partial Y} = \frac{1}{Y}s^Y_{a,t}(\gamma_a - \gamma_b)\frac{\left(\sum_\tau s^Y_{b,\tau}\right)}{\gamma_a\sum_\tau s^Y_{a,\tau} + \gamma_b\sum_\tau s^Y_{b,\tau}}$$

Now find how the income elasticity varies with income:

$$\begin{aligned}\frac{\partial e^Y_a}{\partial Y} &= \frac{\partial\left(\frac{\gamma_a}{\gamma_a\sum_\tau s^Y_{a,\tau}+\gamma_b\sum_\tau s^Y_{b,\tau}}\right)}{\partial Y}\\ &= -\gamma_a\frac{1}{\left(\gamma_a\sum_\tau s^Y_{a,\tau} + \gamma_b\sum_\tau s^Y_{b,\tau}\right)^2}\left(\gamma_a\sum_\tau\frac{\partial s^Y_{a,\tau}}{\partial Y} + \gamma_b\sum_\tau\frac{\partial s^Y_{b,\tau}}{\partial Y}\right)\\ &= -\gamma_a\frac{1}{\left(\gamma_a\sum_\tau s^Y_{a,\tau} + \gamma_b\sum_\tau s^Y_{b,\tau}\right)^2}\left(\gamma_a\sum_\tau\frac{1}{Y}s^Y_{a,\tau}\left(e^Y_a - 1\right) + \gamma_b\sum_\tau\frac{1}{Y}s^Y_{b,\tau}\left(e^Y_b - 1\right)\right)\\ &= -\gamma_a\frac{1}{Y}\frac{1}{\left(\gamma_a\sum_\tau s^Y_{a,\tau} + \gamma_b\sum_\tau s^Y_{b,\tau}\right)^2}(\gamma_a - \gamma_b)^2\frac{\left(\sum_\tau s^Y_{b,\tau}\right)\left(\sum_\tau s^Y_{a,\tau}\right)}{\gamma_a\sum_\tau s^Y_{a,\tau} + \gamma_b\sum_\tau s^Y_{b,\tau}}\\ &< 0\end{aligned}$$

The income elasticity is declining in income for both goods, but it is doing so more quickly for the non-necessity good as all the expression is the same across the two goods except for the initial power term (and we know $\gamma_a > \gamma_b$). We can rewrite it as:

$$\frac{\partial e_a^Y}{\partial Y} = -e_a^Y \frac{1}{Y} \frac{1}{\left(\gamma_a \sum_\tau s_{a,\tau}^Y + \gamma_b \sum_\tau s_{b,\tau}^Y\right)} \left(\gamma_a \sum_\tau s_{a,\tau}^Y \left(e_a^Y - 1\right) + \gamma_b \sum_\tau s_{b,\tau}^Y \left(e_b^Y - 1\right)\right)$$

Part 2. Now move to how the MPC varies with income:

$$\begin{aligned}\frac{\partial MPC_t}{\partial Y} &= \frac{\partial s_{a,t}^Y e_a^Y + s_{b,t}^Y e_b^Y}{\partial Y} \\ &= \frac{\partial s_{a,t}^Y}{\partial Y} e_a^Y + s_{a,t}^Y \frac{\partial e_a^Y}{\partial Y} + \frac{\partial s_{b,t}^Y}{\partial Y} e_b^Y + s_{b,t}^Y \frac{\partial e_b^Y}{\partial Y}\end{aligned}$$

For simplicity, and due to symmetry in the problem, we start by working with the first 2 terms:

$$\begin{aligned}&\frac{\partial s_{a,t}^Y}{\partial Y} e_a^Y + s_{a,t}^Y \frac{\partial e_a^Y}{\partial Y} = \\ &= \frac{1}{Y} s_{a,t}^Y \left(e_a^Y - 1\right) e_a^Y \\ &- s_{a,t}^Y e_a^Y \frac{1}{Y} \frac{1}{\left(\gamma_a \sum_\tau s_{a,\tau}^Y + \gamma_b \sum_\tau s_{b,\tau}^Y\right)} \left(\gamma_a \sum_\tau s_{a,\tau}^Y \left(e_a^Y - 1\right) + \gamma_b \sum_\tau s_{b,\tau}^Y \left(e_b^Y - 1\right)\right) \\ &= \frac{1}{Y} s_{a,t}^Y e_a^Y \frac{1}{\left(\gamma_a \sum_\tau s_{a,\tau}^Y + \gamma_b \sum_\tau s_{b,\tau}^Y\right)} \left[\gamma_a - \left(\gamma_a \sum_\tau s_{a,\tau}^Y e_a^Y + \gamma_b \sum_\tau s_{b,\tau}^Y e_b^Y\right)\right] \\ &= \frac{1}{Y} s_{a,t}^Y e_a^Y \frac{1}{\left(\gamma_a \sum_\tau s_{a,\tau}^Y + \gamma_b \sum_\tau s_{b,\tau}^Y\right)^2} \left[\gamma_a \gamma_b \sum_\tau s_{b,\tau}^Y - \gamma_b^2 \sum_\tau s_{b,\tau}^Y\right] \\ &= \frac{1}{Y} s_{a,t}^Y \left(\sum_\tau s_{b,\tau}^Y\right) \frac{\gamma_a \gamma_b}{\left(\gamma_a \sum_\tau s_{a,\tau}^Y + \gamma_b \sum_\tau s_{b,\tau}^Y\right)^3} \left[\gamma_a - \gamma_b\right] > 0\end{aligned}$$

Similarly for the other terms:

$$
\begin{aligned}
&\frac{\partial s_{b,t}^Y}{\partial Y}e_b^Y + s_{b,t}^Y\frac{\partial e_a^Y}{\partial Y} = \\
&= \frac{1}{Y}s_{b,t}^Y\left(e_b^Y - 1\right)e_b^Y \\
&- s_{b,t}^Y e_b^Y \frac{1}{Y}\frac{1}{\left(\gamma_a\sum_\tau s_{a,\tau}^Y + \gamma_b\sum_\tau s_{b,\tau}^Y\right)}\left(\gamma_a\sum_\tau s_{a,\tau}^Y\left(e_a^Y - 1\right) + \gamma_b\sum_\tau s_{b,\tau}^Y\left(e_b^Y - 1\right)\right) \\
&= -\frac{1}{Y}s_{b,t}^Y\left(\sum_\tau s_{a,\tau}^Y\right)\frac{\gamma_a\gamma_b}{\left(\gamma_a\sum_\tau s_{a,\tau}^Y + \gamma_b\sum_\tau s_{b,\tau}^Y\right)^3}\Bigg[\gamma_a - \gamma_b\Bigg] < 0
\end{aligned}
$$

These two expressions are specular besides the two terms in front and the change in sign. We can use this to find expression for the change in MPC with respect to income:

$$
\begin{aligned}
\frac{\partial MPC_t}{\partial Y} &= \frac{\partial s_{a,t}^Y e_a^Y + s_{b,t}^Y e_b^Y}{\partial Y} \\
&= \frac{\partial s_{a,t}^Y}{\partial Y}e_a^Y + s_{a,t}^Y\frac{\partial e_a^Y}{\partial Y} + \frac{\partial s_{b,t}^Y}{\partial Y}e_b^Y + s_{b,t}^Y\frac{\partial e_b^Y}{\partial Y} \\
&= \frac{1}{Y}s_{a,t}^Y\left(\sum_\tau s_{b,\tau}^Y\right)\frac{\gamma_a\gamma_b}{\left(\gamma_a\sum_\tau s_{a,\tau}^Y + \gamma_b\sum_\tau s_{b,\tau}^Y\right)^3}\Bigg[\gamma_a - \gamma_b\Bigg] \\
&- \frac{1}{Y}s_{b,t}^Y\left(\sum_\tau s_{a,\tau}^Y\right)\frac{\gamma_a\gamma_b}{\left(\gamma_a\sum_\tau s_{a,\tau}^Y + \gamma_b\sum_\tau s_{b,\tau}^Y\right)^3}\Bigg[\gamma_a - \gamma_b\Bigg] \\
\frac{\partial MPC_t}{\partial Y} &= \left[s_{a,t}^Y\left(\sum_\tau s_{b,\tau}^Y\right) - s_{b,t}^Y\left(\sum_\tau s_{a,\tau}^Y\right)\right]\frac{1}{Y}\frac{\gamma_a\gamma_b}{\left(\gamma_a\sum_\tau s_{a,\tau}^Y + \gamma_b\sum_\tau s_{b,\tau}^Y\right)^3}\Bigg[\gamma_a - \gamma_b\Bigg] \qquad (10)
\end{aligned}
$$

Where the last equation is the derivative of the MPC with respect to income we need.

Part 3. Notice that all elements following the first one in square brackets in (10) are positive, if we rearrange that element we can see the result that the MPC is increasing with income if:

$$
\frac{s_{a,t}^Y}{s_{b,t}^Y} > \frac{\left(\sum_\tau s_{a,\tau}^Y\right)}{\left(\sum_\tau s_{b,\tau}^Y\right)}
$$

To show the condition (4) and to prove that the sign depends only on prices and preference parameters plug in the FOCs there and simplify to show that the condition does not depend neither on income, nor on the Lagrange multiplier:

$$\frac{\beta^{t\gamma_a}\lambda^{-\gamma_a}p_{a,t}^{1-\gamma_a}/Y}{\beta^{t\gamma_b}\lambda^{-\gamma_b}p_{b,t}^{1-\gamma_b}/Y} > \frac{\left(\sum_\tau \beta^{\tau\gamma_a}\lambda^{-\gamma_a}p_{a,\tau}^{1-\gamma_a}/Y\right)}{\left(\sum_\tau \beta^{\tau\gamma_b}\lambda^{-\gamma_b}p_{b,\tau}^{1-\gamma_b}/Y\right)}$$

$$\frac{\beta^{t\gamma_a}p_{a,t}^{1-\gamma_a}}{\beta^{t\gamma_b}p_{b,t}^{1-\gamma_b}} > \frac{\left(\sum_\tau \beta^{\tau\gamma_a}p_{a,\tau}^{1-\gamma_a}\right)}{\left(\sum_\tau \beta^{\tau\gamma_b}p_{b,\tau}^{1-\gamma_b}\right)}$$

■

Whereas the sign of the derivative of the MPC with respect to income does not depend on the income level, its magnitude does, so that how an agent will respond to shocks of different sizes differently depending on her position along the income distribution. To this aim, we move to the final proof.

Proof of Proposition 2.

Part 1. Let's start by finding the second derivative of the MPC with respect to income:

$$\begin{aligned}
\frac{\partial^2 MPC_t}{\partial Y^2} = & \left[(e_a^Y-1)s_{a,t}^Y\left(\sum_\tau s_{b,\tau}^Y\right) + (e_b^Y-1)s_{a,t}^Y\left(\sum_\tau s_{b,\tau}^Y\right) - (e_a^Y-1)s_{b,t}^Y\left(\sum_\tau s_{a,\tau}^Y\right)\right. \\
& \left. - (e_b^Y-1)s_{b,t}^Y\left(\sum_\tau s_{a,\tau}^Y\right)\right]\frac{1}{Y^2}\frac{\gamma_a\gamma_b}{\left(\gamma_a\sum_\tau s_{a,\tau}^Y+\gamma_b\sum_\tau s_{b,\tau}^Y\right)^3}\left[\gamma_a-\gamma_b\right] \\
& - \left[s_{a,t}^Y\left(\sum_\tau s_{b,\tau}^Y\right) - s_{b,t}^Y\left(\sum_\tau s_{a,\tau}^Y\right)\right]\frac{1}{Y^2}\frac{\gamma_a\gamma_b}{\left(\gamma_a\sum_\tau s_{a,\tau}^Y+\gamma_b\sum_\tau s_{b,\tau}^Y\right)^3}\left[\gamma_a-\gamma_b\right] \\
& - 3\left[s_{a,t}^Y\left(\sum_\tau s_{b,\tau}^Y\right) - s_{b,t}^Y\left(\sum_\tau s_{a,\tau}^Y\right)\right]\frac{1}{Y^2}\frac{\gamma_a\gamma_b}{\left(\gamma_a\sum_\tau s_{a,\tau}^Y+\gamma_b\sum_\tau s_{b,\tau}^Y\right)^4}\left[\gamma_a-\gamma_b\right] \\
& \left[\gamma_a\left(\sum_\tau s_{a,\tau}^Y\right)(e_a^Y-1)+\gamma_b\left(\sum_\tau s_{b,\tau}^Y\right)(e_b^Y-1)\right] \\
\frac{\partial^2 MPC_t}{\partial Y^2} = & \frac{\partial MPC_t}{\partial Y}\frac{1}{Y}\left[\frac{\gamma_a+\gamma_b}{\left(\gamma_a\sum_\tau s_{a,\tau}^Y+\gamma_b\sum_\tau s_{b,\tau}^Y\right)} - 3 - 3\frac{(\gamma_a-\gamma_b)^2\left(\sum_\tau s_{a,\tau}^Y\right)\left(\sum_\tau s_{b,\tau}^Y\right)}{\left(\gamma_a\sum_\tau s_{a,\tau}^Y+\gamma_b\sum_\tau s_{b,\tau}^Y\right)^2}\right] \\
\frac{\partial^2 MPC_t}{\partial Y^2} = & \frac{\partial MPC_t}{\partial Y}\frac{1}{Y}\frac{1}{\left(\gamma_a\sum_\tau s_{a,\tau}^Y+\gamma_b\sum_\tau s_{b,\tau}^Y\right)^2} \\
& \left[\gamma_a^2\left(\sum_\tau s_{a,\tau}^Y\right)+\gamma_a\gamma_b+\gamma_b^2\left(\sum_\tau s_{b,\tau}^Y\right)-3\gamma_a^2\left(\sum_\tau s_{a,\tau}^Y\right)-3\gamma_b^2\left(\sum_\tau s_{b,\tau}^Y\right)\right]
\end{aligned}$$

Which gives the expression for the second derivative of the MPC with respect to income.

$$\frac{\partial^2 MPC_t}{\partial Y^2} = \frac{\partial MPC_t}{\partial Y}\frac{1}{Y}\frac{1}{\left(\gamma_a \sum_\tau s^Y_{a,\tau} + \gamma_b \sum_\tau s^Y_{b,\tau}\right)^2}\left[\gamma_a\gamma_b - 2\gamma_a^2\left(\sum_\tau s^Y_{a,\tau}\right) - 2\gamma_b^2\left(\sum_\tau s^Y_{b,\tau}\right)\right] \tag{11}$$

Part 2. The results comes form inspecting (11). We consider the case of increasing MPC in income, $\frac{\partial MPC_t}{\partial Y} > 0$. Therefore the sign the second derivative depends only on the last term in the square brackets. From there we can see that for high values of income the MPC is always concave as we have $\gamma_a > \gamma_b$:

$$\begin{aligned}\lim_{Y\to\infty} \gamma_a\gamma_b - 2\gamma_a^2\left(\sum_\tau s^Y_{a,\tau}\right) - 2\gamma_b^2\left(\sum_\tau s^Y_{b,\tau}\right) &= \gamma_a\gamma_b - 2\gamma_a^2 \\ &< \gamma_a\gamma_a - 2\gamma_a^2 \\ &= -\gamma_a^2 \\ &< 0\end{aligned}$$

With respect to the behavior for low values of income we can see how for $\gamma_b < \frac{\gamma_a}{2}$ we have a convex MPC:

$$\begin{aligned}\lim_{Y\to 0} \gamma_a\gamma_b - 2\gamma_a^2\left(\sum_\tau s^Y_{a,\tau}\right) - 2\gamma_b^2\left(\sum_\tau s^Y_{b,\tau}\right) &= \gamma_a\gamma_b - 2\gamma_b^2 \\ \gamma_a\gamma_b - 2\gamma_b^2 &> 0 \\ \gamma_b &< \frac{\gamma_a}{2}\end{aligned}$$

Part 3. Finally, we can find the threshold output $\bar{Y}$ and threshold contemporaneous expenditures $\bar{s}^X_{a,0}$ from noticing that both are monotonically related (both increasing) to the threshold implied by the term in the square bracket:

$$\overline{\left(\sum_{\tau} s^{Y}_{b,\tau}\right)} = \frac{\gamma_b(\gamma_a - 2\gamma_b)}{2(\gamma_a^2 - \gamma_b^2)}$$

To see that, take the derivative of the average expenditures with respect to income:

$$\begin{aligned}
\frac{\partial \sum_\tau s^{Y}_{a,\tau}}{\partial Y} &= \frac{\partial}{\partial Y} \frac{\sum_\tau \beta^{\tau\gamma_a} p_{a,\tau}^{1-\gamma_a}}{\sum_\tau \left[\beta^{\tau\gamma_a} p_{a,\tau}^{1-\gamma_a} + \beta^{\tau\gamma_b}\lambda^{\gamma_a-\gamma_b} p_{b,\tau}^{1-\gamma_b}\right]} \\
&= \frac{\sum_\tau \beta^{\tau\gamma_a} p_{a,\tau}^{1-\gamma_a}}{\left(\sum_\tau \left[\beta^{\tau\gamma_a} p_{a,\tau}^{1-\gamma_a} + \beta^{\tau\gamma_b}\lambda^{\gamma_a-\gamma_b} p_{b,\tau}^{1-\gamma_b}\right]\right)^2} \left(\sum_\tau \beta^{\tau\gamma_b}\lambda^{\gamma_a-\gamma_b} p_{b,\tau}^{1-\gamma_b}\right) (\gamma_a - \gamma_b)(-1)\frac{\partial \lambda}{\partial Y} > 0
\end{aligned}$$

Which is positive as all elements are besides the last two. We can make a similar argument for the current share if we notice that we can write it in a similar way:

$$\begin{aligned}
\frac{\partial}{\partial Y} s^{X}_{a,t} &= \frac{\partial}{\partial Y} \frac{s^{Y}_{a,t}}{s^{Y}_{a,t} + s^{Y}_{b,t}} \\
&= \frac{\partial}{\partial Y} \frac{\beta^{t\gamma_a} p_{a,t}^{1-\gamma_a}}{\left[\beta^{t\gamma_a} p_{a,t}^{1-\gamma_a} + \beta^{t\gamma_b}\lambda^{\gamma_a-\gamma_b} p_{b,t}^{1-\gamma_b}\right]} \\
&= \frac{\beta^{t\gamma_a} p_{a,t}^{1-\gamma_a}}{\left[\beta^{t\gamma_a} p_{a,t}^{1-\gamma_a} + \beta^{t\gamma_b}\lambda^{\gamma_a-\gamma_b} p_{b,t}^{1-\gamma_b}\right]^2} \left(\beta^{t\gamma_b}\lambda^{\gamma_a-\gamma_b} p_{b,t}^{1-\gamma_b}\right) (\gamma_a - \gamma_b)(-1)\frac{\partial \lambda}{\partial Y} > 0
\end{aligned}$$

This implies that we can define the threshold in terms of output and current observable shares. ■

F.2 Simplified model

To build intuition for proposition 1 we take a simplified setting, one where there is a constant trend growth in prices for both goods such that: $p_{a,t} = (R^{-1}g_a)^t p_{a,0}$ and $p_{b,t} = (R^{-1}g_b)^t p_{b,0}$, where R^{-1} is there in order to signal how prices are growing after discounting at the market rate. Plug this into 4 for MPC_0:

$$\frac{p_{a,0}^{1-\gamma_a}}{p_{b,0}^{1-\gamma_b}} > \frac{\left(\sum_{\tau=0}^{\infty} \beta^{\tau\gamma_a} p_{a,\tau}^{1-\gamma_a}\right)}{\left(\sum_{\tau=0}^{\infty} \beta^{\tau\gamma_b} p_{b,\tau}^{1-\gamma_b}\right)}$$

$$\frac{p_{a,0}^{1-\gamma_a}}{p_{b,0}^{1-\gamma_b}} > \frac{\left(\sum_{\tau=0}^{\infty} \beta^{\tau\gamma_a} p_{a,0}^{1-\gamma_a} (R^{-1}g_a)^{\tau(1-\gamma_a)}\right)}{\left(\sum_{\tau=0}^{\infty} \beta^{\tau\gamma_b} p_{b,0}^{1-\gamma_b} (R^{-1}g_b)^{\tau(1-\gamma_b)}\right)}$$

$$\left(\sum_{\tau=0}^{\infty} \beta^{\gamma_b\tau} (R^{-1}g_b)^{\tau(1-\gamma_b)}\right) > \left(\sum_{\tau=0}^{\infty} \beta^{\gamma_a\tau} (R^{-1}g_a)^{\tau(1-\gamma_a)}\right)$$

$$\beta^{\gamma_b} (R^{-1}g_b)^{(1-\gamma_b)} > \beta^{\gamma_b} (R^{-1}g_a)^{(1-\gamma_a)}$$

$$g_b^{(1-\gamma_b)} > g_a^{(1-\gamma_a)} (R\beta)^{\gamma_a-\gamma_b}$$

For $\beta^{\gamma_b}(R^{-1}g_a)^{(1-\gamma_a)} < 1$ and $\beta^{\gamma_b}(R^{-1}g_b)^{(1-\gamma_b)} < 1$. In the empirically plausible case of $\gamma_a > 1 > \gamma_b$, with $R\beta \leq 1$, we need growth in non-necessities price to be high enough: $g_a > g_b^{\frac{\gamma_b-1}{\gamma_a-1}} (R\beta)^{\frac{\gamma_a-\gamma_b}{\gamma_a-1}}$. Take various cases:

- If $g_b = 1$ and $R\beta = 1$ we just need positive trend growth for non-necessities: $g_a > 1$.

- If $g_b > 1$ and $R\beta = 1$ notice that the condition weakens, a lower trend growth g_a is enough with a threshold < 1. This might appear counterintuitive, but the reason is that, with $\gamma_b < 1$ income effects are stronger than substitution effects for good b, so households would tilt consumption expenditures away from where it is cheaper, that is today with $g_b > 1$.

- For any γ_b, having $R\beta < 1$ also allows for a lower threshold for g_a. The reason is that the present becomes relatively more beneficial, so agents would tilt consumption relatively more to commodities which are easier to shift intertemporally: the non-necessities. This can be seen from the exponent to $R\beta$ being $\gamma_a - \gamma_b$.

Further notice that even if $\gamma_a > \gamma_b > 1$ the expression remains $g_a > g_b^{\frac{\gamma_b-1}{\gamma_a-1}} (R\beta)^{\frac{\gamma_a-\gamma_b}{\gamma_a-1}}$, but now the exponent on g_b is positive, but below one. This implies that even in this case $g_a > g_b > 1$ would be sufficient to guarantee an increasing MPC on income.

The question is whether the condition is satisfied in the data. First of all, in the data it is likely that, especially recently, $R\beta < 1$, making it more likely that the condition is satisfied for any g_a and g_b. Furthermore, the data seem to point to $g_a > g_b > 1$, making the condition trivially satisfied for $\gamma_a > 1 > \gamma_b$. The first two panels of Figure G.1 provides support for $g_a > g_b$ both for Italy and the United States taking food consumption at home and away from home as a proxy. The bottom two panels of the same figure present evidence on how sub-indices of the CPI which plausibly include more non-necessity goods have been growing faster in both Italy and the United States for the past 25 years.

F.3 Calibration

In this subsection, we discuss the calibration of the simplified model to bring it to the data, in order to construct Figures 5 and 6. The calibrated parameters are in Table F.2. We normalize prices in period 0 to one for both goods. The calibration of β and R is standard and it maps exactly to the Aiyagari (1994) model. With respect to the calibration of γ_a and γ_b, we do not have direct empirical evidence that reflects on the overall budget of the households.[36] However, we have indirect evidence of how the average IES varies along the income distribution, and this metric maps directly to the MPC expression in equation (8) of Appendix F1. More specifically, Attanasio, Banks and Tanner (2002) estimate IESs for non-stock market participants (which we view as low-income households) and stock market participants (which we regard as affluent families) from household expenditure survey data and the nominal interest rate on Treasury bills (see their Table 2). We map their estimates to γ_a and γ_b using the expression in equation (8) of Appendix F together with data on non-necessities shares along the household cash-on-hand distribution in Table F.1.[37] For poor households, we set $\gamma_b = 0.1168$, which is the inverse of the IES estimate of 8.564 estimated by Attanasio, Banks and Tanner (2002), according to the notion that low-income families consume a negligible share of non-necessities (i.e. $s^X_{a,t} = 0$). As for γ_a, we use equation (8) again, the calibrated value of 0.1168 for γ_b, the inverse of the IES for rich households

[36] Crossley and Low (2011) estimate the good specific IES on a subset of goods for which they have good price data, but cannot estimate it for all categories. Notice that, on this subset, they find evidence for $\gamma_a > 1 > \gamma_b$ and for $\gamma_a > 2\gamma_b$ necessary for proposition 2.

[37] As additional evidence, the recent work by Calvet et al. (2021) on detailed Swedish data and using Epstein-Zin preference to separately identify the IES and the risk aversion coefficient also find heterogeneous IES estimates that are in line with with our calibration: households with a higher wealth to income ratio tend to have a higher IES.

estimated by Attanasio, Banks and Tanner (2002) (i.e. one over 0.458) and the non-necessity consumption share for the tenth decile of the cash-on-hand distribution (i.e. $s^X_{a,t} = 0.167$). This results in $\gamma_a = 10.3651$. In Appendix Section I.2, we account for the uncertainty around the parameters γ_a and γ_b.

Finally, we calibrate $g_a = 1.03$ and $g_b = 1.015$ from data on inflation on food at home and outside form home in Italy and in the United States presented in Figure G.1. The other parameters β and R are standard are calibrated to the same values as in the Aiyagari (1994) model at 0.95 and 1.01 respectively.

F.4 From expenditure shares to MPC

As discussed in 5.2, in this class of non-homothetic models we do not have scale invariance with respect to the income scale choice, but we do have it with respect to observable expenditure shares on necessities and non necessities ($s^X_{a,0}$ and $s^X_{b,0}$). We use this insight to map the model to the data where we use data from Table F.1.[38]

For a given calibration and an expenditure share $s^X_{a,0}$, we take the following steps:

1. Compute the all set of prices $\{p_{a,t}, p_{b,t}\}_{t=0}^{\infty}$
2. Obtain the Lagrange multiplier numerically with the expression for the FOCs (6):

$$s^X_{a,0} = \frac{\lambda^{-\gamma_a} p_{a,0}^{1-\gamma_a}}{\lambda^{-\gamma_a} p_{a,0}^{1-\gamma_a} + \lambda^{-\gamma_b} p_{b,0}^{1-\gamma_b}}$$

3. Compute Y from (9)
4. Obtain $Y_{1m} = Y + Y(1-\beta)/12$ and $Y_{1y} = Y + Y(1-\beta)$
5. Compute resulting λ_{1m} and λ_{1y} from (9)
6. Obtain the MPCs out of these two income levels with (6), (2), and (3)
7. Check slope and convexity of the MPC with (10) and (11)

[38] In order to deal with zero shares and to ensure interior solutions we add an "eps" of 2.2204e-16% to the necessity shares in the computation.

Table F.1: Statistics by deciles of cash-on-hand

	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eigth	Ninth	Tenth
Consumption	14.25	13.40	16.80	18.60	20.40	23.40	25.20	28.75	30.60	41.21
Income	5.349	10.80	14.31	17.63	21.02	23.16	25.01	28.05	31.42	42.94
Financial assets	0	0	2.426	3.696	5	9.500	15.38	25.32	46.59	103
Cash-on-hand	6.354	12	16.91	21.48	26.29	32.52	40.87	53.74	78.27	149.9
Eating out share	0	0	0	0	0.0400	0.0667	0.103	0.111	0.130	0.167

Notes: The table shows the median value for each variable for each decile of cash-on-hand. Cash-on-hand is the sum of disposable income and financial assets. The sample includes households we observe in both waves as in the main regressions. Consumption, income, financial assets, and cash-on-hand are 2010 values in current thousands of Euros.

Table F.2: Non-homothetic model calibration

Parameter	Value	Description
β	0.95	Discount Factor
R	1.01	Interest Rate
γ_a	10.3651	Non-Necessities IES
γ_b	0.1168	Necessities IES
g_a	1.03	Non-Necessities Inflation
g_b	1.015	Necessities Inflation

Notes: The first two parameters are standard and match the Aiyagari (1994) model calibration. The two power elasticity parameters are calibrated by matching the average IES for poor and rich households estimated by Attanasio, Banks and Tanner (2002). The inflation parameters come from the inflation on food at home and away from home in Italy.

To find $\bar{Y}$ for proposition 2 we take similar steps as above, but rather than starting from an expenditure share $s_{a,0}^X$ we simply iterate on Y until we find zero convexity in the MPC with (11). As shown in the proof of proposition 2, if the conditions outlined are satisfied, the second derivative of the MPC with respect to income is continuous and crosses zero only once on the strictly positive and finite space, guaranteeing a unique solution.

G Macro Price Data Description

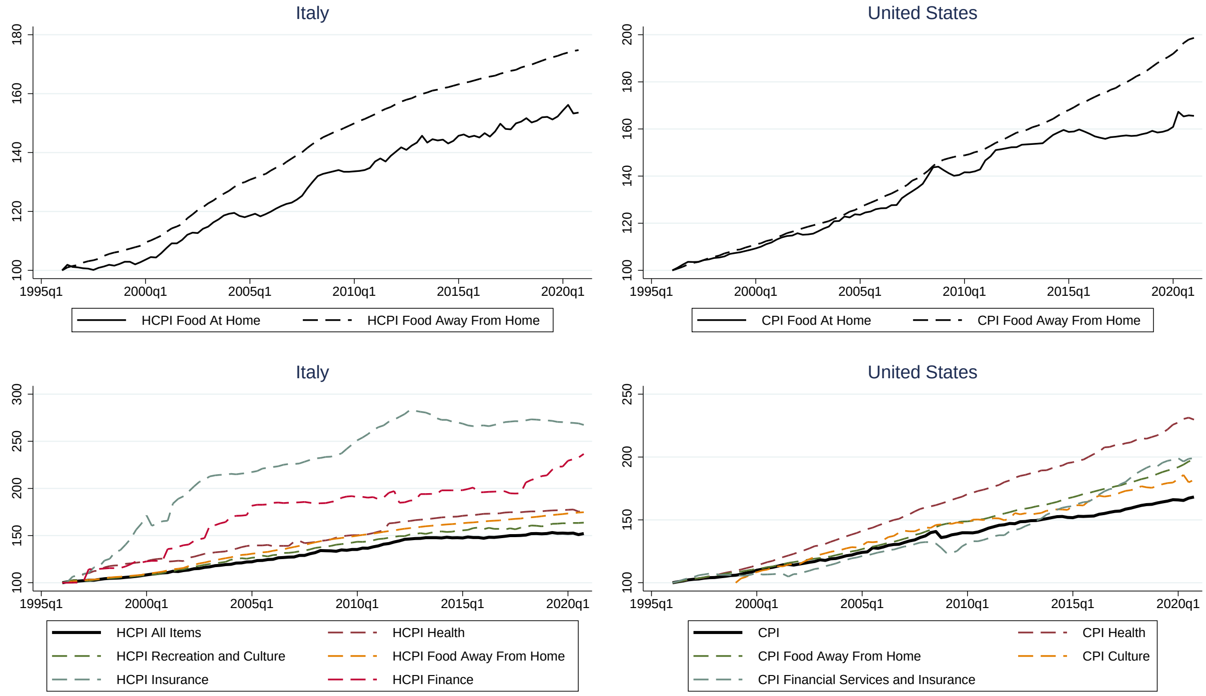
In this appendix, we provide the details on how we constructed Figure G.1. All data comes from FRED, to construct quarterly data we used end of quarter monthly data. We normalize all series at 100 on 1996Q1, except for the US series for Culture, which starts in 1999Q1. For that series we normalize at 100 on this date. In Table G.1 we report all series codes with their description.

Table G.1: Macro price data description

Series Name	FRED Code	Description
CPI	cpiaucsl	Consumer Price Index for All Urban Consumers: All Items in U.S. City Average
CPI Food Away From Home	cusr0000sefv	Consumer Price Index for All Urban Consumers: Food Away from Home in U.S. City Average
CPI Food At Home	cusr0000saf11	Consumer Price Index for All Urban Consumers: Food at Home in U.S. City Average
CPI Health	cpimedsl	Consumer Price Index for All Urban Consumers: Medical Care in U.S. City Average
CPI Financial Services and Insurance	difsrg3q086sbea	Personal consumption expenditures: Financial services and insurance (chain-type price index)
CPI Culture	cusr0000ss62031	Consumer Price Index for All Urban Consumers: Admission to Movies, Theaters, and Concerts in U.S. City Average
HCPI	cp0000itm086nest	Harmonized Index of Consumer Prices: All Items for Italy
HCPI Food Away From Home	cp1111itm086nest	Harmonized Index of Consumer Prices: Restaurants, cafés, and the Like for Italy
HCPI Food At Home	cp0110itm086nest	Harmonized Index of Consumer Prices: Food for Italy
HCPI Health	cp0600itm086nest	Harmonized Index of Consumer Prices: Health for Italy
HCPI Recreation and Culture	cp0940itm086nest	Harmonized Index of Consumer Prices: Recreational and Cultural Services for Italy
HCPI Insurance	cp1250itm086nest	Harmonized Index of Consumer Prices: Insurance for Italy
HCPI Finance	cp1260itm086nest	Harmonized Index of Consumer Prices: Financial Services, Not Elsewhere Classified for Italy

Notes: All data can be downloaded from FRED with the code shown in the second column. All series starting with CPI refer to the United States, all series starting with HCPI refer to Italy.

Figure G.1: Consumer Price Indeces for different categories and sub-categories of household expenditure proxying essential and non-essential consumption in Italy and the United States



Notes: All data comes from FRED. Monthly series are converted to quarterly ones with end of quarter values. CPI Culture starts in 1999Q1, all other in 1996Q1. All series are normalized at 100 on their starting period.

H Aiyagari's Model Derivations

We solve a partial equilibrium version of the model by Aiyagari (1994). Households maximize a standard CRRA utility with elasticity of intertemporal substitution equal to γ and where they can invest in a riskless asset a_t with gross rate R, cannot have negative wealth $a_{t+1} \geq 0$, and face idiosyncratic income risk:

$$\begin{aligned}
\max_{\{c_t, a_{t+1}\}_{t=0}^{\infty}} \mathbb{E}_0 & \left[\sum_{t=0}^{\infty} \beta^t \frac{c_t^{1-\frac{1}{\gamma}} - 1}{1 - \frac{1}{\gamma}} \right] \\
s.t. & \\
a_{t+1} + c_t & \leq y_t + R a_t \\
a_{t+1} & \geq 0 \\
y_t & = \exp(\eta_t + \varepsilon_{2,t}) \\
\eta_t & = \rho \eta_{t-1} + \varepsilon_{1,t}
\end{aligned}$$

Income y_t has two components, a persistent one η_t and a transitory one $\varepsilon_{2,t}$. The persistence of η_t is governed by ρ and its shock is $\varepsilon_{1,t}$, which is an iid normal income shock with standard deviation σ_1. $\varepsilon_{2,t}$ is also distributed as an iid normal with standard deviation σ_2. We solve for the policy functions $c(a, \eta, \varepsilon_2)$ and $a'(a, \eta, \varepsilon_2)$ globally with value function iteration with the Howard's improvement algorithm and compute the MPC out of a one-off income shock by picking different values of ε_2. As our calibration is annual, we pick $\exp(\varepsilon_2) = 1 + 1$ for the one year shock, $\exp(\varepsilon_2) = 1 + 1/12$ for the one month shock, and $\exp(\varepsilon_2) = 1 + 0$ for the comparison under no shock. Notice that the expression for y is multiplicative in $\exp(\eta)$ and $\exp(\varepsilon_2)$, so that any temporary shock $\exp(\varepsilon_2)$ multiplies the persistent income $\exp(\eta)$; consequently, agents with a higher persistent income have a one month (year) shock relative to their income, as in the data. For any wealth and persistent income state pair (a, η), we compute cash-on-hand as $cash(a, \eta) = \exp(\eta) + Ra$ under no shock and the corresponding

MPCs numerically with these two shocks plugged in the policy functions:

$$
\begin{aligned}
MPC_{1y}(a,\eta) &= \frac{c(a,\eta,\ln(1+1)) - c(a,\eta,\ln(1))}{\exp(\eta)(1+1) - \exp(\eta)1} = \frac{c(a,\eta,\ln(1+1)) - c(a,\eta,\ln(1))}{\exp(\eta)} \\
MPC_{1m}(a,\eta) &= \frac{c(a,\eta,\ln(1+1/12)) - c(a,\eta,\ln(1))}{\exp(\eta)(1+1/12) - \exp(\eta)1} = \frac{c(a,\eta,\ln(1+1/12)) - c(a,\eta,\ln(1))}{\exp(\eta)1/12}
\end{aligned}
$$

Next, we need aggregate these MPCs to be consistent with the data. Specifically, notice how cash on hand in the model is relative to an average per capita annual income of 1. Therefore, as a first step, we transform the data by dividing cash on hand over average income (all per capita). As a second step, we compute the deciles of this transformed cash on hand. Third, for a given shock size, we average all theoretical MPCs with cash on hand comprised by these empirical decile thresholds. Finally, we plot this result with a lowess smoother. The upper panel of figure 5 shows the outcome of this exercise.

We take a standard calibration that is as comparable as possible with the non-homothetic model. We calibrate the elasticity of intertemporal substitution $\gamma = 0.995$, which is equal to the IES for the non-homothetic model for a household with an average income, by using equation (8) with $s^X_{a,t} = 8.57\%$. We also match the discount factor β and the real interest rate on saving (agents cannot borrow in this model) R to the non-homothetic model. Their values are standard and are equal to 0.95 and 1.01, respectively. The other parameters are standard at $\rho = 0.8$, $\sigma_1 = 0.01$, and $\sigma_2 = 0.03$.

The results are standard for this class of models. When agents are relatively closer to the borrowing limit, they exhibit stronger precautionary saving behavior because of the utility function prudence, thereby lowering the MPC for low level of cash-on-hand. On the other hand, agents at the borrowing constraint exhibit higher MPC as they would borrow if they could, thereby increasing the MPC for low levels of cash-on-hand, with this effect prevailing on the previous one. This implies that the MPC is higher for poor households than for wealthier ones for a given shock size. Moreover, a bigger shock size results into a lower MPC for a given affluence level as a bigger shock is more likely to push the agent away from the borrowing constraint.

I Mixture of Models Further Results

I.1 MPC levels

In this appendix, we provide an additional result on the mixture of models presented in Section 5 and its ability to match the data. We kept both the borrowing constraint and the non-homothetic models as simple as possible in order to highlight the economic mechanisms and to obtain close form expressions on the behavior of the MPC for the novel non-homothetic model. Despite the simplicity, the mixture of the two model explains, quantitatively, the main empirical finding that poorer households exhibit a higher MPC out of small shocks than large shocks, whereas the opposite is true for richer households. One common drawback of these simple models is that they cannot explain the overall high levels of MPCs found empirically. To complete the analysis, we present the predictions for the levels of the MPCs for the mixture of models and show that, despite not hitting the overall level, the model can match the overall shape of the MPC behavior across shock size and cash-on-hand deciles.

Figure I.1 is the counterpart in level of Figure 6. It plots the theoretical predictions and empirical coefficients for the MPCs out of the large and small shocks in levels along the cash-on-hand distribution. It presents the theoretical predictions obtained by mixing the borrowing constraint model and the non-homothetic model, with the same method discussed for Figure 6. The empirical predictions, with the 95% bands, come from the coefficients on the cash-on-hand deciles from columns 4 (for the small shock) and 5 (for the large shock), controlling for demographic controls, from the tobit regressions presented in Table 2.

The level of the theoretical MPCs is lower than the one for the empirical estimates by about 0.25 points. The MPC out of a small shock at the lowest cash-on-hand decile for the theoretical prediction is around 0.4, whereas the empirical one is 0.65. At the other end, for the highest decile, the theoretical prediction is 0.05 and the empirical is 0.3. The theoretical MPC prediction for the small shock is a parallel shift downward of the empirical one, that preserves the overall shape. A similar pattern emerges while comparing the theoretical and empirical MPCs for the large shock. Both curves are essentially flat along the cash-on-hand distribution, with the empirical one being slightly increasing, and the theoretical one having a small negative slope for the lowest deciles. The crossing of the small and large MPCs is between the sixth and seventh deciles for both the theoretical and empirical cases.

I.2 Parameter uncertainty

In this appendix, we address the uncertainty in the parameters governing the intertemporal elasticities of substitution: γ_a and γ_b in the non-homothetic model, and γ in the Aiyagari (1994) model. We do this by exploiting the uncertainty in the IES estimates provided by Attanasio, Banks and Tanner (2002). We draw 1000 times from the distribution of the inverse of the IESs: for the poor households we draw the inverse of the IES from a truncated normal, with positive support, a mean of 8.564 and a standard deviation of 4.165. For rich households, we draw from a truncated normal, with positive support, a mean of 0.548 and a standard deviation of 0.149. We compute γ_a and γ_b using the same methodology as in Appendix F.3. We keep the draws that result in positive γ_a and γ_b. For each draw, we then calculate the IES corresponding to the average household income using equation (8) and $s^X_{a,t} = 8.57\%$. This is γ for the Aiyagari (1994) model. Given these parameters, we compute the MPC out of small and large shocks as well as their difference in each model and their mixture. This yields a distribution of parameters and of differences in MPCs: the results of this exercise are presented in Table I.1 below.

In the first column of Table I.1, we report the point estimates of the γ's as well as the point estimates of the differences in MPCs (small less large shock). These correspond to the black dashed model line presented in Figure 6 of the main text. Table I.1 reveals a substantial variation in the IESs parameters, with γ_a going from 7.185 to 15.951 moving from the 10th to the 90th percentile and γ_b ranging from 0.072 to 0.305. Moreover, the IES of an average income household also moves significantly, from 0.762 to 1.542. At the same time, the prediction on the differences in MPC along the cash-on-hand distribution is robust to uncertainty in the parameters governing the intertemporal elasticities of substitution: poor households are always characterized by a larger MPC out of a smaller windfall (i.e. a positive difference) while the most affluent families persistently exhibit a larger MPC out of a bigger windfall (i.e. a negative difference).

Table I.1: Accounting for uncertainty in the intertemporal elasticities of substitution

		point estimate	p10	p25	p50	p75	p90
Diff	I cash-on-hand decile	0.167	0.149	0.156	0.168	0.184	0.205
	II cash-on-hand decile	0.108	0.097	0.102	0.110	0.121	0.135
	III cash-on-hand decile	0.108	0.097	0.102	0.110	0.071	0.077
	IV cash-on-hand decile	0.036	0.036	0.039	0.043	0.047	0.053
	V cash-on-hand decile	0.023	0.016	0.021	0.025	0.028	0.031
	VI cash-on-hand decile	0.011	-0.007	0.003	0.011	0.015	0.018
	VII cash-on-hand decile	-0.004	-0.027	-0.014	-0.003	0.004	0.009
	VIII cash-on-hand decile	-0.017	-0.051	-0.031	-0.015	-0.004	0.002
	IX cash-on-hand decile	-0.039	-0.094	-0.061	-0.035	-0.018	-0.008
	X cash-on-hand decile	-0.118	-0.256	-0.173	-0.108	-0.062	-0.034
	γ^a	10.365	7.185	8.375	10.065	12.642	15.951
	γ^b	0.117	0.072	0.088	0.119	0.180	0.305
	γ	0.995	0.762	0.858	1.005	1.242	1.542

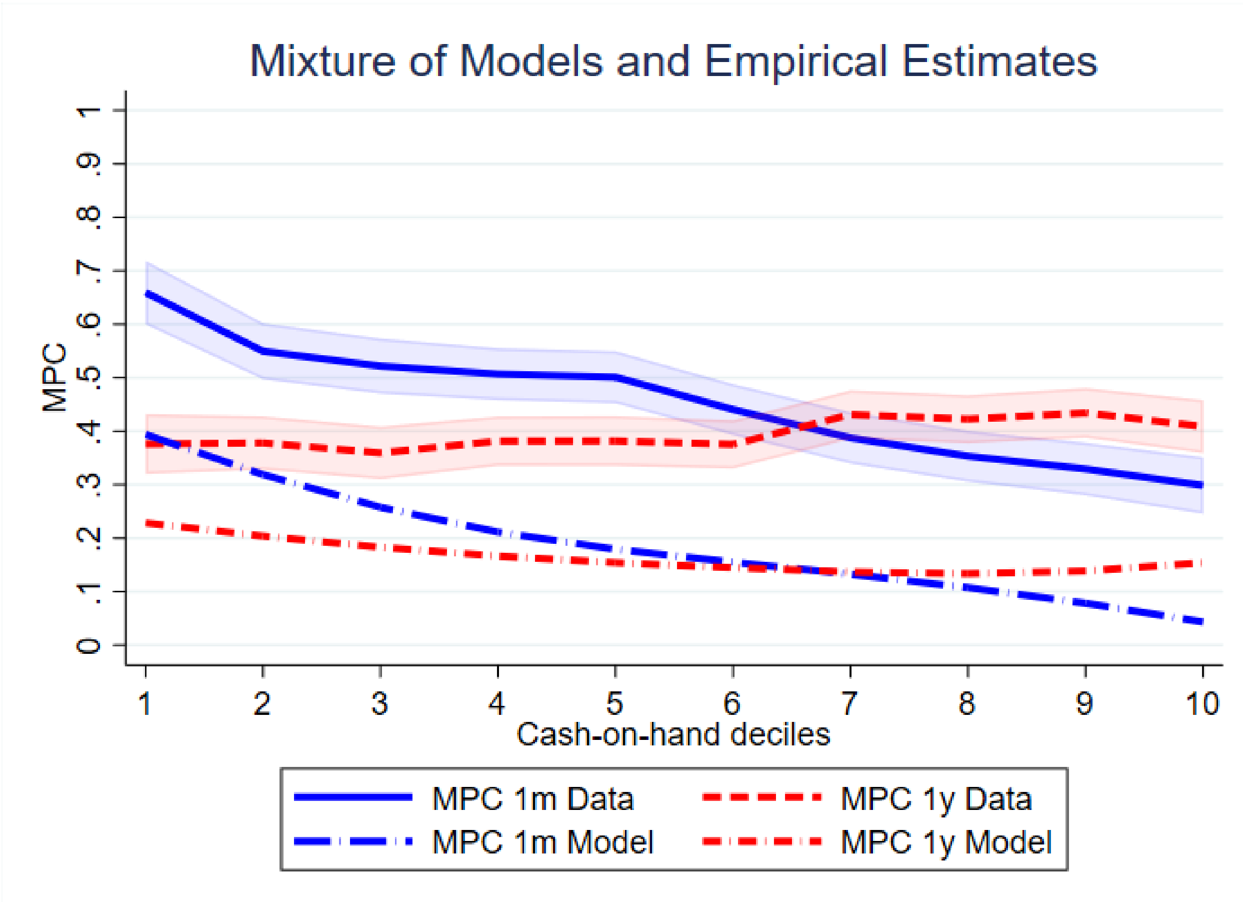
Notes: The table accounts for uncertainty in the intertemporal elasticities of substitution: γ_a and γ_b and the resulting γ. It draws from the distribution of IESs in Attanasio, Banks and Tanner (2002) to compute γ_a and γ_b for the non-homothetic model and it computes the corresponding γ for the Aiyagari (1994) model with equation (8). For each draw, it computes the implied MPCs for each model and the mixture of models to construct the implied difference in MPCs across the cash-on-hand distribution ("Diff" is the one month MPC less one year MPC).

I.3 Changes in Macroeconomic Conditions

In 2012, macroeconomic conditions deteriorated significantly in Italy, due to the European sovereign debt crisis. Therefore, it is possible that the high MPC we observe in 2012 might be due to higher interest rate and higher uncertainty. We address this concern in this appendix by solving the model for the large shock (measured in 2012) with a different calibration. Specifically, we increase the value of the short run interest rate from 1% to 2% (the Italian t-bill rate in 2010 was 1.1333% and in 2012 1.859%. See annual values in FRED: INT-GSTITM193N). Moreover, for the Aiyagari model, we double the standard deviation in the income process both for the temporary (from 0.03 to 0.06) and persistent (from 0.01 to 0.02) shocks.

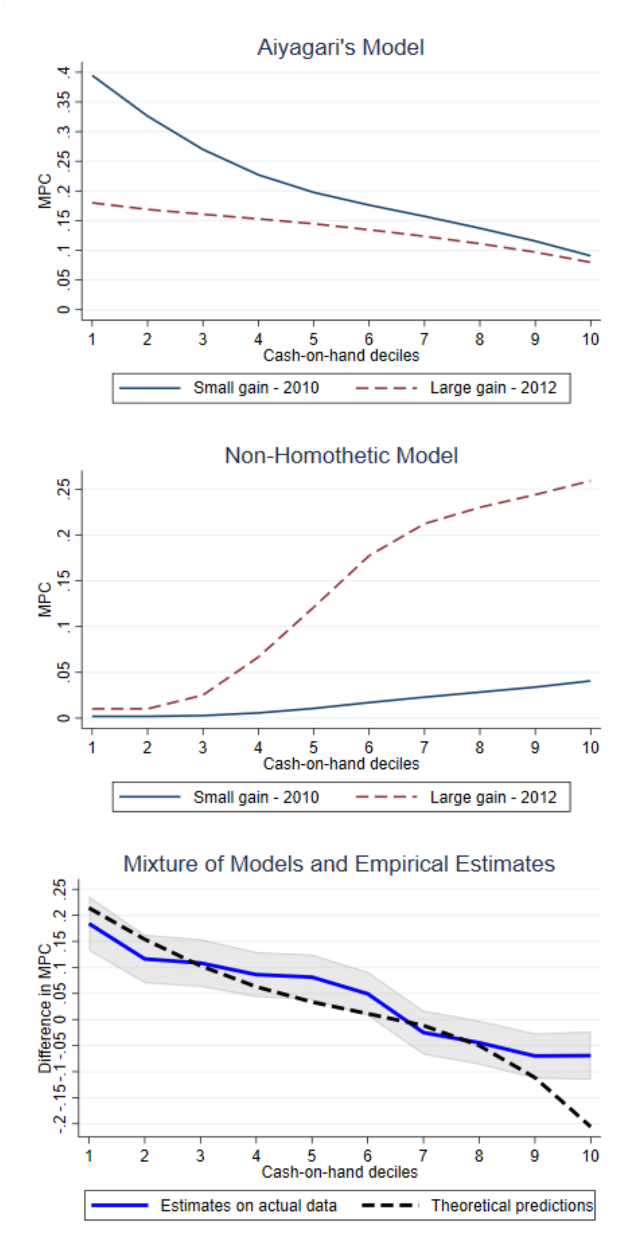
Figure I.2 shows the results of this exercise. The new model predictions are close to the old ones. If anything, the MPCs difference becomes even more negative for richer households because, the non-homothetic model predicts a higher MPC out of a large shock. If anything, the Aiyagari model on its own would have predicts a lower MPC out of a large shock, as the higher income uncertainty leads to a lower MPC for unconstrained households.

Figure I.1: MPC levels across shock size by cash-on-hand deciles — models and estimates.



Notes: The figure plots the MPCs out of the small gain (equal to one month of income) and the MPCs out of the large gain (equal to one year of income) in levels. The empirical estimates and the 95% confidence interval refer to the Tobit regression displayed in columns 4 and 5 of Table 2 and represent the marginal effects of the deciles of cash-on-hand on the latent uncensored MPC levels controlling for demographic characteristics for the small (with the blue solid line) and large gain (with the red dashed line), respectively. The theoretical predictions are obtained combining the quantitative results of the models with borrowing constraints and non-homothetic preferences about the MPC levels for shocks of size equal to one month (with the blue dot-long dash line) and one year (with the red dot-short dash line) of income, respectively. The models are mixed such that the probability that the observed spending behaviour is generated by the non-homothetic preference model in each decile of the cash-on-hand distribution is equal to the average individual cash-on-hand of that decile over the average in the tenth decile.

Figure I.2: MPC out of large income gains, small income gains, and MPC differences across shock size in the theoretical models with different macroeconomic conditions.



Notes: The first panel plots the MPCs from a Aiyagari model, the second panel plots the MCPs from the non-homothetic model. The first two panels show the MPCs out of a small (one month, in blue) and of a large (one year, in red) temporary income shocks. Each line is plotted with a lowess smoother. The x-axis moves along the theoretical counterpart to the empirical cash-on-hand distribution for 2010. In the third panel, the MPC differences are calculated as the difference between the MPC out of the small gain (equal to one month of income) less the MPC out of the large gain (equal to one year of income). The empirical estimates and the 95% confidence interval refer to the Tobit regression displayed in column 6 of Table 2 and represent the marginal effects of the deciles of cash-on-hand on the latent uncensored MPC difference controlling for demographic characteristics. The theoretical predictions are obtained combining the quantitative results of the models with borrowing constraints and non-homothetic preferences about the MPC difference for shocks of size equal to one month and one year of income, respectively. The models are mixed such that the probability that the observed spending behaviour is generated by the non-homothetic preference model in each decile of the cash-on-hand distribution is equal to the average individual cash-on-hand of that decile over the average in the tenth decile. The theoretical model predictions for the one month shock are calibrated with 2010 macroeconomic data, for the one year shock are calibrated with 2012 macroeconomic data.

J Additional Fiscal Experiments

In section 6, we show how fiscal stimuli targeting a small transfer to a large number of poor households increase aggregate consumption more than stimuli of the same aggregate size which target a larger transfer to a smaller number of poor households. In this appendix, we show how this result also broadly applies to the tax side. For a given fiscal consolidation amount over GDP, it is generally less contractionary to target a large number of affluent households with a relatively small tax amount, than imposing a larger tax on a smaller pool of very affluent households.

Table J.1 presents the results of additional fiscal experiments on the tax side. We raise a given amount of taxes over GDP in each panel (1, 2, 3, and 4% of GDP) on the most affluent households and we ask how to raise it more efficiently given the stated MPCs. In the first row (i) of each panel, we tax one month income from the top of the cash-on-hand distribution with the threshold stated in the first column. As an example, in panel A, we raise 1% of GDP, if we tax one month of income we tax the top 10%, or equivalently we tax from the 90th percentile onward of the cash-on-hand distribution. In the second row (ii) of each panel, we raise the same amount but with a tax of one year income on the top of the distribution, with the threshold always specified on the first column. We show the weighted average tax bill of the respondents in the second column and the corresponding average MPC in the third column. In the fourth column, we show the negative aggregate consumption response of these policies. We move from the revenues to GDP to the amount we need to raise in our sample by diving the revenue to GDP by the private consumption to GDP in 2010 (0.61011094) from national statistics and we multiply this by aggregate consumption in the sample.[39] A caveat of this exercise is that we assume that the positive MPC we have from the SHIW would apply equally to a negative income shock. However, notice that Christelis et al. (2019) report that affluent households display very similar MPCs across income gains and income losses of equal size.

Three results stand out from this exercise. The first one is the most surprising, in all panels except the last one, that is when we raise less than 4% of GDP in taxes, the aggregate

[39] We use the same procedure in table 4.

consumption cost is higher if we tax the super-rich a lot (one year income) rather than if we tax the merely well-heeled a bit (one month income). The reason is that, as shown in Figure 2, households from the 7th decile of the cash-on-hand distribution have a larger MPC out of a large income shock than a small one. The second result is that if the government needs to raise a lot of resources, here 4% of GDP in taxes, then the result on aggregate consumption flips, as, with a one month tax, we start taxing poorer households (we start from the 30 percentile, the top 70%) with high MPC, so that in that case the drop in consumption is lower by taxing one year income from the top 2%. Finally, an interesting remark is that the post-tax income distribution is highly right-skewed, to raise the same amount of resources we need to tax one year from the top 0.2% or one month from the top 10% to raise 1% of GDP, or one year from the top 2% or one month from the top 70% to raise 4% of GDP.

Table J.1: Fiscal experiments - fiscal consolidation

Panel A - Aggregate Tax Increase equal to 1% of GDP

Policy Experiments	Average Taxes		Aggregate
	Value(€)	MPC	Consumption
i) One month income from top 10%	4618	0.35	-0.58%
ii) One year income from top 0.2%	121902	0.42	-0.66%

Panel B - Aggregate Tax Increase equal to 2% of GDP

Policy Experiments	Average Taxes		Aggregate
	Value(€)	MPC	Consumption
i) One month income from top 26%	3385	0.37	-1.21%
ii) One year income from top 0.7%	105422	0.45	-1.42%

Panel C - Aggregate Tax Increase equal to 3% of GDP

Policy Experiments	Average Taxes		Aggregate
	Value(€)	MPC	Consumption
i) One month income from top 45%	2821	0.39	-1.91%
ii) One year income from top 1.4%	92662	0.41	-1.97%

Panel D - Aggregate Tax Increase equal to 4% of GDP

Policy Experiments	Average Taxes		Aggregate
	Value(€)	MPC	Consumption
i) One month income from top 70%	2368	0.42	-2.73%
ii) One year income from top 2.0%	86713	0.37	-2.38%

Notes: The aggregate tax increase amount is constant in each panel. In the first (second) row the tax disbursement is equal to one month (year) of income for households at the top of the cash-on-hand distribution as indicated in the first column. The average tax payment is presented in the second column, and the resulting average MPC is in the third column. All variables are weighted by the population weights to be representative of the Italian population. Cash-on-hand is the sum of disposable income and financial assets. The change in aggregate consumption presented in the fourth column is computed as the ratio between the sum of the spending decreases by the households who pay the tax and the level of total aggregate consumption by all households.