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WHY DON'T HOUSEHOLDS SMOOTH CONSUMPTION? EVIDENCE FROM
A 25 MILLION DOLLAR EXPERIMENT

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ABSTRACT

This paper evaluates theoretical explanations for the propensity of households to increase spending in response to the arrival of predictable, lump-sum payments, using households in the Nielsen Consumer Panel who received \$25 million in Federal stimulus payments that were distributed randomly across weeks. The pattern of spending is inconsistent with models in which identical households cycle through high and low response states as they manage liquidity. Instead, the propensity spend is a persistent household trait. This trait is unrelated to expectation errors, almost unrelated to crude measures of procrastination and self-control, moderately related to measures of sophistication and planning, and highly related to a measure of impatience.

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The canonical assumption that the benefits of additional consumption decline with the level of consumption – that marginal utility is diminishing – implies that people should manage liquidity to stabilize their consumption over time. While many issues complicate testing, this proposition of consumption smoothing has been frequently rejected: on average, predictable changes in household income or liquidity cause significant changes in household spending, with the causal effects concentrated among households with low liquid wealth or low income.¹ This paper investigates why.

One possibility is that illiquidity and lack of consumption smoothing are the result of poor income shocks or temporary portfolio illiquidity, as in the textbook buffer stock model or life-cycle/permanent income model (LCPIH) with borrowing constraints (e.g. Zeldes, 1989a; Deaton, 1991; Carroll, 1997). Similar predictions follow from a model in which households have costly access to high-return, relatively illiquid savings vehicles (Kaplan and Violante, 2014). According to these models, lack of consumption smoothing is due to temporary low liquidity.

An alternative hypothesis is that low liquidity and lack of consumption smoothing are persistent household traits due to preferences or behavioral characteristics rather than being situational. The most straightforward version of such a theory is that some households are simply highly impatient, hand to mouth households as in Campbell and Mankiw (1989), Krusell and Smith (1998), and Hurst (2003). Other theories motivated by evidence from laboratory experiments and neurological studies characterize lack of consumption smoothing as due to the limits of human reasoning or the complexity of human motivation in economic behaviors. As examples, lack of consumption smoothing may be due to limited attention, limited planning, reliance on heuristics, or problems of self-control (Caballero, 1995; Reis, 2006; Lusardi, 1999; Ameriks et al., 2003; Laibson et al. 2001; Gul and Pesendorfer, 2004a, 2004b). While according to the basic model, some people are unable to smooth consumption due to temporarily low liquid

¹ Most studies examine increases in liquidity caused by predictable increases in income (Zeldes, 1989b; Shapiro and Slemrod, 1995; Parker, 1999; Souleles, 1999; Johnson, Parker, and Souleles, 2009; Stephens, 2003; Jappelli and Pistaferri, 2014). Other studies have studied increases in liquidity caused by predictable increase in spending costs (Souleles, 2000), changes in credit constraints (Gross and Souleles, 2002; Ludvigson, 1999), or predictable decreases in loan payments (Stephens, 2008; Dimagio, Kermani, and Ramcharan, 2014; Keys, Piskorski, and Seru 2014).

wealth, according to these alternatives, some people choose not to smooth consumption and not to accumulate liquid wealth due to persistent behavioral characteristics.

This paper studies why households spending responds strongly to liquidity using a natural field experiment provided by disbursement of the Federal economic stimulus payments of 2008 and data from a specially-designed survey of households that are reporting spending in the Nielsen Consumer Panel (NCP, formerly Homescan Consumer Panel). I find that lack of consumption smoothing is not caused by an inability of some households to smooth consumption due to temporarily low income (budget constraints); instead persistent characteristics (preferences) cause some households to choose not to smooth consumption and not to accumulate liquid wealth. What behavioral characteristics? Spending responses in this experiment are not significantly associated with expectations of receipt or with measures of procrastination or lack of self-control. Instead, lack of consumption smoothing is associated with a measure of impatience, a measure of lack of financial planning, and some measures of lack of frictionless optimization in other dimensions.

In terms of the experiment, among households receiving stimulus payments by check and among those receiving payments by direct deposit, the week in which the payment was disbursed was determined by the last two digits of the recipient's Social Security number, digits which are effectively randomly assigned. Following previous research that shows the arrival of a payment causes an increase in household spending on average, I use this randomization to identify the causal effect of the receipt of a payment on household spending by comparing the spending patterns of households who receive their payments at different times.² Because the timing of the payment is randomly set by the government and is unrelated to a household's characteristics or economic situation, this comparison measures the increase in spending caused by receipt. Because the variation in timing is uncorrelated with household characteristics, comparing differences in spending responses across households with different characteristics measures the characteristics that indicate whether a not a given household increases spending in response to liquidity.

² Following the methodology of Johnson, Parker, and Souleles (2006). This approach has also been used to study these and other rebates by Agarwal, Lui, and Souleles (2007), Parker, Souleles, Johnson, and McClelland (2013), and Broda and Parker (2014), and other outcomes by Bertrand and Morse (2009) and Gross, Notowidigdo, and Wang (2014).

In terms of the data, the basic NCP data contain daily information on each household's purchases of household items as well as annual demographic information such as family size and income. In conjunction with Nielsen, a multi-wave survey was designed early in 2008 and then fielded while the stimulus payments were being disbursed in 2008. The survey, administered by email and web for households with web access at home and by mail and barcode scanner for households without, collected information on *i*) the arrival and amount of the first stimulus payment received in order to measure the spending response to the payment, and *ii*) the liquid wealth, behaviors, and expectations of households in order to relate these characteristics to the failure to smooth consumption spending. After dropping households that did not receive payments or did not report valid payments, the supplemental survey measures more than 25 thousand NCP households in 2008 as they receive more than 25 million dollars in randomly-timed stimulus payments.

On average, the spending of households that receive their payments early rises relative to the spending of households that receive their payments later. Specifically, in different specifications, the average household raises its spending on NCP-measured household goods in the week of receipt by around 13 dollars, roughly 9 percent of average weekly spending, or about 1.4 percent of the average payment. These estimates are all highly statistically significant. The increase in spending decays slowly over the following weeks, so that over seven weeks, the receipt of a payment causes an increase in spending of roughly 30 dollars on NCP-measured goods, of 2.5 to 3 percent more spending, or of roughly 2.5 percent of the payment.³

If spending responses were similar across households, then cross-sectional data on household responses would tell us little about behavioral models. In fact, consistent with previous research, the majority of the average spending response is due to households with low liquidity, who spend at a rate three to four times that of liquid households on arrival. Thus, for an observable factor to be the causes of spending responses, it must exhibit variation in the sample. And this variation must be correlated with liquidity in order to explain a substantial share of the average spending response.

³ In addition to the earlier cited papers, the spending responses are also estimated by Bureau of Labor Statistics (2009) and Sahm, Shapiro, and Slemrod (2010).

The first main result is that, while low liquidity is a strong predictor of large spending responses, this is not due to current or recent poor income shocks but rather is a persistent characteristic of low income households. If shocks to income cause low liquid wealth and failure to smooth spending, then declines in income ought to be correlated with spending responses. But households with low income growth are no more likely to spend the payment on arrival than those with high income growth. It is the case that low income in 2008 is associated with high rates of spending from payments. But income in 2006 is as good as income in 2008, and as liquidity in 2008, at separating households who spend from those who do not. Thus the propensity to spend out of liquidity is highly persistent.

Second, the analysis rejects models that generate spending responses through beliefs about the payments. Few households were surprised to get payments and there is little evidence of a larger spending effect of arrival for those who were not expecting the payments. In one of two specifications, there is a statistically higher spending response for households who held incorrect beliefs about their payments. But this higher spending response occurs whether the surprise is positive or negative. Thus, the spending response did not occur because many households, particularly low liquidity households, were surprised by the payments. Instead, the evidence is suggestive of a link between consumption smoothing and economic abilities or planning, here as revealed by understanding of the stimulus payment program.

Third, the data provide evidence consistent with lack of planning causing violations of consumption smoothing, as in Reis (2006). Households that have not made financial plans or do not plan for vacations do not smooth spending across arrival of the payment. Households that have made financial plans smooth consumption well. Only twenty two percent of households plan a great deal for vacations, and while these households smooth spending well the week of arrival, they do less well at a horizon of a month. Relatedly, households that use more coupons or deals when making purchases smooth spending much better than those that do not. This is particularly true among households with low liquidity, consistent with households differing in planning or optimization of economic resources, and with 'inattentive' households having low liquidity, low incomes, and a high propensity to spend out of liquidity.

Fourth, the majority of lack of consumption smoothing is predicted by a simple measure of impatience. Consumption smoothing is highly correlated with whether a household reports

being *the sort of people* who would rather spend their money and enjoy today than save more for the future. Households that report being savers smooth consumption; households that report being spenders do not. Not surprisingly, being a saver is also highly correlated with the level of liquid wealth, so that the type of person is an important predictor of both low wealth and lack of consumption smoothing. And the type of people who are spenders are worse at consumption smoothing even among households with low liquidity.

Finally, the spending response is unrelated to my measures of problems of self-control and procrastination and. First, there is an economically large but statistically-weak higher propensity to spend on arrival among the small share of the population that frequently regrets past purchases. But this does not explain much of the average spending response. The other 95 percent of the population still exhibits substantial violations of consumption smoothing. Second, to measure procrastination, I sort households by their delay in responding to the supplemental survey. This procrastination is unrelated to the size of spending response.

In interpreting these results, three caveats are in order. First, these estimates pertain to spending rather than consumption, and only over a one-month period that is precisely measured. Second, it is possible that actual responses differ due to different propensities to spend on non-measured goods and services. Third, these results may or may not generalize to other domains of consumption smoothing or other populations. For example, less publicized payments may be more unexpected upon arrival and so lead to different spending responses with consequently possibly different patterns across households. Similarly, much larger or much smaller payments, may lead to different responses.

These findings have several implications for the modelling of consumption and saving behavior. First, these results reject models that generate the average spending response through surprise at the arrival of these payments and or through low liquidity as a transitory economic circumstance that generates a high propensity to consume. Second, these findings are generally consistent with a model with financial frictions in which some households have high levels of impatience. Such a model does not naturally match the evidence on coupon use or planning but potentially could if coupled with behavioral characteristics or costs of optimization. Alternatively, these costs of optimization or behavioral characteristics could be central, causing some households to have low incomes, hold little liquidity, not use coupons or deals, fail to plan,

and spend income when it arrives. As an example, if planning costs are negatively correlated with income, then the Reis (2006) model of information processing frictions would generate many of these patterns.⁴ Finally some households frequently regret purchases and poorly smooth spending, but the small share of such households implies that this can account for only a small fraction of the average spending response to arrival.

1. The Nielsen Consumer Panel

The subjects for this study are a subset of the households in the 2008 NCP. The NCP is a panel survey of U.S. households in 52 metropolitan areas that measures demographic characteristics, annual income, and daily spending on household goods. Households report spending using barcode scanners and keypads at the conclusion of every shopping trip for household goods.⁵ Household goods include primarily grocery, drugstore and mass-merchandise sectors, and so the recorded expenditures primarily cover goods such as food and drug products, small appliances and electronic goods, and some mass merchandise products excluding apparel. Participants get newsletters and personalized tips and reminders via email and/or mail to upload spending information and to answer occasional surveys. For regularly uploading information, participants are entered in prize drawings and receive Nielsen points that can be accumulated and used to purchase prizes or ‘gifts’ from a catalogue.

Participants are surveyed when they initially join the survey and at the end of each subsequent calendar year about their demographic characteristics, and these answers are used as the demographic information for the following calendar year. Low performing households are dropped, and about 80% of Nielsen households are retained from year to year. Nielsen seeks to maintain a panel that is representative of the US population, and produces sampling weights that can be used to make the sample representative of the U.S. population along 10 demographic dimensions (including income). These weights are used throughout the analysis.

⁴ Similarly, Bernheim, Skinner, and Weinberg (2001), Hurst (2003), Ameriks, Caplin, and Leahy (2003), and Lusardi and Mitchell (2007) present evidence that differences in wealth across households are not well captured by behavior in the standard model even with financial frictions but are instead consistent with some features of models of behavior incorporating rules of thumb, mental accounts, problems with self-control, or an important role for planning. Similar evidence on saving behaviors is provided by Choi, Laibson, and Madrigan (2009) and Chetty et al. (2014).

⁵ Households also scan individual items, enter a price if Nielsen does not already have it, and report whether they used any coupons or deals. For more details on the NCP see Broda and Weinstein (2008).

While the NCP is limited in the scope of spending that it covers, it has numerous benefits for the purpose at hand. First, while I primarily use information on total trip spending rather than the large amount of detail available on products (approximately 700,000 different goods are purchased at some point by household in the sample), the use of scanners in real time and administrative price data increase the accuracy of reported expenditures. The temporal precision allows analysis of weekly spending responses which increases the statistical power of the analysis given that the stimulus payments were randomized across weeks. Second, the NCP is relatively large: there are around 60,000 active households (of the roughly 120,000 households in the panel at any point in 2008) that meet the static reporting requirement used by Nielsen to define participating households for the period January to April 2008. Finally, Nielsen has in place a system to survey the households in the NCP. Nielsen typically uses these supplemental surveys to conduct marketing studies for corporate clients, conducting the surveys, analyzing the results, and delivering complete analyses to clients.

Christian Broda and I worked with Nielsen in March and April of 2008 to write and conduct a survey of the NCP households about both their characteristics and their receipt of economic stimulus payments. The next section describes these payments, and the following the supplemental survey. The data employed in this study are a combination of the responses to this survey, data licensed from Nielsen, and data available through the Kilts-Nielsen Data Center at The University of Chicago Booth School of Business.⁶

2. The 2008 Economic Stimulus Payments

The random variation in liquidity provided to the NCP households is due to the Economic Stimulus Act, passed by Congress in January and signed into law on February 13, 2008. In total, the Act called for \$100 billion in economic stimulus payments to be disbursed to about 130 million eligible taxpayers. Each stimulus payment consisted of a basic payment and – conditional on eligibility for the basic payment – a supplemental payment of \$300 per child that qualified for the child tax credit. The basic payment was generally the maximum of \$300 (\$600 for couples filing jointly) and a taxpayer’s tax liability up to \$600 (\$1,200 for couples). Households without tax liability received basic payments of \$300 (\$600 for couples), so long as

⁶ Data are available at: <http://research.chicagobooth.edu/nielsen/>.

they had at least \$3,000 of qualifying income (which includes earned income and Social Security benefits, as well as certain Railroad Retirement and veterans' benefits). The stimulus payment amount was reduced by five percent of the amount by which adjusted gross income exceeded a threshold of \$75,000 for individuals and \$150,000 for couples. All income information was based on tax returns for year 2007. Thus the amount was zero for low-income households which had neither positive net income tax liability nor sufficient qualifying income, and also zero for sufficiently high-income households.

The random variation used in this paper comes from the timing of the disbursement. Because it was not administratively possible for the IRS to mail all stimulus checks or letters accompanying direct deposits at once, within each method of disbursement, the week in which the payment was disbursed was determined by the last two digits of the recipient's Social Security, digits which are effectively randomly assigned.⁷ For recipients that did not provide a personal bank routing number, the payments were mailed (using paper checks) in one of nine one-week periods ranging from the middle of May to the middle of July.⁸ The IRS sent a notification letter one week before the check was mailed. For recipients that had provided the IRS with their personal bank routing number (i.e., for direct deposit of tax refunds), the stimulus payments were disbursed electronically over three one-week periods ranging from late April to the middle of May.⁹ The IRS mailed a statement to the household informing them about the deposit to arrive a few business days before the electronic transfer of funds.¹⁰ Table 1 shows the schedule of payment disbursements.

⁷ The last four digits of a Social Security number (SSN) are assigned sequentially to applicants within geographic areas (which determine the first three digits of the SSN) and a "group" (the middle two digits of the SSN).

⁸ Taxpayers who filed their tax returns after April 15 received their payments either in their allotted time based on their SSN, or as soon as possible after this date (about two weeks after they would receive a refund). Since 92 percent of taxpayers typically file at or before the normal April 15th deadline (Slemrod et al., 1997) and the vast majority of late returns are filed close to October 15, there should be very few payments that are distributed during the main program and have their distribution date set by the lateness of the return.

⁹ The payment was mailed for any tax return for which the IRS had the tax preparer's routing number, as for example would occur as part of taking out a refund anticipation loan.

¹⁰ Banks also get notified a couple of days before the date of funds transfer, and some banks showed the amount on the beneficiary's bank account a day or more before the actual credit date. For example, some electronic transfers deposited on Monday April 28 were known to the banks on Thursday April 24, and some banks seem to have credited accounts on Friday April 25.

3. The NCP supplemental survey

To measure the payments received by NCP households, a supplemental survey was administered to the households in the NCP that consists of two parts, each to be answered by “the adult most knowledgeable about your household’s income tax returns.” The survey thus only measures the first ESP received by a household, or, if more than one was received, the household was instructed to report the larger. Part I of the survey contains questions pertaining to the household’s liquid assets and behaviors related to planning, spending, and self-control. Part II first describes the program of economic stimulus payments and then asks “Has your household received a tax rebate (stimulus payment) this year?” Households that respond yes, are then asked about the amount and date of arrival of their stimulus payment, whether it was received by check or direct deposit, the extent to which the amount was expected, whether the household mostly saved or spent the stimulus payment, and the amount of spending across categories of goods.

The survey was fielded in multiple waves, with each wave following the standard procedures that Nielsen uses to survey the consumer panel households. For households with internet access and who were in communication with Nielsen by email the survey was administered in three waves in a web-based form, and for households without access and in contact with Nielsen by regular mail the survey was administered in only two waves in a paper/barcode scanner form, since the distribution time was slower and the preparation time greater. Repeated surveying was conditional on earlier responses.¹¹ The surveys covered the main period during which payments were distributed with random timing. A supplementary on-line appendix gives the timing of the surveys, the invitations and reminders, survey, response rates, and information about data access.

The repeated nature of the survey implies that the recall window for the payment is relatively short: one month for the email/web survey when it is first fielded and just over one and a half months for the mail/scanner survey when it first arrives. The survey was administered to

¹¹ Households completing part I of the survey (household characteristics) in any wave were not asked Part I again. Households reporting payment information in Part II were not re-surveyed. Households that responded to the first question on Part II that they don’t know whether they had received a stimulus payment, that they have not received one and “expect to,” or respond that they “are unsure whether I will get any” do not proceed to Part II and are re-surveyed with Part II in a later wave (if there is one). Finally, households that respond “No, and I am definitely not getting one” do not proceed and are not re-surveyed.

all households meeting a Nielsen static reporting requirement for January through April 2008, which amounted to 46,620 households by email/web and 13,243 by mail/barcode scanner. For both types of survey, the response rates were 72% to the first wave, and 80% after all waves, giving 48,409 survey responses (of which some are invalid for various reasons).

To proceed, I drop all households from the analysis that: i) do not report receiving a payment (roughly 20 percent of the respondents); ii) do not report a date of payment receipt; iii) report not having received a payment in one survey and then later report receiving a payment prior to their response to the earlier in a later survey; iv) report receiving a payment after the date they submitted the survey; v) report receiving a payment by direct deposit (by mail) outside the period of the randomized disbursement by direct deposit (mail), and vi) do not report means of receipt but report receiving a payment outside both periods of randomized disbursement.¹²

These cuts reduce the sample to 28,937 households reporting receiving a total of over 26 million dollars in payments. These households are merged with the information on total spending on each trip taken by each household during 2008 from the KILTS NCP which includes only households that meet the Nielsen static reporting requirement for 2008. These data are collapsed down to total spending per week per household.

This sample selection is not random. But it is (presumably) uncorrelated with the randomization, and so creates no bias for estimation of the average treatment effect in the remaining sample. But it is important to note that given heterogeneity in treatment effect, non-random sample attrition may create bias for inference if there are differences in treatment effects between households dropped from the sample and households that are included. It is also true that there is selection involved in which households are recruited and participate in the NCP survey.

Table 2 shows summary statistics for the data and sample used. Average (weighted) weekly spending in the baseline, static sample is \$149. In comparison, in the 2008 CEX Survey, average spending on a broad measure of nondurable goods is about \$400 per week and total expenditures on goods is about \$800, or 2.6 times larger for CEX broad nondurable goods and

¹² I allow a two day grace period for reporting relative to survey submit dates, and a seven day grace period for misreporting relative to the period of randomization. I do not adjust the reported date of receipt in either case.

5.3 larger for CEX total expenditures.¹³ The spending of households receiving payments by mail is \$16 less than that of households receiving a payment by direct deposit. The average payment conditional on receiving one is \$898. Households receiving payments by direct deposit on average have higher payments by about \$190, which is reasonably consistent with their having on average 0.4 members more in these households.¹⁴ As was true for the actual disbursements, most reported payments are clustered at multiple of \$300.¹⁵ These features of the distributions line up well with those in similar surveys conducted by the SIPP and the CEX (see Parker et al. (2013)). More details are provided in the on-line appendix.

4. Estimation methodology

I use the following specification to examine the average impact of the receipt of a payment on spending for household i with characteristic j in week t receiving a payment by method m :

$$C_{i,t} = \mu_i + \sum_{s=-L}^S \beta_{s,j} ESP_{i,t+s} + \tau_{m,j,t} + \eta_{i,t} \quad (1)$$

where $C_{i,t}$ is a measure of spending, μ_i is a household-specific intercept that captures differences in the average level of spending across households, $\beta_{s,j}$ are coefficients measuring the spending response on leads (up to L) and lags (up to the largest possible lags, S) of $ESP_{i,t}$, which is a measure of the receipt of a payment by i in t , $\tau_{m,j,t}$ is a set of indicator variables for every week in the sample for each type of household for each method of disbursement (mail or by direct deposit), and finally $\eta_{i,t}$ captures all expenditures unexplained by the previous factors. For measures of household spending, $C_{i,t}$, I use either the dollar amount of NCP spending by household i in week t or the ratio of that level of spending to the average weekly spending of that household during the first 12 weeks of 2008 (prior to the disbursements). For measures of payment receipt, $ESP_{i,t}$, I use either an indicator variable indicating whether a payment was received by household i in week t or that indicator variable times the average amount of the payment received by households of type j getting paid by method of receipt m .

¹³ The average household sizes, both among recipients and on-time recipients, are very similar to those in the CE Survey.

¹⁴ Recall that each additional child eligible for the CTC leads to \$300 larger payment, while a married couple receives \$600 more than the equivalent family with an unmarried head.

¹⁵ Households in the mail survey were prompted by the example of \$600 as part of reminding them how to enter a dollar amount on their barcode scanner. There was no amount prompt in the on-line survey.

It is important to note three features of equation (1). First, the $\beta_{s,j}$ are the key parameters of interest; they are allowed to differ by household characteristic, j , so that they measure the spending effects of the receipt of a payment for households with characteristic j .

Second, the fact that there are time effects interacted with type j and means of receipt implies that differences in the impact of aggregate changes or difference in seasonal spending between recipients with different characteristics of means of disbursement do not bias the estimated $\beta_{s,j}$. That said, this specification is demanding of the data, so I also report results with a complete set of time dummies interacted only with household type and not with means of receipt (and where average payment amount is taken separately over j but not m).

Finally, identification of the key parameters of interest for a type j does not require that households are similar, or unselected, across types. Consistency requires that the variation in $ESP_{i,t}$ be uncorrelated with all other factors that might influence household expenditure besides the receipt-driven variation of interest. Selection into type j – or more generally correlation of type and average treatment effect – does not bias estimates of average effects within type. In fact, differences in average treatment effect are the main issues of interest. But it is important to note that selection into the NCP and/or selective attrition out of our sample ex ante or over time could bias population inference of differences in average treatment effects across household types if correlated with treatment effect. For example, if, in the population, the extent of consumption smoothing were uncorrelated with wealth across households, and if low wealth households that smooth consumption well did not respond to our survey and everyone else did, then we would observe in our sample that low wealth households smooth consumption more poorly than high wealth households but this would be true only for our sample and not the population.

In estimation, standard errors are adjusted to allow for arbitrary heteroskedasticity and within-household serial correlations.

5. The average response of spending to the receipt of a payment

This section first shows that there is a significant increase in spending caused by the receipt of a payment on average across all households (only one type j so that $\beta_{s,j} = \beta_s$). Second, this section documents that, consistent with previous research, households with low levels of

liquid wealth raise spending when the payment arrives while households with significant liquidity smooth spending across the arrival of the payment relatively well. The following section uses heterogeneity in spending response to test a number of theories for lack of consumption smoothing by testing whether each can account for the differences in spending behavior observed across households.

Beginning with the average response, Table 3 shows, for a variety of different regression specifications, that there is a highly statistically significant increase in spending among NCP households upon arrival of a payment. Each column reports, for a different regression, the coefficients on the included leads, contemporaneous value, and the first 6 lags (of the complete set of lags included) of ESP . The first three columns of Table 3 displays results from regressions that use all available variation in timing, including that due to different method of disbursement. That is, this first set of estimates use equation (1) with $\tau_{m,j,t} = \tau_t$, and so treats all variation over time in the ESP receipt – including that due to receipt by mail vs. direct deposit – as valid for identifying the spending effect of receipt. The second three columns display results from regressions that treat the two different methods of disbursement as two separate experiments. That is, this second set of estimates use equation (1) with $\tau_{m,j,t} = \tau_{m,t}$.

In the first column of Table 3, the dependent variable is NCP spending (in dollars per week) and the $ESP_{i,t}$ is an indicator variable whether a payment is received, so that the coefficients on contemporaneous $ESP_{i,t}$ implies that households on average increase their spending by a reasonably precisely estimated \$13.42 in the week that the ESP arrives. The estimates of column four are similar: households on average raise spending on NCP goods by a slightly lower but still highly statistically significant \$12.50 the week the payment arrives.

The second and fifth columns confirm this finding for a specification in which the dependent variable is dollar spending as a percent of average spending in the first 12 weeks of the year, and imply that spending rises by just under 10 percent of average weekly spending the week of arrival.

Finally, the third and sixth columns in Table 3 report the most important specification for later analysis. In these regressions, dollar spending is regressed on the lead/lag polynomial of the indicator variable for receipt times the average amount of ESP (divided by 100 so as to report a percent and averaged across all households in column 3 and separately by means of receipt in

column 6). According to these columns, households spend one and a half percent of the ESP the week of arrival. Again, this is highly statistically significant and is consistent with other columns given the average reported ESP amount.

The increase in spending the week of arrival is quite sharp. There is no evidence of any greater spending one or two weeks before the arrival of the ESP in any specification – all point estimates are economically small and almost all are negative.¹⁶ None are statistically significant. This suggests that there is very little reporting error in date, as for example due to recall error, at least after removing the clearly erroneous reports.

While there is no increase in spending immediately before receipt, there is a continued higher level of spending after the week of receipt. This higher level of spending declines slightly the week after arrival and then declines more rapidly so that the coefficients on weekly spending in all specifications are all individually statistically insignificant by the third week after the week of receipt. The last two rows of the table report the cumulative spending caused by receipt over the four weeks starting with the week of receipt and over the seven weeks starting with the week of receipt respectively.

Over four weeks, the cumulative dollar spending (\$33 or \$27), the percent increase in spending over the period (roughly 5%), and the total share of the ESP spent (roughly 3.5 %) are all highly statistically significant. Over seven weeks, the estimates are similar in terms of total spending, but are less precisely estimated.¹⁷ As a result, for the balance of the paper, I focus on consumption smoothing on arrival and over the following four weeks. In general, the pattern of smoothing over seven weeks is roughly similar to that over four weeks but with larger standard errors.¹⁸

¹⁶ This paper does not measure any changes in spending caused when the stimulus plan became public. Broda and Parker (2014) show that household spending does not seem to rise at the different times that households report learning about their payments.

¹⁷ Note that the percent increase is lower, but since it is an average over seven weeks, and is roughly 4/7th the size of the percent increase in spending over four weeks, the implied total spending amounts are similar.

¹⁸ These results for average spending are reasonably robust. Similar patterns emerge when restricting to households reporting spending in at least half the weeks or in every week, and when trimming the top and bottom 1% of spending. Similar percentage changes and spending effects relative to average dollar spending are found using as a measure of weekly spending the more volatile and smaller measure of spending constructed as the sum of all individual items purchased instead of the sum of all total trip spending and using households that do not meet the Nielsen static reporting requirement for the year. Finally, while these results are not directly comparable to those from the CEX – the CEX excludes some items like drugstore items that are in the NCP and the NCP does not cover most of the spending categories in the CEX – they are also not inconsistent with them. Parker, Souleles, Johnson,

If the spending response were the same across households, then cross-sectional information would be useless for evaluating models of lack of consumption smoothing. Instead, as I now show, there is significant heterogeneity in spending response across households correlated with liquidity. Why investigate liquidity? With incomplete financial markets, a household experiencing temporarily low income needs to run down liquid wealth or borrow to maintain its level of spending. If a household either is unable to borrow due to a binding liquidity constraint or does not want to borrow due to uncertainty about future income, then this low liquidity can cause a high propensity to spend expected increases in income. As noted, this prediction has been widely confirmed in empirical work.

To measure liquidity, Part I of the supplemental survey contains the question “In case of an unexpected decline in income or increase in expenses, do you have at least two months of income available in cash, bank accounts, or easily accessible funds?” and the respondent can answer yes or no.

Table 4 shows that households with low liquidity, 36 percent of the sample, spend 2.5 to 2.8 percent of the payment the week of arrival and 4.9 to 6.6 percent the four weeks of and following arrival. While households with sufficient liquid wealth still exhibit a statistically significant increase in spending in response to arrival, they spend only at one fourth the rate of households with insufficient wealth the week the payment arrives, and one half to one third the rate over the four weeks of and following arrival.¹⁹ This finding is consistent with previous research and consistent with the presence of liquidity constraints or incomplete financial markets. Lack of consumption smoothing is concentrated among households with low liquidity.

6. Testing models of lack of consumption smoothing

The significant heterogeneity in spending responses in (at least) the dimension of liquidity implies that one can test models of consumer behavior by evaluating their ability to explain the cross-sectional differences in spending responses. If a model of spending responses cannot generate variation in spending responses across households, or if the determinants or

and McClelland (2013) estimate that households raise spending on a broad measure of CEX nondurable goods and services by slightly more, about 2.1 – 4.5 percent of spending.

¹⁹Despite the additional set of time dummies interacted with method of receipt in the regressions of Table 4, the sample weighted average of the spending increases are almost exactly equal to the average spending increase reported in Table 3.

indicators of this variation show no variation in the data, then this model is inconsistent with the finding that some households smooth spending well and some poorly. Further, if these determinants or indicators are not correlated with liquid wealth, then this model is inconsistent with the observed correlation between liquid wealth and spending response and is unlikely to be the main explanation why households fail to smooth consumption.

In sum, plausible theories must predict variation in consumption smoothing along an observable characteristic that is correlated with liquidity. Such a relationship raises the question of whether this characteristic causes low liquidity or whether this characteristic is caused by or merely correlated with low liquidity. This paper does not observe exogenous variation in the characteristic or liquidity, and so cannot distinguish the direction of causation.

6.1 Heterogeneity in consumption smoothing: transitory state or persistent characteristic?

Perhaps the leading model that incorporates lack of consumption smoothing is caused by a series of poor income shocks, as in the models of such as Zeldes (1989a), Deaton (1991), and Carroll (1997), or by a transitory low level of liquid assets due to fixed costs of portfolio adjustment, as in the model of Kaplan and Violante (2014). An alternative is that persistent behavioral traits cause low liquid wealth and, either directly or indirectly through low liquidity, cause spending responses. Most obviously, this behavioral trait could be due to preferences, but it could also be due to nonlinearities in budget constraints such as caused by means-tested benefit programs.

This subsection shows that lack of consumption smoothing is a persistent characteristic and not due to *temporarily* low liquidity. While measured only crudely, recent income growth and consumption smoothing are unrelated across households. Transitory income shocks play no measureable role in spending responses to the arrival of payments. The level of income in 2008 however has a strong correlation with both liquidity and consumption smoothing. Households with low current income smooth consumption poorly while households with high current income smooth consumption well. But a similar relationship exists for income in 2007 and, even more strikingly for income in 2006, two years prior to the payments. Thus, lack of consumption smoothing is a persistent characteristic related to low permanent income, and not primarily

driven by transitory bad income shocks or costs of accessing illiquid wealth and temporary low liquid wealth.

Annual income is reported in the NCP at the end of each calendar year for the previous calendar year. I use the NCP reports of annual income for each household's income in 2006, 2007, and 2008, taken from survey years 2008, 2009, and 2010 respectively. Income is reported in 19 income ranges. The ranges are each less than or equal to \$5,000 for incomes less than \$50,000, then rise through \$10,000 and then \$25,000 ranges until the highest two ranges covering an income range of \$150,000 to \$200,000 and \$200,000 and above. A household is defined as having an income increase if it reports moving to a higher range and a decrease if it reports moving to a lower range.

Panel A in Table 5 shows spending responses for households whose income moves to a lower range, stays in the same range, and moves to a higher range from 2007 to 2008, the year of the payment program. There is no evidence of any differential spending response across categories of income growth. Panel B repeats this exercise for income changes from 2006 to 2007. In Panel B, there is no evidence that households that have had declines in income spend more of their payments on receipt than households whose incomes have stayed in the same range who in turn spend more than those whose incomes have increased. In fact, there is some evidence that household spending responses are increasing in income growth from 2006 to 2007. While measurement is not precise, these results on income growth are inconsistent with the view that the high spending response of low income households is due to temporarily low income.

Panel C of Table 5 splits households into three roughly equal groups according to the *level* of 2008 income.²⁰ The bottom 36 percent of households by 2008 income – those with annual labor incomes of less than \$35,000 – spend at more than double the rate of the middle income group both on impact and cumulatively. The group with highest 2008 income does not consume a statistically significant fraction of the payment in either specification or at either horizon. This is consistent with the textbook model of liquidity constraints (or precautionary saving), in which a household's temporarily low income leads them to violate consumption smoothing because they are unable to borrow against (or insure) future labor income.

²⁰ These ranges/choices follow the industry standard, see Zeldes (1989b), Jappelli, Pischke and Souleles (1998), Jappelli (1990), and Souleles (1999).

However, this same pattern is evident in Panel D when households are split according to their incomes in 2007. And more strikingly still, the same pattern is observed in Panel E using income in 2006. Low income in 2006 indicates poor consumption smoothing in 2008, and high income in 2006 indicates good consumption smoothing in 2008. This evidence is at odds with a model in which either poor transitory income shocks or portfolio management of cash flows and illiquid high return assets have caused both low liquidity and large spending responses for some households.

Rather this evidence shows that households that have persistent low income are poor at smoothing consumption. Low income in 2006 is as good as if not better than contemporaneous liquidity (Table 4) at separating the households who spent from those who did not.

How does income interact with liquidity in explaining spending responses? Table 6 shows how household responses differ by both income and liquidity. Panels A and B show that 2008 income level is correlated with liquidity: 45 percent of households with low liquidity have low income in 2008 while 31 percent of households with sufficient liquidity have low income. Panel C and D show that this correlation is just as strong between income in 2006 and liquidity in 2008.

Conditional on sufficient liquidity, households with low income in 2006 have significant spending responses (Panel C) while households with high incomes do not. And conditional on low liquidity (Panel D), there are statistically significant differences in the size of the spending response at four weeks between households with high incomes in 2006 and those with low incomes. This is not to say that liquidity does not have additional explanatory power conditional on income, but simply that a large share of the variation in spending response in 2008 across households both unconditionally (Table 5 panel E) and conditional on current liquidity (Table 6 Panels C and D) is explained by household income in 2006.

6.2 Beliefs: are spending response due to households that are surprised by their payments?

This subsection shows that the payments did not cause spending because they were unexpected. Most households expected the payments, there are significant spending responses for those who were expecting their payments, and households that are positively surprised by their payments spend similarly to those that are negatively surprised. The responses of these two

groups of surprised households do provide some weak evidence linking understanding of the stimulus program and consumption smoothing: in one of two specifications spending response are greater for the households that incorrectly understood the payments by underestimating the amount or (primarily) overestimating the amount.

One reason that the arrival of a pre-announced payment might cause an increase spending is that some households might be surprised by the arrival of the payment despite available, and in this case even provided, information about the payment. Motivated in part by the findings of excess sensitivity, recent modeling of human behavior has considered the costs of gathering and processing information and how economizing on these costs might alter the predictions of the canonical model of consumption and saving (e.g. Caballero (1995), Reis (2006), and Sims (2003)). While these models need not imply strong spending response to receipt, Reis (2006) shows that households with large costs of optimization choose to be ‘inattentive savers’ who follow a saving plan and optimally let consumption track income.

While these models also have implications for the relationship between measures of planning and spending responses, this subsection assesses the role of expectations in the spending response. The supplemental survey asked households who reported that they received a payment: “Was this about the amount your household was expecting?” Households were given the following answers to choose from: ‘No, and we were surprised to get any rebate at all,’ ‘No, and it was less than we were expecting,’ ‘No, and it was more than we were expecting,’ ‘Yes, and we’ve known the approximate amount since February,’ ‘Yes, and we’ve known the approximate amount since March,’ ‘Yes, and we’ve known the approximate amount since April,’ ‘Yes, but we only learned about it recently,’ and ‘Not sure/don’t know.’

Panel A of Table 7 contains the results for three groups of households and shows four main results. First, the last row of Panel A shows that most households expected the payment when it arrived. Only 12 percent of households were positively surprised (columns 2 and 5); 5 percent of households were surprised by the arrival and 7 percent found that it was more than they were expecting. Thirteen percent of households found that their payment was less than they expected (columns 3 and 6).

Second, even those households who had been expecting the payment in the correct amount had significant spending response to the arrival on impact and cumulatively over 4

weeks (columns 1 and 4). Third, while few households were positively surprised by the ESP, there is some statistically weak evidence that this led to a higher propensity to spend on impact but no consistent evidence of more spending over four weeks.²¹

Finally, and interestingly, there is not only no decline in spending for households who received payments that were less than they were expecting, but in fact, point estimates suggest that these households spent at higher rates than the average household. One can reject the equality of the contemporaneous spending response between households who are expecting the payment (columns 1) and those who are negatively surprised (column 3) (t-statistic 2.08). This is not the case for the four week response (t-statistic = 1.47) nor at either horizon in the second set of columns, in which the responses across groups are more similar.

Panels B and C split households by liquidity. The mistake of expecting a larger than actual payment is more prevalent among households with insufficient funds who tend to spend more. A larger share of households with low liquid wealth are negatively surprised by the amount of their payments (18 percent of households with low liquid wealth and only 10 percent of households with sufficient liquid wealth). This is not true of being positively surprised by the payment: the share of households who learned only recently or were surprised is similar among recipients with and without sufficient liquid funds.

In terms of the estimated spending responses, smaller samples lead to less statistical power within each level of liquidity. For households with sufficient liquid wealth, where one might expect news to carry the largest effect, there is mixed evidence of any role for expectations in spending responses. For households with low liquid wealth, there is some evidence that those who expected the payment have smaller spending responses, but even this is statistically weak (the strongest finding is the contemporaneous spending response between columns 1 and 2 which has a t-statistics of 1.60).

In sum, with few households positively surprised by the payment or its amount on arrival, and with no measurable difference in their propensity to spend, there is no evidence that incorrect beliefs caused the violations of consumption smoothing. But more households with low liquidity were negatively surprised by their payments, and, while statistically weak, these

²¹ The propensity to spend is larger for households surprised by the payment in the first triplet of columns, but not in the second triplet in which the distribution by mail and by direct deposit are treated as separate experiments.

households have the largest propensity to spend on arrival despite this negative surprise. Thus, these findings suggest the possibility that households with low levels of economic sophistication or planning as measured by understanding of the stimulus payment program have little ability to smooth consumption.

6.3 Sophistication: financial planning, planners, and coupons use

This section provides evidence on the roles of planning in two domains and optimization as measured by coupon use. Households that have made financial plans in the last two years smooth spending across arrival well, and a small share of households that plan extensively for vacation seem to smooth consumption well. Financial planning is more important than planning for vacation, in that spending responds to payment for households that plan for vacations but not for households that have made financial plans. Finally, households that make use of coupons or deals when shopping smooth consumption significantly better than those that do not.

Lusardi (1999) theorizes that careful planning – through making better investment choices and considering the need to save – is a major determinant of wealth accumulation for retirement. Further, the paper shows evidence that differences in the propensity to plan explain a significant amount of the differences in wealth accumulation in observed in the US. Ameriks, Caplin, and Leahy (2003) show that households who say that they have made a financial plan have much greater financial wealth after controlling for large set of other possible determinants of wealth accumulation (including income and many traditional measures of preferences). Finally, as noted, Reis (2006) shows that in theory households with large costs of optimization choose to be ‘inattentive savers’ who follow a saving plan and optimally let consumption track income.²²

Two questions were asked in the supplemental NCP survey to measure the importance of planning behavior for consumption smoothing. The first question mimics the Ameriks, Caplin, and Leahy (2003) question: “In the last few years, have you gathered together your household’s financial information, reviewed it in detail, and formulated a financial plan for your household’s long term future?” The second question relates not to financial planning, but to planning as a

²² See also Lusardi and Mitchell (2007), and these results relate to those in both Agarwal, Driscoll, Gabaix, and Laibson (2009), which shows a link between ability and financial mistakes, and Grinblatt, Keloharju, and Linnainmaa (2010) which shows a positive relationship between IQ and stock market participation.

trait in another sphere, in this case for vacation: “Before going on a vacation, how much time do you spend examining where you would most like to go and what you would like to do?” with possible answers: ‘A great deal of time,’ ‘Quite a bit of time,’ ‘A little time,’ ‘Almost no time,’ and ‘Do not go on vacation.’²³

Panel A of Table 8 shows that households that have made financial plans are much better at smoothing consumption than those that have not. First, note that there is a lot of variation in this question in this sample, with roughly half the households responding each way. Second, planning is highly correlated with liquidity. Panels B and C shows that 79% of households that plan have sufficient liquidity and 69% of households with sufficient liquidity plan. Panel A shows economically large differences in spending responses. For households that have formulated financial plans, the spending response is only borderline statistically significant and roughly a third as large as for those how have not planned. About three quarters of the total spending response in the sample is accounted for by households that do not make financial plans.

Finally, financial planning has some explanatory power beyond liquidity (Table 8, panels B and C). Among households with liquidity, those that do not plan do not smooth spending. While pairwise comparisons are rarely statistically significant level, a joint test of equality of responses between planners and non-planners in both Panels B and C rejects equality with 95% (90%) confidence for both contemporaneous and four week responses using all variation in timing of receipt (using only variation of timing within each means of disbursement).

Table 9 reports the results of the same analysis for vacation planning. Again, there is lots of variation in the sample, but time spent planning vacations is almost uncorrelated with liquidity. Across degrees of planning, moving across the columns, 65%, 68%, and 67% have sufficient liquidity. The remainder of the table presents a statistically weak case that vacation planning matters for consumption smoothing. In Panel A households that spend a great deal of time planning for vacations do not raise spending the week of arrival as much as the other households (statistically significant at the 90% confidence level only). The point estimates have the same pattern over the entire month, but the economic significance is smaller and larger standard errors preclude making any conclusion with confidence. Looking at households with different levels of liquidity, in Panel C there is a tendency for those who spend a great deal of

²³ Households responding that they do not go on vacation are dropped from the analysis of this question.

time to smooth spending better than others among households with low liquidity. There is no such difference for households with sufficient liquidity.

In sum, not only are the differences across vacation planners statistically weaker than the differences across financial planners, only twenty two percent of households plan a lot and smooth consumption well, and forty four percent of the sample spends “quite a bit of time” planning for vacations and these households giving this “middle” response still show a substantial spending responses similar to households that plan less.

The final variable dealing with sophistication is the extent to which households use coupons or deals when making NCP purchases. When households scan in individual purchased items, they are asked to input whether they used a coupon or deal in that purchase. For participating stores, this information is also provided by the store. I calculate the share of individual reported purchases that use coupons or deals, and split households evenly into those whose coupon use is low and those whose coupon use is high.

On the one hand, one might expect households that have fewer resources to spend more time on conserving them, suggesting that households that use coupons should have low liquidity and smooth spending poorly. On the other hand, if households that use coupons plan – that is, spend more time and effort optimizing – then they may not only make better use of the resources that they have but also do a better job of inter-temporal optimization and thus of consumption smoothing.

Splitting the NCP sample into high and low coupon use households (so that they are evenly split in Panel A of Table 10), high coupon use has only a correlation of 0.07 with liquidity. Among households with sufficient liquidity slightly more use coupons (Panel B), and among households with insufficient liquidity, slightly fewer use coupons (Panel C). Panel A shows however that coupon use is economically significantly and statistically significantly related to spending responses at the one week horizon, with high coupon use households smoothing spending better. At the one month horizon, the difference is statistically weaker, but the same pattern is present. Conditioning on liquidity, because it is largely uncorrelated with coupon use, does not change this ordering, but it also reduces the sample size used to estimate each coefficient, and standard errors rise as a result.

In sum, these results are consistent with an important role for financial planning as a determinant of consumption smoothing, and with a role for optimization as revealed by coupon use, but the case for an important role for planning as a general trait in other spheres of activity rather than only financial planning is weak.

6.4 Spenders, savers, self-control, and procrastination

This section shows first that households that self-identify as the ‘type of household that lives for today and spends’ have much larger spending response to the payment than households that identify as more patient. Second, there is an economically large but statistically-weak higher propensity to spend on arrival among the small share of the population that frequently regrets past purchases. But this correlation does not explain much of the aggregate spending response; the other 95 percent of the population still exhibits substantial violations of consumption smoothing. Third, procrastination – measured from delay in responding to the survey – is not indicative of larger spending responses to arrival of the payment.

A substantial literature has suggested that some households have extreme impatience or simply act as hand-to-mouth households that spend their incomes (e.g. Campbell and Mankiw, 1989; Krusell and Smith, 1998). The NCP supplemental survey asked households to characterize themselves as spenders or savers: “In general, are you or other household members the sort of people who would rather spend your money and enjoy it today or save more for the future?” with a binary choice of ‘spend now’ and ‘save for the future.’ There is lots of variation in the responses, with two thirds of households reporting that they are the type to save for the future. Low liquidity is significantly correlated with being a spender, a correlation of 0.31. Causation of course could run in either direction, but the phrasing as the “type of people” was designed to avoid households simply responding based on current behavior.

Consistent with persistent differences in households, households that report being the type of people who spend and enjoy today have much larger spending response than those that report being the type who save. Table 11 Panel A shows that the self-reported spending types exhibit large violations of consumption smoothing; the self-reported saving types smooth consumption the week of arrival but still show a statistically significant spending response over the month following arrival that is about half the size of the self-reported spending types. In the

week of arrival, saving types have an economically small and statistically insignificant increase in spending, spending types have a statistically significant and three times larger increase in spending. Over a month, the cumulative spending of spending types is estimated to be double that of saving types, but this difference is not statistically significant.

Panel B and C of Table 11 show that this pattern continues to hold among households with low liquidity, but the only statistically significant (at the 90% level) differences are found for households with low liquidity the week the payment arrives for which the spending responses of spending types is just under double that of saving types. Among households with sufficient liquid wealth, there is little evidence of greater spending by households who characterize themselves as spenders.

Another possible reason for spending payments when they arrive is that some households have difficulty not spending liquidity. For example, one theory suggests that some households spend more of the payment on arrival than they would have chosen to had they been able to commit not to spend as much at an earlier time (see Laibson, Angeletos, Repetto, Tobacman, and Weinberg, 2001; Gul and Pesendorfer, 2004a and 2004b). I investigate this proposition in two ways.

First, to investigate whether differences in the degree to which households perceive their past spending to be suboptimal, households were asked “Many people sometimes buy things that they later wish they had not bought. About how often do you or other household members make purchases that you later regret?” and households could answer: Often, Occasionally, Rarely, or Never. Panel A of Table 12 shows that there is significant variation in the population in response to this question. About forty percent of households regret purchases often or occasionally, while 60 percent do so rarely or never. But the variation is almost unrelated to liquidity. And frequency of regret explains little of the differences in spending responses across households.

The contemporaneous response to the arrival of the payment is almost identical between households who often or occasionally regret purchases (columns 2 and 5) and those who rarely/never do (columns 3 and 6). Columns 1 and 4 break out only those households who say that they often regret past purchases. Among this small set of households, the contemporaneous and cumulative spending responses are economically much larger, but the contemporaneous

responses are only borderline statistically significantly different from zero and the cumulative responses are statistically even weaker.

Panels B and C show variation conditional on sufficient liquidity and low liquidity. Panel C shows that there is no evidence for a role of regret in spending responses for households with low liquid wealth. However in Panel B, there is some evidence that households that rarely or never regret past purchases increase spending more in response to payment arrival than households that regret purchases more often. The estimates are economically large, but the small samples preclude confidence.

While this pattern is evidence against an important role for sophisticated models of self-control, or at least against the existence of a significant number of households who have not successfully managed their issues of self-control, this evidence may not be inconsistent with the existence of some households that are naive about their self control problems (Akerloff, 1991; O'Donoghue and Rabin, 1999). That is, if the primary source of variation were not problems of self-control, but instead the perceptions of them and therefore the wherewithal to manage them, then a response of never or rarely regretting would signal lack of understanding and lack of management of self-control problems.

As a second approach, I estimate whether the spending response is higher for households that delay responding to the supplemental survey, relative to households that respond rapidly.²⁴ Households that delay response may have more problems of short-term self-control. Dividing the sample into three groups whose responses to the survey were rapid, medium and slow, reveals almost no correlation between delay in survey response and liquidity. Table 13 further shows no evidence that procrastination is associated with worse consumption smoothing. In fact, if anything, the more that the survey is procrastinated, the lower the spending response to receipt of a payment. This result is not close to statistically significantly for the contemporaneous response but for the cumulative responses, the difference between the third column and the first and second columns has a t-statistic of 1.75, and between the sixth column and the fourth and fifth columns has a t-statistic of 1.55. Among households with sufficient liquidity, only those

²⁴ Rapid/medium/slow is responding the day of the survey/in days 1-7/after 8 or more days for email surveys, and in the first 5 days/in days 6 to 12/after 13 or more days for mail surveys.

who respond to the survey in a middling amount of time spend significant amount on arrival (Panel B). Among households with low liquidity, there is no noticeable pattern.

In sum, while there is statistically weak evidence that there is a small portion of the population with ex-post perceived self-control problems that are associated with violations of consumption smoothing, there is no evidence that theories of hyperbolic discounting or self-control explain a significant portion of the observed differences in spending responses in this natural experiment.

7. Conclusion and discussion of results

The significant average response to the largely-expected payments – a nine to ten percent increase in spending the week the payment arrived, a five percent increase over the first month, and a three and a half percent increase over the 7 weeks including and following arrival – is almost entirely due to the behavior of the subpopulation of households that have less than two months of income in liquid assets. Further, household beliefs were not an important determinant of the month to month increase in household spending caused by the arrival of stimulus payments in 2008. The economic stimulus payments of 2008 were widely anticipated and their arrival caused significant spending increases even among households anticipating the payments. Thus, on one level, the view that households smooth consumption across predictable changes in income subject only to the financial friction posed by a borrowing constraint receives significant support.

However, the weight of the evidence is consistent with spending responses being driven by a persistent household characteristic rather than transitory economics circumstances, such as shocks to labor income. Most convincingly, low income two years prior to the payments is highly correlated with large spending responses to the payments. Income growth, although not measured precisely, explains almost none of the variation in spending response. While this correlation could be due to budget constraints, say through means-tested transfer programs, a number of behaviors and measures of household type explain who smooths spending and who does not as well as liquidity does. Arrival causes larger spending responses for the type of households that lives for today, for households who have not made a financial plan in the last two years, and for households that using few coupons or deals when making purchases.

Statically weaker, I also find that arrival causes somewhat larger spending responses for households that are disappointed in their payment amount, for households that do not plan for vacations, as well as for the small share of people who often regret past purchase.

Is the best model of consumption smoothing simply one in which financial markets are imperfect and some households are highly impatient? Such a model produces large spending responses among households with low liquidity (as found for the saver-spender distinction). Augmented with costly investment in skills that produce income in the future, heterogeneity in discount rates could also produce a correlation between lack of consumption smoothing and low labor income. But other evidence suggests a role for sophistication or planning, so that, if high levels of impatience are the driving force, costly planning or optimization may be an additional causal channel through which impatience affects spending.

An alternative approach to matching the results of this paper is a behavioral or boundedly-rational model of the consumer in which heterogeneity in economic sophistication or ability causes the observed correlation between low levels of liquid wealth and poor consumption smoothing. Persistent low ability or economic sophistication could cause both poor economic outcomes like low wealth, low income, and lack of consumption smoothing, and a general lack of planning, lack of coupon use, and little understanding of payment programs like the stimulus program. In this alternative, observed behaviors like high spending responses to predictable income, lack of planning, being a ‘spender,’ etc. are all symptoms of low levels of sophistication, for want of a better term.

In conclusion, this paper relates heterogeneity in cleanly-estimated causal treatment effects to household characteristics, but does not measure causation from household characteristics to the strength of these treatment effects. Causation could run from characteristics to spending responses, or the reverse, or both could be caused by a third factor. Thus, while many models are rejected by the findings of this paper, evidence beyond this paper must be used to further distinguish between the models just sketched that were designed to fit the findings of this paper.

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Table 1: The timing of the economic stimulus payments

<i>Panel A: Payments by transfer of electronic funds</i>		<i>Panel B: Payments by paper check</i>	
Last two digits of taxpayer SSN	Date by which payment funds deposited	Last two digits of taxpayer SSN	Date by which payment check in mail
00 – 20	May 2	00 – 09	May 16
21 – 75	May 9	10 – 18	May 23
76 – 99	May 16	19 – 25	May 30
		26 – 38	June 6
		39 – 51	June 13
		52 – 63	June 20
		64 – 75	June 27
		76 – 87	July 4
		88 – 99	July 11

Source: Internal Revenue Service (<http://www.irs.gov/newsroom/article/0,,id=180247,00.html>)

Table 2: Sample summary statistics

Sample:	Static reporting sample		Static reporting sample with only payments by mail		Static sample with only payments by direct deposit	
	Mean	std dev	Mean	std dev	Mean	std dev
<u>Observations</u>						
Number of observations	1,131,520		593,684		534,196	
<i>Spending</i>	149.3	185.0	141.3	177.8	157.2	191.4
<i>Spending / Spending > 0</i>	178.7	188.9	166.6	181.8	190.8	195.1
<i>Payment amount</i>	17.3	142.9	15.4	128.6	19.1	155.8
<i>I(Payment amount > 0)</i>	0.019	0.137	0.019	0.137	0.019	0.137
<i>Payment amount / amount > 0</i>	897.9	521.4	800.7	480.6	993.8	541.5
<u>Households</u>						
Number of households	21,760		11,417		10,273	
<i>I(2007 Income < 20,000)</i>	0.15	0.36	0.20	0.40	0.10	0.30
<i>I(20,000 ≤ Income < 50,000)</i>	0.37	0.48	0.40	0.49	0.35	0.48
<i>I(2007 Income ≥ 100,000)</i>	0.13	0.33	0.11	0.31	0.15	0.35
<i>Household size</i>	2.6	1.5	2.4	1.4	2.8	1.5
<i>I(Number children > 0)</i>	0.38	0.49	0.30	0.46	0.46	0.50
<i>I(Children under 6 > 0)</i>	0.15	0.36	0.11	0.31	0.20	0.40

Notes: Each sample includes only households that meet the standard NCP static reporting requirement for the year and report both receipt during the period of the experimental variation and sufficient payment information for that variable and sample. All samples statistics are weighted by the NCP projection factor for 2008. Calculated based on data from The Nielsen Company (US) LLC and provided by the Marketing Data Center at the University of Chicago Booth School of Business.

Table 3: Estimated spending responses to receipt of payment

Regression Specification: (Interpretation)	Using all variation in time of receipt			Using only variation in timing within each method of receipt		
	Dollars	Spending as pct of	Dollars spent	Dollars	Spending as pct of	Dollars spent
	spent on indicator of ESP (\$ spent)	2008Q1 spending on indicator of ESP (% chg in spending)	on average ESP/100 (MPC, in %)	spent on indicator of ESP (\$ spent)	2008Q1 spending on indicator of ESP (% chg in spending)	on average ESP/100 (MPC, in %)
Two weeks before	-1.48 (1.83)	-2.74 (1.58)	-0.16 (0.20)	-0.64 (2.00)	-1.75 (1.73)	-0.02 (0.23)
Week before	-0.65 (1.88)	-2.16 (1.66)	-0.07 (0.21)	-0.34 (2.17)	-0.86 (1.92)	0.01 (0.25)
Contemporaneous week	13.42 (2.21)	9.03 (1.84)	1.49 (0.25)	12.50 (2.44)	9.86 (2.11)	1.45 (0.29)
First week after	12.17 (2.15)	7.89 (1.91)	1.36 (0.24)	9.93 (2.61)	8.02 (2.40)	1.20 (0.31)
Second week after	4.32 (2.16)	0.92 (2.02)	0.46 (0.24)	2.53 (2.74)	1.14 (2.55)	0.35 (0.32)
Third week after	3.33 (2.28)	1.02 (2.14)	0.39 (0.26)	1.70 (3.04)	1.47 (2.73)	0.32 (0.36)
Fourth week after	1.09 (2.31)	-0.51 (2.17)	0.14 (0.26)	0.09 (3.28)	0.16 (2.85)	0.12 (0.39)
Fifth week after	-1.07 (2.41)	-1.51 (2.46)	-0.08 (0.27)	-1.44 (3.57)	-0.76 (3.22)	-0.06 (0.42)
Sixth week after	-1.98 (2.56)	-0.28 (2.59)	-0.22 (0.29)	-1.74 (3.84)	0.69 (3.72)	-0.13 (0.46)
Four week cumulative or avg. percent increase	33.23 (6.27)	4.71 (1.54)	3.70 (0.70)	26.66 (8.69)	5.12 (2.07)	3.31 (1.04)
Seven week cumulative or avg. percent increase	31.27 (11.51)	2.36 (1.70)	3.53 (1.29)	23.56 (17.64)	2.94 (2.39)	3.24 (2.11)
Number of households	21,760	21,540	21,386	21,690	21,470	21,320

Notes: The regressions in the first panel include fixed effects for each month in the sample and in the second include fixed effects for each month for each means of receipt. All regressions also include household fixed effects and are weighted by the NCP projection factor for 2008. Each sample includes only households that report sufficient ESP information for that specification and receipt during the period of the experimental variation, and meet the standard NCP static reporting requirement for the year. Calculated based on data from The Nielsen Company (US) LLC and provided by the Marketing Data Center at the University of Chicago Booth School of Business.

Table 4: Spending responses by household liquidity

<i>At least two months available income in liquid wealth?</i>	Using all variation in time of receipt		Using only variation in timing within each method of receipt	
	Yes	No	Yes	No
Contemporaneous week	0.63 (0.29)	2.78 (0.39)	0.66 (0.30)	2.53 (0.42)
<i>t-stat of difference</i>		4.47		3.64
Four week cumulative increase	2.04 (0.74)	6.57 (1.01)	2.08 (1.03)	4.87 (1.36)
<i>t-stat of difference</i>		3.63		1.64
Number of households	13,685	7,656	13,654	7,621

Notes: Table reports the propensity to consume NCP goods out of an ESP in percent. The regressions in the first triplet of columns include fixed effects for each month in the sample and in the second triplet of columns include fixed effects for each month for each means of receipt. All regressions include household fixed effects and are weighted by the NCP projection factor for 2008. Each sample includes only households that report receipt during the period of the experimental variation, report sufficient ESP information for that specification, and meet the standard NCP static reporting requirement for the year. Calculated based on data from The Nielsen Company (US) LLC and provided by the Marketing Data Center at the University of Chicago Booth School of Business.

Table 5: Spending responses by income growth and income group

	Using all variation in time of receipt			Using only variation in timing within each method of receipt		
	To lower category	Same category	To higher category	To lower category	Same category	To higher category
<i>Panels A and B: Income growth</i>						
<u>Panel A: Income growth 2007 to 2008</u>						
Contemporaneous week	1.35 (0.57)	0.99 (0.39)	1.70 (0.61)	0.85 (0.64)	0.90 (0.42)	1.29 (0.67)
Four week cumulative increase	4.18 (1.55)	2.45 (1.05)	4.57 (1.61)	1.35 (2.06)	1.84 (1.46)	1.80 (2.11)
Number of households	3,416	7,719	3,051	3,405	7,696	3,042
<u>Panel B: Income growth 2006 to 2007</u>						
Contemporaneous week	1.19 (0.65)	1.28 (0.32)	1.94 (0.61)	0.88 (0.64)	1.10 (0.35)	1.89 (0.65)
Four week cumulative increase	2.20 (1.61)	4.01 (0.86)	5.19 (1.57)	0.12 (2.08)	3.28 (1.19)	4.23 (2.26)
Number of households	3,142	10,051	4,055	3,133	10,023	4,042
<i>Panels C, D and E: Income levels</i>						
	income < \$35,000	\$35,000 ≤ income < \$70,000	\$70,000 ≤ income	income < \$35,000	\$35,000 ≤ income < \$70,000	\$70,000 ≤ income
<u>Panel C: 2008 Income</u>						
Contemporaneous week	2.46 (0.58)	1.40 (0.45)	0.21 (0.49)	2.06 (0.64)	0.87 (0.49)	0.39 (0.50)
Four week cumulative increase	3.78 (1.64)	4.01 (1.16)	2.20 (1.33)	2.68 (2.02)	1.07 (1.46)	1.98 (1.95)
Number of households	5,057	5,303	3,826	5,035	5,289	3,819
<u>Panel D: 2007 Income</u>						
Contemporaneous week	2.56 (0.55)	1.44 (0.40)	0.71 (0.44)	2.39 (0.57)	1.11 (0.44)	0.65 (0.46)
Four week cumulative increase	5.35 (1.44)	3.97 (1.05)	3.17 (1.19)	4.85 (1.81)	3.02 (1.44)	1.73 (1.71)
Number of households	6,067	6,398	4,783	6,049	6,377	4,772
<u>Panel E: 2006 Income</u>						
Contemporaneous week	3.13 (0.57)	1.41 (0.34)	0.56 (0.37)	3.09 (0.59)	1.15 (0.37)	0.59 (0.39)
Four week cumulative increase	6.99 (1.33)	3.44 (0.90)	1.99 (1.02)	8.13 (1.73)	2.16 (1.20)	1.10 (1.42)
Number of households	7,495	7,783	6,063	7,466	7,761	6,048

Notes: The table reports the propensity to consume NCP goods out of an ESP in percent. The regressions in the first triplet of columns include fixed effects for each month in the sample and in the second triplet of columns include fixed effects for each month for each means of receipt. All regressions include household fixed effects and are weighted by the NCP projection factor for 2008. Each sample includes only households that report sufficient ESP information for that specification, report receipt during the period of the experimental variation, and meet the standard NCP static reporting requirement for the year. Calculated based on data from The Nielsen Company (US) LLC and provided by the Marketing Data Center at the University of Chicago Booth School of Business.

Table 6: Spending responses by liquidity and income level

	Using all variation in time of receipt			Using only variation in timing within each method of receipt		
	income < \$35,000	\$35,000 ≤ income <\$70,000	\$70,000 ≤ income	income < \$35,000	\$35,000 ≤ income <\$70,000	\$70,000 ≤ income
	<u>Panel A: Households with sufficient liquid wealth, by 2008 income</u>					
Contemporaneous week	0.91 (0.76)	0.62 (0.50)	-0.06 (0.55)	1.08 (0.82)	-0.03 (0.53)	0.17 (0.56)
Four week cumulative increase	-0.17 1.92	3.55 (1.44)	0.41 (1.51)	0.18 (2.51)	0.89 (1.76)	0.66 (2.26)
Number of households	3,068	3,762	2,964	3,055	3,754	2,962
<u>Panel B: Households with low liquid wealth, by 2008 income</u>						
Contemporaneous week	4.23 (0.90)	2.61 (0.84)	1.21 (1.03)	3.26 (1.01)	2.23 (0.95)	1.20 (1.08)
Four week cumulative increase	8.41 (2.76)	4.74 (1.99)	8.31 (2.86)	5.77 (3.29)	1.10 (2.56)	6.44 (3.66)
Number of households	1,989	1,541	862	1,980	1,535	857
<u>Panel C: Households with sufficient liquid wealth, by 2006 income</u>						
Contemporaneous week	2.33 (0.85)	0.44 (0.41)	0.06 (0.42)	2.46 (0.85)	0.24 (0.43)	0.21 (0.43)
Four week cumulative increase	3.79 (1.70)	2.27 (1.16)	1.04 (1.19)	5.45 (2.33)	1.97 (1.61)	0.79 (1.60)
Number of households	4,147	5,047	4,491	4,134	5,036	4,484
<u>Panel D: Households with low liquid wealth, by 2006 income</u>						
Contemporaneous week	3.79 (0.76)	2.60 (0.56)	1.81 (0.75)	3.69 (0.81)	2.23 (0.61)	1.52 (0.81)
Four week cumulative increase	9.91 (2.01)	5.02 (1.40)	4.45 (2.01)	10.40 (2.53)	2.22 (1.79)	1.53 (3.06)
Number of households	3,348	2,736	1,572	3,332	2,725	1,564

Notes: The table reports the propensity to consume NCP goods out of an ESP in percent. The regressions in the first triplet of columns includes fixed effects for each month in the sample and in the second triplet includes fixed effects for each month for each means of receipt. All regressions include household fixed effects and are weighted by the NCP projection factor for 2008. Each sample includes only households that report sufficient ESP information for that specification, report receipt during the period of the experimental variation, and meet the standard NCP static reporting requirement for the year. Calculated based on data from The Nielsen Company (US) LLC and provided by the Marketing Data Center at the University of Chicago Booth School of Business.

Table 7: Spending responses by household expectations and liquidity

<i>Was this about the amount your household was expecting?</i>	Using all variation in time of receipt			Using only variation in timing within each method of receipt		
	Yes, known since Feb, March, or Apr.	Known more recently, surprised to get any, or more than expecting		Yes, known since Feb, March, or Apr.	Known more recently, surprised to get any, or more than expecting	
		No, less than expecting	No, less than expecting		No, less than expecting	No, less than expecting
<i>Panel A: All households</i>						
Contemporaneous week	1.19 (0.25)	2.37 (0.83)	2.80 (0.73)	1.30 (0.27)	1.68 (0.81)	2.00 (0.81)
Four week cumulative	3.31 (0.67)	5.13 (1.74)	6.69 (2.20)	3.42 (0.93)	1.91 (2.03)	4.52 (3.10)
Number of households	15,991	2,525	2,693	15,956	2,505	2,685
<i>Panel B: Households with sufficient liquid wealth</i>						
Contemporaneous week	0.39 (0.29)	1.07 (1.18)	2.08 (1.13)	0.59 (0.31)	0.43 (1.15)	1.35 (1.24)
Four week cumulative	1.69 (0.82)	2.61 (2.08)	4.68 (3.00)	2.56 (1.13)	-0.58 (2.58)	1.99 (4.94)
Number of households	10,603	1,658	1,317	10,586	1,649	1,314
<i>Panel C: Households with low liquid wealth</i>						
Contemporaneous week	2.41 (0.46)	4.26 (1.06)	3.41 (0.96)	2.39 (0.50)	3.47 (1.09)	2.55 (1.07)
Four week cumulative	5.89 (1.12)	8.89 (3.03)	8.74 (3.15)	4.51 (1.58)	5.58 (3.32)	6.89 (3.99)
Number of households	5,388	867	1,376	5,370	856	1,371

Notes: The table reports the propensity to consume NCP goods out of an ESP in percent. The regressions in the first triplet of columns include fixed effects for each month in the sample and in the second triplet include fixed effects for each month for each means of receipt. All regressions include household fixed effects and are weighted by the NCP projection factor for 2008. Each sample includes only households that report receipt during the period of the experimental variation, report sufficient ESP information for that specification, and meet the standard NCP static reporting requirement for the year. Calculated based on data from The Nielsen Company (US) LLC and provided by the Marketing Data Center at the University of Chicago Booth School of Business.

Table 8: Spending responses by liquidity and the propensity to plan financially

<i>Formulated a financial plan for long term future?</i>	Using all variation in time of receipt		Using only variation in timing within each method of receipt	
	Yes	No	Yes	No
<i>Panel A: All households</i>				
Contemporaneous week	0.73 (0.32)	2.25 (0.34)	0.83 (0.33)	2.01 (0.36)
<i>t-statistic of difference</i>		3.29		2.42
Four week cumulative	1.81 (0.78)	5.76 (0.90)	1.72 (1.14)	4.71 (1.18)
<i>t-statistic of difference</i>		3.33		1.82
Number of households	10,936	10,405	10,902	10,373
<i>t-statistic of difference</i>				
<i>Panel B: Households with sufficient liquid wealth</i>				
Contemporaneous week	0.27 (0.37)	1.19 (0.46)	0.38 (0.37)	1.11 (0.49)
<i>t-statistic of difference</i>		1.58		1.19
Four week cumulative	1.35 (0.90)	3.15 (1.25)	1.41 (1.32)	3.13 (1.64)
<i>t-statistic of difference</i>		1.17		0.82
Number of households	8,598	5,087	8,578	5,076
<i>t-statistic of difference</i>				
<i>Panel C: Households with low liquid wealth</i>				
Contemporaneous week	2.03 (0.65)	3.10 (0.48)	2.06 (0.70)	2.72 (0.52)
<i>t-statistic of difference</i>		1.33		0.76
Four week cumulative	3.38 (1.60)	7.89 (1.26)	2.44 (2.24)	5.82 (1.68)
<i>t-statistic of difference</i>		2.21		1.21
Number of households	2,338	5,318	2,324	5,297

Notes: The table reports the propensity to consume NCP goods out of an ESP in percent. The regressions in the first triplet of columns include fixed effects for each month in the sample and in the second triplet include fixed effects for each month for each means of receipt. All regressions include household fixed effects and are weighted by the NCP projection factor for 2008. Each sample includes only households that report receipt during the period of the experimental variation, sufficient ESP information for that specification, and meet the standard NCP static reporting requirement for the year. Calculated based on data from The Nielsen Company (US) LLC and provided by the Marketing Data Center at the University of Chicago Booth School of Business.

Table 9: Spending responses by liquidity and the propensity to plan vacations

<i>Before going on vacation, how much time planning?</i>	Using only variation in timing within each method of receipt					
	Using all variation in time of receipt			Using only variation in timing within each method of receipt		
	A great deal of time	Quite a bit of time	A little time or Almost no time	A great deal of time	Quite a bit of time	A little time or Almost no time
	<i>Panel A: All households</i>					
Contemporaneous week	0.66 (0.49)	1.57 (0.38)	1.87 (0.48)	0.50 (0.50)	1.49 (0.41)	1.79 (0.48)
<i>t-statistic of 'A gret deal...'='A little...'</i>		1.76			1.86	
Four week cumulative	2.90 (1.21)	3.24 (1.02)	3.98 (1.19)	2.00 (1.63)	3.05 (1.51)	3.01 (1.50)
<i>t-statistic of 'A gret deal...'='A little...'</i>		0.64			0.09	
Number of households	4,065	7,818	5,602	4,053	7,796	5,583
	<i>Panel B: Households with sufficient liquid wealth</i>					
Contemporaneous week	0.00 (0.57)	0.66 (0.44)	1.03 (0.64)	0.01 (0.59)	0.79 (0.47)	0.99 (0.60)
<i>t-statistic of 'A gret deal...'='A little...'</i>		1.20			1.17	
Four week cumulative	2.08 (1.52)	1.40 (1.26)	2.12 (1.38)	1.63 (2.03)	2.24 (1.92)	1.65 (1.69)
<i>t-statistic of 'A gret deal...'='A little...'</i>		0.02			0.15	
Number of households	2,630	5,285	3,771	2,625	5,274	3,761
	<i>Panel C: Households with low liquid wealth</i>					
Contemporaneous week	1.63 (0.84)	2.99 (0.68)	3.23 (0.73)	1.21 (0.87)	2.55 (0.74)	3.08 (0.79)
<i>t-statistic of 'A gret deal...'='A little...'</i>		1.44			1.59	
Four week cumulative	4.44 (1.98)	6.49 (1.70)	6.96 (2.20)	2.56 (2.70)	4.19 (2.37)	5.09 (2.88)
<i>t-statistic of 'A gret deal...'='A little...'</i>		0.85			0.02	
Number of households	1,435	2,533	1,831	1,428	2,522	1,822

Notes: The table reports the propensity to consume NCP goods out of an ESP in percent. The regressions in the first triplet of column include fixed effects for each month in the sample and in the second triplet include fixed effects for each month for each means of receipt. All regressions include household fixed effects and are weighted by the NCP projection factor for 2008. Each sample includes only households that report receipt during the period of the experimental variation, sufficient ESP information for that specification, and meet the standard NCP static reporting requirement for the year. Calculated based on data from The Nielsen Company (US) LLC and provided by the Marketing Data Center at the University of Chicago Booth School of Business.

Table 10: Spending response by liquidity and optimization: coupon use

<i>Share of purchases made using coupons or deals</i>	Using all variation in time of receipt		Using only variation in timing within each method of receipt	
	Low	High	Low	High
<i>Panel A: All households</i>				
Contemporaneous week	2.08 (0.34)	0.84 (0.31)	2.14 (0.36)	0.55 (0.32)
<i>t-stat of difference</i>		2.71		3.30
Four week cumulative increase	4.61 (0.83)	2.96 (0.85)	4.39 (1.18)	1.81 (1.12)
<i>t-stat of difference</i>		1.38		1.59
Number of households	10,666	10,663	10,631	10,632
<i>Panel B: Households with sufficient liquid wealth</i>				
Contemporaneous week	0.85 (0.44)	0.43 (0.37)	1.03 (0.45)	0.27 (0.38)
<i>t-stat of difference</i>		0.72		1.29
Four week cumulative increase	2.39 (1.08)	1.71 (0.99)	3.02 (1.59)	1.05 (1.29)
<i>t-stat of difference</i>		0.46		0.96
Number of households	6,172	7,506	6,156	7,491
<i>Panel C: Households with low liquid wealth</i>				
Contemporaneous week	3.49 (0.53)	1.57 (0.54)	3.39 (0.57)	1.07 (0.59)
<i>t-stat of difference</i>		2.55		2.83
Four week cumulative increase	7.24 (1.30)	5.34 (1.60)	5.81 (1.75)	3.31 (2.16)
<i>t-stat of difference</i>		0.92		0.90
Number of households	4,494	3,157	4,475	3,141

Notes: The table reports the propensity to consume NCP goods out of an ESP in percent. The regressions in the first triplet of columns include fixed effects for each month in the sample and in the second triplet include fixed effects for each month for each means of receipt. All regressions include household fixed effects and are weighted by the NCP projection factor for 2008. Each sample includes only households that report receipt during the period of the experimental variation, sufficient ESP information for that specification, and meet the standard NCP static reporting requirement for the year. Calculated based on data from The Nielsen Company (US) LLC and provided by the Marketing Data Center at the University of Chicago Booth School of Business.

Table 11: Spending responses by liquidity and grasshoppers and ants

<i>The sort of people who spend or save?</i>	Using all variation in time of receipt		Using only variation in timing within each method of receipt		N
	Spend now	Save for future	Spend now	Save for future	
<i>Panel A: All households</i>					
Contemporaneous week	2.37 (0.39)	0.92 (0.28)	2.19 (0.43)	0.92 (0.29)	
<i>t-stat of difference</i>		3.00		2.46	
Four week cumulative increase	5.14 (1.05)	2.96 (0.71)	4.09 (1.40)	2.71 (1.00)	
<i>t-stat of difference</i>		1.72		0.80	
Number of households	7,881	13,460	7,852	13,423	
<i>Panel B: Households with sufficient liquid wealth</i>					
Contemporaneous week	0.90 (0.55)	0.52 (0.33)	0.85 (0.59)	0.58 (0.34)	
<i>t-stat of difference</i>		0.59		0.39	
Four week cumulative increase	2.53 (1.60)	1.84 (0.81)	1.65 (2.20)	2.25 (1.14)	
<i>t-stat of difference</i>		0.38		0.24	
Number of households	3,528	10,157	3,522	10,132	
<i>Panel C: Households with low liquid wealth</i>					
Contemporaneous week	3.36 (0.54)	1.92 (0.54)	3.05 (0.59)	1.74 (0.57)	
<i>t-stat of difference</i>		1.90		1.60	
Four week cumulative increase	7.01 (1.39)	5.92 (1.43)	5.60 (1.82)	3.64 (2.03)	
<i>t-stat of difference</i>		0.55		0.72	
Number of households	4,353	3,303	4,330	3,291	

Notes: The table reports the propensity to consume NCP goods out of an ESP in percent. The regressions in the first triplet of columns include fixed effects for each month in the sample and in the second triplet include fixed effects for each month for each means of receipt. All regressions include household fixed effects and are weighted by the NCP projection factor for 2008. Each sample includes only households that report receipt during the period of the experimental variation, sufficient ESP information for that specification, and meet the standard NCP static reporting requirement for the year. Calculated based on data from The Nielsen Company (US) LLC and provided by the Marketing Data Center at the University of Chicago Booth School of Business.

Table 12: Spending responses by liquidity and self control: regret of purchases

<i>About how often do you or other household members make purchases that you later regret?</i>	Using all variation in time of receipt			Using only variation in timing within each method of receipt		
	Often	Often or Occasionally	Rarely or Never	Often	Often or Occasionally	Rarely or Never
	<i>Panel A: All households</i>					
Contemporaneous week	2.80 (1.64)	1.10 (0.34)	1.81 (0.31)	3.64 (1.99)	0.92 (0.38)	1.80 (0.33)
<i>t-statistic of difference</i>			1.53			1.77
Four week cumulative	7.54 (4.83)	3.61 (0.96)	4.04 (0.76)	7.44 (7.06)	2.83 (1.29)	3.61 (1.07)
<i>t-statistic of difference</i>			0.35			0.47
Number of households	481	8,426	12,915	479	8,399	12,876
	<i>Panel B: Households with sufficient liquid wealth</i>					
Contemporaneous week	1.27 (2.77)	0.27 (0.45)	0.83 (0.37)	2.77 (3.25)	0.10 (0.49)	0.97 (0.37)
<i>t-statistic of difference</i>			0.96			1.42
Four week cumulative	10.80 (8.54)	3.29 (1.27)	1.37 (0.90)	9.81 (12.40)	2.64 (1.72)	1.78 (1.28)
<i>t-statistic of difference</i>			1.23			0.40
Number of households	221	4,927	8,758	221	4,917	8,737
	<i>Panel C: Households with low liquid wealth</i>					
Contemporaneous week	4.17 (2.03)	2.02 (0.52)	3.49 (0.57)	4.40 (2.61)	1.77 (0.57)	3.24 (0.62)
<i>t-statistic of difference</i>			1.91			1.75
Four week cumulative	7.20 (5.82)	4.32 (1.48)	8.68 (1.38)	6.98 (8.15)	2.93 (1.97)	6.65 (1.89)
<i>t-statistic of difference</i>			2.15			1.36
Number of households	260	3,499	4,157	258	3,482	4,139

Notes: The table reports the propensity to consume NCP goods out of an ESP in percent. The regressions in the first triplet of columns include fixed effects for each month in the sample and in the second triplet include fixed effects for each month for each means of receipt. All regressions include household fixed effects and are weighted by the NCP projection factor for 2008. Each sample includes only households that report receipt during the period of the experimental variation, sufficient ESP information for that specification, and meet the standard NCP static reporting requirement for the year. Calculated based on data from The Nielsen Company (US) LLC and provided by the Marketing Data Center at the University of Chicago Booth School of Business.

Table 13: Spending responses by liquidity and self control: survey response time

<i>Speed of response to survey in days</i>	Using all variation in time of receipt			Using only variation in timing within each method of receipt		
	Slow	Medium	Fast	Slow	Medium	Fast
	<i>Panel A: All households</i>					
Contemporaneous week	1.19 (0.46)	1.74 (0.31)	1.15 (0.58)	1.16 (0.49)	1.72 (0.32)	0.75 (0.63)
Four week cumulative	2.52 (1.12)	4.55 (0.81)	2.89 (1.58)	2.63 (1.58)	4.03 (1.05)	0.99 (2.37)
Number of households	6,268	11,826	3,239	6,245	11,796	3,226
	<i>Panel B: Households with sufficient liquid wealth</i>					
Contemporaneous week	0.40 (0.55)	0.90 (0.39)	-0.24 (0.66)	0.48 (0.54)	1.02 (0.40)	-0.62 (0.76)
Four week cumulative	-0.55 (1.34)	3.19 (0.98)	0.91 (2.01)	-0.06 (1.87)	3.72 (1.32)	-0.89 (3.13)
Number of households	4,117	7,438	2,123	4,105	7,425	2,117
	<i>Panel C: Households with low liquid wealth</i>					
Contemporaneous week	2.34 (0.79)	2.88 (0.49)	3.29 (1.03)	2.16 (0.91)	2.61 (0.52)	2.92 (1.03)
Four week cumulative	6.93 (1.92)	6.62 (1.37)	6.01 (2.52)	6.66 (2.76)	4.15 (1.73)	3.48 (3.46)
Number of households	2,151	4,388	1,116	2,140	4,371	1,109

Notes: The table reports the propensity to consume NCP goods out of an ESP in percent. The regressions in the first triplet of columns include fixed effects for each month in the sample and in the second triplet include fixed effects for each month for each means of receipt. All regressions include household fixed effects and are weighted by the NCP projection factor for 2008. Each sample includes only households that report receipt during the period of the experimental variation, sufficient ESP information for that specification, and meet the standard NCP static reporting requirement for the year. Calculated based on data from The Nielsen Company (US) LLC and provided by the Marketing Data Center at the University of Chicago Booth School of Business.