Measuring Household Spending and Payment Habits: The Role of "Typical" and "Specific" Time Frames in Survey Questions

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Abstract

We have designed and fielded an experimental module in the American Life Panel (ALP) where we ask individuals to report the frequency of their purchases and the amount spent by debit cards, cash, credit cards, and personal checks. The experimental design features several stages of randomization. First, three different groups of sample participants are randomly assigned to an entry month (July, August, or September, 2011) and will be interviewed four times during a year, once every quarter. Second, for each method of payment a sequence of questions elicits spending behavior during a day, week, month, and year. At the time of the first interview, this sequence is randomly assigned to refer to "specific" time spans or to "typical" time spans. In all subsequent interviews, a "specific" sequence becomes a "typical" sequence and vice versa. In this paper, we analyze the data from the first wave of the survey. We show that the type – specific or typical – and length of recall periods greatly influence household reporting behavior.

1 Introduction

The rapid transformation of the U.S. payment system and the increasing availability of payment instruments have greatly changed household attitudes toward payment methods and spending habits. Understanding these trends has important policy implications. First, an assessment of consumers' preferences and financial literacy may help enact regulations, laws, and educational programs to protect and support consumer payment choices. Second, identifying which individual characteristics and personal traits drive such preferences and determine spending attitudes

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is critical to target interventions aimed at reducing households' exposure to consumer debt and boosting lifetime savings.

The Survey of Consumer Payment Choice (SCPC), developed by the Federal Reserve Bank of Boston and administered in the RAND American Life Panel (ALP), offers a unique opportunity to study these questions. As a preliminary step in this direction, however, an important issue is to assess the quality and validity of individual reports about their payment choices and spending habits.

Measuring the frequency with which people perform regular actions, such as purchasing consumer goods, is not a simple task. The cognitive process used by subjects to answer a frequency question, in fact, may differ substantially depending on the question content and format (Chang and Krosnick, 2003). The SCPC asks respondents about their spending and payment behavior during a "usual" or "typical" period (day, week, month, or year). This type of question may conceivably trigger a rate-based estimation, in which individuals construct an occurrence rule and apply it to the reference time frame. An alternative approach is to elicit behavior frequency within "specific" time periods, such as past day, week, month, or year. In this case, respondents may be more likely to use episode enumeration, in which they recall and count episodes from a well-defined time frame.

Individuals tend to balance effort and accuracy in selecting formulation processes and the trade-off is often determined by the accessibility of the information in memory. The answer to a question about a specific recent period entails shorter-term recall than does one about a typical period and may therefore be subject to smaller recall error. On the other hand, it may represent a less accurate description of average behavioral frequencies. Assessing the quality and validity of individual reports referring to specific and typical periods is an interesting methodological question with important implications for the design of consumer spending surveys and their use for policy analysis.

With this objective in mind, we have designed and fielded an experimental module in the ALP where we ask individuals to report the frequency of their purchases and the amount spent by debit card, cash, credit card, and check. The experimental design features several stages of randomization. First, three different groups of sample participants are invited every month to answer the survey. Each respondent is randomly assigned to an entry month (July, August, or September, 2011) and is interviewed four times during a year, once every quarter (e.g. the respondents entering in July are re-interviewed in October, respondents entering in August are

re-interviewed in November, etc.). Second, for each method of payment a sequence of questions elicits spending behavior during a day, week, month, and year. At the time of the first interview, this sequence is randomly assigned to refer to "specific" time spans or to "typical" time spans. In all subsequent interviews, a "specific" sequence becomes a "typical" sequence and vice versa. Finally, the order of the time frames (day, week, month, year) within a sequence is randomly determined so as to reduce anchoring or order effects.

This design generates both between- and within-subjects variation for our research purposes. In each quarter, we will have one group of respondents answering about specific periods and another group answering about typical periods. Within these two sub-samples, we will compare answers to different reference periods and evaluate the effect of shorter vs. longer recall spans. Also, the randomization of the period sequence (day, week, month, year) will allow us to gauge the degree of dependency among answers referring to different time spans. For instance, is the number of payments in a typical week consistent with the number of payments in a typical day or month? At the same time, we will be able to compare, for a given reference period, reported frequencies within a specific time frame and a typical time frame.

Over two subsequent quarters, we will have individual changes from a specific to a typical period and individual changes from a typical to a specific period. By studying the direction of these changes, we will get insights on whether any of the two formats leads to systematic over- or under- reporting and on whether the"intensity" of the bias differs depending on the length of the reference period (day, week, month, or year).

Over the four planned waves, we will have changes over time for each "specific" and "typical" period. Hence, we can analyze how stable answers are for different question formats. A priori, one would expect reported payment frequencies and spending amounts within typical periods to be less volatile than those within specific periods. Moreover, one would expect such differences to decrease with the length of the reference time frame. Consistency of answers could be treated as an indicator of reliability of the measurements.

An interesting output of this analysis is an assessment of how alternative measures obtained from different question formats correlate with individual characteristics such as education, cognitive ability, and wealth. We will also test the validity of such measures by evaluating their association with criterion variables (i.e. variables with which we expect spending and payment habits to correlate relatively strongly and in a specific way). Possible criterion variables among those already collected by the SCPC are household income, respondents' financial responsibil-

ity within the household, individual financial literacy and cognitive capability, and consumers' opinion about the characteristics - security, convenience, acceptance for payment, and cost - of a particular payment instrument.

The first wave of this experimental module has now been completed, while the second wave is currently in the field. In this paper, we describe the experimental design and the characteristics of the sample (Section 2) and provide some preliminary evidence of the role played by time frames when eliciting spending and payment habits in household surveys (Section 3).

2 Data and Experimental Design

2.1 The sample

The study is carried out on a sample of individuals participating in the American Life Panel (ALP), an internet-based survey administered by the RAND Corporation. Respondents in the ALP either use their own computer to log on to the Internet or they are given internet access through a provided small laptop or a Web TV device. About twice a month, sample participants receive an email with a request to visit the ALP URL and fill out specific questionnaires. Typically an interview takes no more than 30 minutes and respondents are paid a monetary incentive proportional to the length of the interview (about 70 cents per minute). Most respondents respond within one week and the vast majority within three weeks. To further increase response rates reminders are sent each week. For the current study, 97% of the sampled individuals completed the survey within one week, 2.5% within three weeks, and only 0.5% within four weeks.

There are currently 5,000 members in the ALP mainly recruited from survey programs that collect representative samples of U.S. consumers. Until August 2008, most participants were recruited from the pool of individuals age 18 and older who were respondents to the Monthly Survey (MS) of the University of Michigan's Survey Research Center (SRC). The MS is the leading consumer sentiments survey that incorporates the long-standing Survey of Consumer Attitudes (SCA) and produces, among others, the widely used Index of Consumer Expectations. After August 2008, the ALP did not receive new members from the University of Michigan's MS. A subset of participants (approximately 550) have been recruited through a "snowball" sample. That is, respondents were given the opportunity to suggest friends or acquaintances who might also want to participate in the panel. These were then contacted and asked if they

wanted to join the ALP. In the fall of 2009, a new group of respondents (approximately 600) was recruited from the National Survey Project (NSP), an NSF-funded panel of Stanford University and Abt SRBI. More recently, the ALP has begun recruiting from a random mail and telephone sample using the Dillman method as well as from vulnerable populations so as to increase the representation of minorities and less affluent individuals.

For this study we rely on a sample of 3,285 individuals. Of these, 50% were recruited through the MS, 15% through the NSP, 20% through the "snowball" sample, and 15% through the vulnerable population pool. About 60% of the respondents are females and 40% are males. Table 1 below summarizes the characteristics of the selected sample.

Table 1: Sample Characteristics

Gender/Age			Gender/Education			Gender/Income		
	Freq.	Perc.		Freq.	Perc.		Freq.	Perc.
M, Age 18-34	248	7.55	M, High School or less	268	8.16	M, Inc<35k	375	11.45
M, Age 35-54	507	15.43	M, Some College	476	14.49	M, Inc 35-59k	352	10.75
M, Age 55+	578	17.60	M, College+	589	17.93	M, Inc 60k+	601	18.35
F, Age 18-34	475	14.46	F, High School	426	12.97	F, Inc<35k	746	22.78
F, Age 35-54	774	23.56	F, Some College	823	25.05	F, Inc 35-59k	510	15.57
F, Age 55+	703	21.40	F, College +	703	21.40	F, Inc 60k+	691	21.10
Total	3,285	100.00	Total	3,285	100.00	Total	3,275	100.00

2.2 The experiment

About one third of the selected sample is invited every month to answer the experimental module. Each participant is interviewed four times during a year, once every quarter. The first wave of the survey was fielded on July 15^{th} 2011. Respondents were randomly assigned to three different entry dates – July 15^{th}, August 15^{th}, and September 15^{th} – and will be re-interviewed every three months since then. For instance, those who started on July 15^{th} 2001 will be asked to take the second wave of the survey on October 15^{th} 2011, the third wave on January 15^{th} 2012, and the fourth wave on March 15^{th} 2012.

The module features questions about the four most common methods of payment adopted by U.S. consumers in recent years, as documented by Foster et al. (2008) and (2009). These are, in order of importance, debit cards, cash, credit cards, and personal checks. For each method of payment, sample participants are asked to report first the number of transactions made and

Table 2: Randomization 1 – Entry Date

	Freq.	Perc.
July 15^{th}	1,067	32.48
August 15^{th}	1,079	32.85
September 15^{th}	1,139	34.67
Total	3,285	100.00

then the amount spent in four recall periods, a day, a week, a month, and a year. At the time of the first interview, each respondent is randomly assigned to answer about "specific past" recall periods or "typical" recall periods. In all subsequent waves, those who answered about "specific past" recall periods in the previous interview will be asked to answer about "typical" recall periods and vice versa. Thus, each sample participant faces two possible initial options – "specific past" and "typical" recall periods – and two possible paths over the entire survey originating from them as shown in Table 3.

Table 3: Randomization 2 – "Specific Past" and "Typical" Recall Periods

1st Interview		2nd Interview		3rd Interview		4th Interview
"Specific Past"	$\longrightarrow$	"Typical"	$\longrightarrow$	"Specific Past"	$\longrightarrow$	"Typical"
"Typical"	$\longrightarrow$	"Specific Past"	$\longrightarrow$	"Typical"	$\longrightarrow$	"Specific Past"

After the type of recall periods has been assigned, a further stage of randomization determines, at each interview and for each respondent, the order in which the four payment instruments appear in the questionnaire. Moreover, the order of the recall period sequence (day/week/month) is randomly allocated to each method of payment so as to reduce mechanic answers and systematic anchoring or order effects. On the other hand, questions referring to the year are always asked after the respondent has reported about all other recall periods.[1] Table 4 illustrates such random assignments.

It should be noticed that blocking questions by payment method and not by recall periods has the advantage of attenuating possible "seam" effects (Rips et al., 2003; Ham et al., 2007; Moore et al., 2009). That is, the tendency of providing relatively similar answers for each

[1]In a pilot test we randomized the whole period sequence (day/week/month/year). Respondents' feedback revealed strong reluctance to answer the "year" question at the beginning of the recall period sequence. We therefore decided to permute only day, week, and month, while keeping the "year" question at the end of the sequence for each method of payment. We acknowledge that this may cause some anchoring effects. On the other hand, however, it makes it easier for survey participants to approximate the number of payments and the amount spent over a long time span such as one year.

recall period within one wave and relatively different answers across waves. This issue may conceivably arise if respondents adopt "constant responding" strategies so as to simplify the reporting task. For instance, when asked about the number of payments in a week, survey participants may be inclined to provide the same answer for all payment instruments in order to minimize the recalling effort. Our design should discourage such behaviors and therefore reduce the importance of "seam" effects in our survey.

Table 4: Randomization 3 – Recall Period Sequence and Payment Methods

	Specific Past Period					Typical Period				
	Debit	Cash	Credit	Check	Total	Debit	Cash	Credit	Check	Total
Day/Week/Month	263	257	271	273	1,064	305	267	263	268	1,103
Day/Month/Week	272	261	243	277	1,053	284	287	274	287	1,132
Week/Day/Month	230	272	274	275	1,051	265	282	285	278	1,110
Week/Month/Day	309	277	252	261	1,099	274	276	279	268	1,097
Month/Day/Week	278	274	287	238	1,077	278	255	295	272	1,100
Month/Week/Day	277	288	302	305	1,172	250	289	260	283	1,082
Total	1,629	1,629	1,629	1,629		1,656	1,656	1,656	1,656	

2.2.1 Defining "specific past" recall periods

In this section, we briefly discuss how "specific past" recall periods are defined in our study. A "specific past" day is determined by randomly drawing a number from 1 to 7 which pins down the specific recent day the respondent has to refer to. For example, if the respondent answers the survey on a Tuesday and the random number is 5, he/she will have to refer to the previous Thursday when answering questions about "specific past" day.

An alternative design would be to ask individuals about payments executed during the day prior to the interview. While this choice would reduce the time of recollection and perhaps increase response accuracy, it has a substantial drawback. Since sample participants are more likely to answer the questionnaire during the first three days after receiving the ALP URL, referring to the day prior to the interview would cluster the reference day on specific days of the week and, hence, reduce its representativeness.[2] For this reason, a design that randomly

[2]Among those who entered the survey on July 15^{th} 2011, 41% answered the survey during the first three days after receiving the ALP URL and 55% during the first five days. Among those who entered the survey on August 15^{th} 2011, 57% answered the survey during the first three days after receiving the ALP URL and 65% during the

selects a specific day during the week prior to the interview is to be preferred.

The "specific past" week is defined as follows. For each interview date, an algorithm goes back 7 days and pins down the reference week. Thus, if the respondent answers the interview on July 27^{th}, the "specific past" week is defined as the time since July 20^{th}. Similarly, the "specific past" month and "specific past" year are anchored to the interview date. Thus, if the respondent answers the questionnaire on July 27^{th} 2011, the "specific past" month is defined as the time since June 27^{th} 2011, whereas the "specific past" year is defined as the time since July 2010.

This procedure avoids having individuals referring to time spans of different length depending on the particular date they answer the questionnaire. For instance, if we were to define the "specific past" month as the month prior to the one when the interview took place, we would have two persons, one answering on July 2^{nd} 2011 and one on July 27^{th} 2011, referring both to June 2011 while facing substantially different recollection times.

3 Results

3.1 Descriptive statistics

Summary statistics reported in Tables 5 and 6 reveal interesting results and, when comparison is possible, confirm the findings by Foster et al., (2008) and (2009). Across all instruments, both the median and the average number of payments tend to be higher in typical recall periods than in specific ones. This pattern is somewhat reversed when the focus shifts on the amount spent. Not surprisingly, the discrepancy between median and mean values is larger for specific recall periods than for typical ones. Also, differences across specific and typical periods decrease as the length of the recall period increases.

Accounting for all possible payment instruments we compute that the median (average) consumer makes 22 (36) transactions in the previous month, spending \$1,320 (\$1,839), and 29 (40) in a typical month, spending \$1,300 (\$1,599). Respondents rely most heavily on debit cards and cash to make their transactions, while credit cards and personal checks are the third and fourth most common methods of payment, respectively. As for the amount spent, survey participants indicate using mainly personal checks and credit cards for large purchases and debit cards and cash to pay for relatively smaller amounts. Such rankings appear to be robust to

first five days. Among those who entered the survey on September 15^{th} 2011, 55% answered the survey during the first three days after receiving the ALP URL and 65%during the first five days.

variations in the type and length of the recall period.

Given the randomization of the sequence (day/week/month), our experimental design allows us to assess the degree of dependency among answers referring to different recall periods. For instance, is the number of payments in a specific or typical week consistent with the number of payments in a specific or typical month? Also, is the answer to a particular reference period systematically anchored to the one given in the preceding question? We investigate these issues in Table 7, where, to help the comparison, we express reported values for day, week, and month in yearly equivalents.

Table 5: Number of Payments

		Specific Past Period				Typical Period			
		Day	Week	Month	Year	Day	Week	Month	Year
Debit	*1st quartile*	0	0	0	0	0	0	0	0
	2nd quartile	0	1	3	20	0	2	4	39
	3rd quartile	1	5	12	140	2	5	20	204
	Mean	1	4	13	171	1	5	15	291
	N of obs.	1,460	1,463	1,464	1,445	1,524	1,527	1,525	1,524
Cash	*1st quartile*	0	0	0	0	0	0	0	5
	2nd quartile	0	1	4	24	0	2	5	50
	3rd quartile	1	4	10	100	1	5	15	200
	Mean	1	5	15	152	1	4	15	260
	N of obs.	1,467	1,469	1,464	1,441	1,529	1,529	1,525	1,521
Credit	*1st quartile*	0	0	0	0	0	0	0	0
	2nd quartile	0	0	2	10	0	0	2	12
	3rd quartile	0	3	10	85	1	3	8	108
	Mean	1	3	12	161	1	3	8	135
	N of obs.	1,464	1,464	1,467	1,448	1,529	1,529	1,530	1,530
Check	*1st quartile*	0	0	0	1	0	0	0	4
	2nd quartile	0	0	2	20	0	0	2	24
	3rd quartile	0	2	6	63	0	1	6	60
	Mean	0	2	6	78	0	1	5	105
	N of obs.	1,468	1,470	1,470	1,454	1,528	1,519	1,534	1,527

Statistics are computed excluding the top 1% of the variables' distribution.

Overall, answers to month and year questions are reasonably consistent, while relatively

large discrepancies can be observed between spending reports referring to short (day and week) and long (month and year)recall periods. There is also evidence that answers are anchored to those given in the preceding question. At the same time, the order of the recall period sequence has some influence on reported values. In particular, the amount spent by debit cards, cash, and credit cards tend to be higher for the "increasing" sequence day/week/month than for the "decreasing" sequence month/week/day.[3]

Table 6: Amount Spent (in current dollars)

		Specific Past Period				Typical Period			
		Day	Week	Month	Year	Day	Week	Month	Year
Debit	*1st quartile*	0	0	0	0	0	0	0	0
	2nd quartile	0	10	150	800	0	35	200	1,200
	3rd quartile	25	200	586	5,000	25	140	600	6,000
	Mean	39	141	430	4,332	17	90	409	4,864
	N of obs.	1,475	1,475	1,466	1,466	1,542	1,542	1,543	1,543
Cash	*1st quartile*	0	0	0	0	0	0	0	30
	2nd quartile	0	20	75	500	0	20	100	1,000
	3rd quartile	15	95	300	2,080	10	70	300	3,000
	Mean	21	81	230	1,981	10	52	200	2,295
	N of obs.	1,472	1,475	1,475	1,475	1,543	1,543	1,543	1,543
Credit	*1st quartile*	0	0	0	0	0	0	0	0
	2nd quartile	0	0	82	750	0	0	100	882
	3rd quartile	0	160	650	6,000	20	100	500	6,000
	Mean	29	162	605	5,677	15	88	477	5,560
	N of obs.	1,475	1,473	1,475	1,475	1,539	1,522	1,540	1,542
Check	*1st quartile*	0	0	0	0	0	0	0	100
	2nd quartile	0	0	240	2,134	0	0	260	2,400
	3rd quartile	0	215	900	9,600	0	100	875	9,000
	Mean	47	252	727	7,282	11	86	634	6,663
	N of obs.	1,475	1,475	1,474	1,475	1,543	1,543	1,543	1,538

Statistics are computed excluding the top 1% of the variables' distribution.

[3]For all the other recall period sequences not reported in Table 7, there are not appreciable differences with respect to the patterns commented above.

Table 7: Mean Values in Yearly Equivalents for Different Recall Period Sequences

Number of Payments

		Specific Past Period				Typical Period			
		Day	Week	Month	Year	Day	Week	Month	Year
Debit	*D/W/M/Y*	612	223	247	175	430	301	225	242
	W/M/D/Y	376	381	198	134	394	275	250	255
	M/W/D/Y	243	118	164	189	272	139	92	145
Cash	*D/W/M/Y*	226	77	51	53	95	49	111	208
	W/M/D/Y	238	171	130	156	354	235	341	421
	M/W/D/Y	188	202	144	136	391	181	233	238
Credit	*D/W/M/Y*	197	143	221	136	180	124	88	125
	W/M/D/Y	98	92	239	69	88	52	61	56
	M/W/D/Y	220	172	136	162	240	163	126	156
Check	*D/W/M/Y*	222	158	112	141	300	242	149	183
	W/M/D/Y	98	123	92	110	153	117	97	106
	M/W/D/Y	80	75	54	64	76	57	52	56

Amount Spent

		Specific Past Period				Typical Period			
		Day	Week	Month	Year	Day	Week	Month	Year
Debit	*D/W/M/Y*	20,765	7,869	5,139	3,935	7,471	4,328	4,264	3,880
	W/M/D/Y	11,065	4,648	2,237	1,776	3,760	2,547	2,263	2,208
	M/W/D/Y	16,837	8,302	6,484	5,317	5,836	4,516	5,350	5,515
Cash	*D/W/M/Y*	27,917	12,683	8,710	8,645	4,560	3,341	7,126	6,584
	W/M/D/Y	10,649	7,609	5,179	4,153	5,527	5,001	5,848	5,844
	M/W/D/Y	6,136	4,022	2,272	1,805	3,427	2,704	2,469	1,862
Credit	*D/W/M/Y*	7,872	11,576	7,887	6,151	5,103	4,836	5,428	5,812
	W/M/D/Y	8,652	14,825	10,164	7,520	3,490	4,276	7,110	7,619
	M/W/D/Y	7,700	5,902	5,529	5,040	5,040	3,695	4,724	3,827
Check	*D/W/M/Y*	4,998	3,372	2,948	1,949	2,360	2,380	2,376	2,449
	W/M/D/Y	5,087	5,437	6,694	4,382	4,875	5,346	6,367	5,592
	M/W/D/Y	7,858	12,834	8,547	7,442	3,755	5,715	7,911	6,456

Statistics are computed excluding the top 1% of the variables' distribution. Reported number of payments and amount spent for day, week and month are expressed in yearly equivalents.

3.2 Regression analysis

We now turn to the analysis of the experimental data in a regression framework so as to quantify the effect that different type – specific or typical – and length of recall periods have on household spending habits as elicited by our module. Throughout this section, we will focus on two outcomes: the reported number of payments and the amount spent using one of the four payment methods in a particular time frame. As a preliminary step, we express these two variables in yearly equivalents, whenever the recall period is a day, a week or a month. This transformation will ease the interpretation and help the comparison of estimated coefficients across recall periods of different length.

Given the experimental design described above, we have four individual reports for each method of payment, one per day, one per week, one per month, and one per year. Our strategy is to express these individual reports in yearly equivalents and regress them on recall period indicators. In order to account for correlation between observations within each individual unit, we cluster standard errors at the respondent level. We control for a set of individual characteristics including gender, age, education, and family income, as well as for survey specific factors such as the order of the recall period sequence faced by the respondent and the time it took him/her to complete the questionnaire. We use relatively flexible specifications allowing the recall period indicators to interact with income, education, age, and survey time. For brevity, we only report the marginal effects throughout this section.

In Tables 8 and 9 we focus on the number of payments and on the amount spent, respectively. In both cases, we present separate OLS regressions for "specific past" recall periods and for "typical" recall periods. The estimated coefficients on the recall period indicators are strongly significant and confirm the patterns of the descriptive analysis in the previous section. Respondents report substantially higher frequency of payments when referring to short time spans, such as a day or a week, than when referring to a year. The difference between "monthly" and "yearly" answers is less marked, with the former returning, in general, lower frequencies than the latter. As far as amounts spent are concerned, the results for the "specific past" frame show a tendency to report from 800 to 1,500 dollars more when referring to a month than to a year, from 2,000 to 5,000 dollars more when referring to a week than to a year, and from 1,800 to 4,700 dollars more when referring to a day than to a year. There is not similar evidence within the "typical" frame.

Table 8: OLS Regressions for Specific and Typical Periods
Number of Payments – Marginal Effects

	Specific Past Period				Typical Period			
	Debit	Cash	Credit	Check	Debit	Cash	Credit	Check
Day	149.9***	163.4***	64.5***	80.5***	163.9***	113.0***	94.4***	26.5***
	(20.2)	(22.3)	(17.8)	(11.9)	(16.9)	(19.9)	(9.1)	(6.4)
Week	18.9	58.1***	4.4	27.8***	24.3*	10.4	20.6***	-7.7**
	(14.7)	(17.3)	(14.5)	(6.5)	(14.7)	(20.0)	(6.1)	(3.7)
Month	-26.6*	34.6*	-27.7*	-1.2	-30.8**	-26.9	-13.4**	-3.6
	(14.0)	(18.4)	(14.4)	(6.2)	(13.7)	(18.5)	(5.2)	(3.8)
Inc 35-59k	8.3	-91.4***	-0.0	15.3	-22.7	-54.7	21.6	14.1*
	(26.1)	(32.6)	(19.9)	(9.9)	(26.7)	(33.4)	(14.4)	(8.2)
Inc 60k+	18.3	-59.4*	87.4***	35.1***	9.9	-54.5*	89.1***	13.0*
	(25.7)	(32.4)	(20.2)	(11.5)	(26.5)	(29.3)	(14.7)	(7.5)
Some College	53.5**	-7.5	-13.8	-5.6	90.9***	60.2**	16.9	-1.4
	(25.7)	(28.5)	(20.5)	(14.1)	(24.9)	(26.6)	(16.0)	(8.2)
College+	47.8*	45.8	81.0***	-12.5	45.4*	96.6***	95.5***	6.1
	(26.5)	(33.0)	(23.2)	(13.7)	(26.2)	(30.7)	(17.7)	(8.7)
Age 35-54	-19.3	41.7	-20.9	43.4***	-118.8***	-25.9	-38.5**	16.3**
	(30.0)	(28.3)	(23.8)	(8.9)	(29.0)	(34.9)	(17.2)	(7.1)
Age 55+	-158.6***	-33.6	-46.0*	77.7***	-231.3***	-76.3**	-41.0**	44.7***
	(28.8)	(27.6)	(23.8)	(10.8)	(29.2)	(35.3)	(17.5)	(7.8)
ST q2	64.3**	39.1	45.3**	-3.6	52.4*	65.8**	54.0***	6.4
	(28.8)	(28.3)	(21.7)	(12.4)	(27.1)	(32.8)	(15.0)	(7.3)
ST q3	50.3*	118.4***	104.5***	2.0	63.3**	97.5***	62.3***	8.4
	(26.5)	(31.8)	(24.6)	(13.4)	(28.0)	(33.2)	(14.5)	(7.4)
ST q4	63.5**	73.4**	126.8***	29.0*	119.0***	45.7	80.2***	37.9***
	(26.7)	(30.2)	(23.7)	(14.8)	(36.0)	(34.3)	(18.2)	(10.5)
N	5827	5836	5836	5855	6078	6082	6096	6086

The dependent variables are the reported number of payments in yearly equivalents. Regressions are run excluding the top 1% of the dependent variable's distribution. *ST* $q(k)$ is an indicator for the k^{th} quartile of the survey time distribution. The omitted categories are the indicator for "Year," $Income < 35k$, $Education \leq High\ School$, $18 \leq Age < 35$, the indicator for $Survey\ Time \leq q1$. The specification allows for interactions $Recall\ Period \times Income \times Education$. Controls for gender and the order of the recall period sequence are included. Standard errors are clustered at the individual level. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 10 shows the results of the OLS regressions after pooling the sub-sample assigned to "specific past" and "typical" recall periods. In this case, we allow the recall period indicators to interact with the "typical" period indicator besides income, education, age, and survey time. Overall, referring to periods shorter than a year tends to increase the reported number of payments and the amount spent. For instance, when referring to a week, surveyed individuals report, on average, 21 more debit card transactions and $1,200 more in debit card purchases than when referring to a year. Similarly, they report 34 more credit card transactions and $1,200 more in credit card purchases than when referring to a year. The difference with "yearly" answers is smaller, the longer the length of the recall period. Indeed, along the line of the previous example,

there are about $400 more in debit and credit card purchases when confronting monthly and yearly reports.

Table 9: OLS Regressions for Specific and Typical Periods
Amount Spent – Marginal Effects

	Specific Past Period				Typical Period			
	Debit	Cash	Credit	Check	Debit	Cash	Credit	Check
Day	4.70***	3.31***	1.81***	2.97***	0.46**	0.58***	-0.26	-3.93***
	(0.60)	(0.34)	(0.56)	(1.05)	(0.22)	(0.13)	(0.23)	(0.31)
Week	2.67***	2.18***	2.09***	5.28***	-0.24	0.30***	-0.21	-2.45***
	(0.39)	(0.21)	(0.40)	(0.74)	(0.17)	(0.10)	(0.17)	(0.25)
Month	0.79***	0.78***	1.49***	1.61***	-0.00	0.06	0.16	0.68***
	(0.25)	(0.16)	(0.26)	(0.46)	(0.13)	(0.08)	(0.14)	(0.17)
Inc 35-59k	1.76**	-1.50***	-0.29	2.25**	1.60***	-0.34	1.50***	1.88***
	(0.69)	(0.43)	(0.70)	(1.04)	(0.40)	(0.22)	(0.43)	(0.47)
Inc 60k+	2.64***	-1.03**	5.68***	5.71***	1.81***	-0.34	5.05***	3.59***
	(0.79)	(0.43)	(0.86)	(1.22)	(0.40)	(0.21)	(0.48)	(0.46)
Some College	0.13	-0.69	-1.16	-1.78	1.33***	-0.26	0.35	0.00
	(1.03)	(0.45)	(0.91)	(1.62)	(0.46)	(0.26)	(0.56)	(0.55)
College+	-0.83	-0.08	3.24***	-0.02	0.02	-0.26	3.97***	0.91
	(1.01)	(0.49)	(1.00)	(1.69)	(0.45)	(0.26)	(0.61)	(0.57)
Age 35-54	0.69	-0.96*	-0.22	2.47**	-1.28***	0.02	0.07	0.99**
	(0.78)	(0.50)	(0.79)	(1.01)	(0.46)	(0.24)	(0.50)	(0.43)
Age 55+	-3.99***	-2.01***	-0.74	6.18***	-3.00***	-0.64***	0.80	3.05***
	(0.73)	(0.50)	(0.82)	(1.15)	(0.47)	(0.25)	(0.53)	(0.49)
ST q2	1.90**	0.87**	1.83**	0.57	1.03**	0.42*	1.75***	1.37***
	(0.87)	(0.43)	(0.79)	(1.08)	(0.45)	(0.23)	(0.50)	(0.47)
ST q3	1.81**	1.68***	4.41***	3.12**	0.39	0.63***	1.94***	1.58***
	(0.81)	(0.48)	(0.89)	(1.24)	(0.43)	(0.24)	(0.49)	(0.47)
ST q4	2.13***	1.34***	4.94***	6.44***	1.72***	0.77**	2.56***	3.83***
	(0.80)	(0.45)	(0.91)	(1.40)	(0.56)	(0.31)	(0.67)	(0.68)
N	5892	5892	5892	5891	6138	6141	6136	6142

The dependent variables are the reported amounts spent in yearly equivalents expressed in thousands of dollars. Regressions are run excluding the top 1% of the dependent variable's distribution. *ST* $q(k)$ is an indicator for the kth quartile of the survey time distribution. The omitted categories are the indicator for "Year," $Income < 35k$, $Education \leq High\ School$, $18 \leq Age < 35$, the indicator for $Survey\ Time \leq q1$. The specification allows for interactions $Recall\ Period \times Income \times Education$. Controls for gender and the order of the recall period sequence are included. Standard errors are clustered at the individual level. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Within the "typical" period framework individuals report, on average, 49 more debit card payments and and 46 more cash transactions, but around 20 less payments by credit card and personal checks. As for the amount spent, instead, there is a clear tendency to report less purchases when referring to a "typical" than to a "specific past" period. Estimated differences range from 1,200 dollars for expenses paid in cash to 5,000 for payments made by personal checks.

Table 10: OLS Regressions – Marginal Effects

	Number of Payments				Amount Spent			
	Debit	Cash	Credit	Check	Debit	Cash	Credit	Check
Day	157.2***	137.7***	79.8***	52.9***	2.53***	1.91***	0.75**	-0.55
	(13.1)	(14.9)	(9.9)	(6.7)	(0.32)	(0.18)	(0.30)	(0.54)
Week	21.4**	33.6**	12.5	9.6***	1.19***	1.22***	0.91***	1.34***
	(10.4)	(13.3)	(7.7)	(3.7)	(0.21)	(0.11)	(0.21)	(0.39)
Month	-28.8***	3.3	-20.4***	-2.5	0.39***	0.41***	0.81***	1.14***
	(9.8)	(13.0)	(7.5)	(3.6)	(0.14)	(0.09)	(0.15)	(0.24)
Typical Period	48.3***	46.1***	-19.8**	-24.1***	-2.20***	-1.24***	-2.27***	-4.91***
	(13.7)	(15.5)	(10.0)	(5.3)	(0.34)	(0.19)	(0.38)	(0.49)
Inc 35-59k	-7.8	-72.9***	11.8	14.1**	1.70***	-0.88***	0.71*	2.06***
	(18.7)	(23.2)	(12.2)	(6.4)	(0.40)	(0.24)	(0.40)	(0.57)
Inc 60k+	15.4	-55.8***	89.5***	24.3***	2.24***	-0.68***	5.45***	4.75***
	(18.5)	(21.5)	(12.4)	(6.8)	(0.44)	(0.23)	(0.48)	(0.65)
Some College	71.3***	23.5	2.0	-3.8	0.72	-0.46*	-0.39	-0.88
	(17.9)	(19.3)	(13.0)	(8.0)	(0.56)	(0.26)	(0.53)	(0.84)
College+	45.0**	68.9***	89.5***	-3.2	-0.39	-0.14	3.65***	0.41
	(18.7)	(22.4)	(14.5)	(8.1)	(0.55)	(0.27)	(0.58)	(0.88)
Age 35-54	-70.7***	8.2	-30.4**	30.1***	-0.35	-0.48*	-0.10	1.76***
	(21.0)	(22.5)	(14.7)	(5.7)	(0.45)	(0.28)	(0.47)	(0.55)
Age 55+	-194.6***	-53.9**	-42.9***	61.4***	-3.49***	-1.33***	0.02	4.59***
	(20.5)	(22.5)	(14.8)	(6.6)	(0.44)	(0.28)	(0.49)	(0.63)
ST q2	56.2***	55.5**	50.4***	1.8	1.46***	0.65***	1.82***	1.12*
	(19.6)	(21.8)	(13.0)	(7.1)	(0.47)	(0.24)	(0.46)	(0.57)
ST q3	55.5***	107.5***	80.9***	4.9	1.06**	1.14***	3.08***	2.28***
	(19.3)	(22.9)	(14.0)	(7.5)	(0.45)	(0.26)	(0.50)	(0.64)
ST q4	88.3***	63.1***	105.1***	33.6***	1.89***	1.05***	3.85***	5.42***
	(21.8)	(22.6)	(15.4)	(9.4)	(0.51)	(0.29)	(0.59)	(0.85)
N	11905	11918	11932	11941	12030	12033	12028	12033

The dependent variables are the reported number of payments and the amounts spent in yearly equivalents. The latter is expressed in thousands of dollars. Regressions are run excluding the top 1% of the dependent variable's distribution. $ST\ q(k)$ is an indicator for the kth quartile of the survey time distribution. The omitted categories are the indicator for "Year," the indicator for "Specific Past" period, $Income < 35k$, $Education \leq High\ School$, $18 \leq Age < 35$, the indicator for $Survey\ Time \leq q1$. The specification allows for interactions $Recall\ Period \times Income \times Education$. Controls for gender and the order of the recall period sequence are included. Standard errors are clustered at the individual level. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

The coefficients on income and education have the expected sign. Other things being equal, more affluent individuals make more transactions and have larger expenses. At the same time, they tend to use more often credit cards and checks and rely less heavily on cash. Compared to those with income less than $35,000, individuals with $60,000 or more make roughly 90 more transactions by credit card, spend $5,500 more per year, and 24 more payments in checks, spending $4,750 more per year. Individuals with a college degree make 90 more transactions by credit card than their high school counterparts, spend $3,650 more per year. Interestingly, they

also report around 70 more transactions in cash, although there is no differential effect when it comes to the amount spent using this payment method.

The estimated coefficients on age dummies reveal an interesting pattern. Relatively older respondents report significantly less payments by debit cards, cash, and credit cards, but substantially more by personal checks. Specifically, being in the group of those age 55 and over decreases the number of debit card and cash transactions by 195 and 54, and the amount of debit card and cash expenses by \$3,500 and \$1,300, respectively. On the other hand, it increases the number of check payments by 60 and the amount spent by check by \$4,600.

A further interesting result is the effect of survey time on reported payment frequencies and spending habits. As mentioned above, we include in our regression a control for the time employed by the respondent to complete the questionnaire.[4] The results in Table 10 document a strong, positive relationship between such variable and both the number of transactions and the amount spent using any of the four methods of payments considered in this study. For instance, passing from the first quartile ($ST\ q1$ corresponding to 5 minutes) of the survey time distribution to the fourth ($ST\ q4$ corresponding to 14 minutes) increases the number of reported credit card payments by 105 and the amount of credit card expenses by \$3,850. The econometric specification also features controls for gender and the order of the recall period sequence. Their estimated coefficients are in general not statistically significant and omitted for brevity.

In Table 11 we present the estimation results of two count data models for the number of payments. First, allowing for unobserved heterogeneity, which would imply overdispersion in the number of reported transactions, we estimate a Negative Binomial model with quadratic variance (left panel in Table 11). Second, in order to deal with the large number of reported zeros for short recall periods and/or for less common payment instruments (e.g. personal checks), we consider a specification for which the process generating zero observations differs from the one producing positive values. This class of count models is known as Zero-Inflated Models (Cameron and Trivedi, 1998). Maximum Likelihood estimates of a Zero-Inflated Negative Binomial model for the number of transactions are shown in the right panel of Table 11. The reported average partial effects are notably similar to the OLS marginal effects commented above from both a qualitative and quantitative perspective.

[4]We computed that the questionnaire could be completed in 5 to 10 minutes, depending on the number of payment instruments adopted by the respondent. This is confirmed by the data. The median respondent answered in 8 minutes, while respondents at the first and third quartile of the survey time distribution answered in 5 and 14 minutes, respectively. In our analysis we exclude all those who completed the questionnaire in less than 2 minutes – 48 – and those who did so over multiple days – 187 (in the ALP respondents can pause the survey and resume it later as long as the survey is still "open").

Table 11: Count Data Regressions for Number of Payments – Marginal Effects

	Negative Binomial				Zero-Inflated Negative Binomial			
	Debit	Cash	Credit	Check	Debit	Cash	Credit	Check
Day	159.4***	136.2***	77.4***	56.2***	162.9***	139.8***	81.2***	63.5***
	(13.4)	(15.4)	(10.6)	(7.6)	(13.0)	(15.0)	(9.8)	(7.4)
Week	22.5**	35.2**	14.1	9.0**	23.2**	35.5***	13.8*	12.3***
	(10.8)	(14.0)	(9.1)	(4.2)	(10.3)	(13.1)	(7.7)	(3.8)
Month	-29.8***	2.5	-18.9**	-1.9	-28.8***	3.5	-18.7**	-2.1
	(10.2)	(13.7)	(9.0)	(4.0)	(9.6)	(12.8)	(7.5)	(3.3)
Typical Period	49.3***	46.9***	-14.8	-22.0***	46.9***	44.7***	-16.1	-23.8***
	(14.2)	(16.0)	(11.4)	(5.9)	(13.4)	(15.4)	(10.0)	(5.5)
Inc 35-59k	-11.7	-87.3***	16.1	14.1*	-8.8	-81.7***	11.6	10.8
	(18.1)	(24.5)	(12.7)	(7.2)	(17.3)	(23.6)	(11.8)	(6.8)
Inc 60k+	20.3	-65.1***	105.2***	30.1***	20.3	-63.0***	92.8***	24.9***
	(18.6)	(23.1)	(14.2)	(8.1)	(17.6)	(22.2)	(12.9)	(7.4)
Some College	76.0***	33.6*	0.2	-6.2	68.3***	26.8	-2.2	-5.1
	(18.9)	(18.4)	(14.3)	(9.8)	(18.0)	(18.4)	(13.4)	(9.2)
College+	42.5**	87.4***	95.5***	-8.1	39.9**	73.1***	84.2***	-7.7
	(19.2)	(21.6)	(15.6)	(9.6)	(18.4)	(21.3)	(14.5)	(9.1)
Age 35-54	-89.9***	9.4	-38.1**	33.1***	-96.4***	11.6	-42.9**	31.6***
	(25.2)	(25.0)	(19.1)	(5.0)	(25.0)	(24.7)	(17.6)	(4.7)
Age 55+	-211.8***	-65.0***	-55.0***	69.7***	-221.6***	-56.5**	-47.5***	79.7***
	(24.0)	(23.5)	(18.8)	(6.0)	(23.6)	(23.0)	(17.7)	(6.2)
ST q2	55.1***	64.2***	68.0***	10.2	65.2***	65.7***	57.0***	10.5
	(19.1)	(21.2)	(11.8)	(6.6)	(18.7)	(22.2)	(11.9)	(6.8)
ST q3	59.1***	124.0***	109.9***	14.0**	64.6***	127.1***	92.5***	16.6**
	(20.3)	(23.0)	(14.8)	(6.5)	(19.4)	(23.7)	(13.6)	(6.9)
ST q4	89.2***	71.3***	139.7***	48.7***	105.7***	76.0***	121.0***	52.1***
	(23.5)	(23.0)	(16.1)	(8.7)	(22.7)	(23.6)	(15.3)	(8.6)
N	11905	11918	11932	11941	11905	11918	11932	11941

The dependent variables are the reported number of payments in yearly equivalents. Regressions are run excluding the top 1% of the dependent variable's distribution. *ST* $q(k)$ is an indicator for the k^{th} quartile of the survey time distribution. The omitted categories are the indicator for "Year," the indicator for "Specific Past" period, $Income < 35k$, $Education \leq High\ School$, $18 \leq Age < 35$, the indicator for $Survey\ Time \leq q1$. The specification allows for interactions $Recall\ Period \times Income \times Education$. Controls for gender and the order of the recall period sequence are included. Standard errors are clustered at the individual level. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Given the mixture of observations with zero and positive values for the reported spending amount and its different balance across the various methods of payment, we also estimate Hurdle (Table 12) and Tobit (Table 13) models for the amount spent.[5] The estimated coefficients of the Hurdle model are generally in line with those from the OLS regressions. The results in Table 12, however, offer further insights on the mechanisms driving reporting behaviors. First, the probability of reporting non-zero expenses is lower, the shorter the recall period and varies

[5]Model specification addressing these issues is discussed, among others, by Deaton and Irish (1984), Blundell and Meghir (1987), Chesher and Irish (1987), and Robin (1993).

across payment methods. The likelihood of reporting a positive purchase by debit card in a day, week, and month is 27, 10, and 3 percentage points lower than in a year, respectively. For transactions using checks, differences are in order of 60 percentage points for a day, 30 for a week, and 6 for a month. Within a "typical" framework the probability of reporting non-zero purchases increases by 9 percentage points for debit cards and cash transactions and by 3 percentage points for credit card payments. On the other hand, there is no differential effect for personal checks.

Table 12: Hurdle Model for Amount Spent – Marginal Effects

	Probit (Whole Sample)				OLS (Amount> 0)			
	Debit	Cash	Credit	Check	Debit	Cash	Credit	Check
Day	-0.27***	-0.33***	-0.34***	-0.60***	13.57***	8.02***	15.58***	35.25***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.72)	(0.39)	(0.86)	(2.24)
Week	-0.10***	-0.10***	-0.16***	-0.30***	3.60***	2.52***	4.92***	8.70***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.35)	(0.17)	(0.42)	(0.72)
Month	-0.03***	-0.03***	-0.04***	-0.06***	1.00***	0.74***	2.10***	2.41***
	(0.00)	(0.01)	(0.01)	(0.01)	(0.22)	(0.12)	(0.25)	(0.34)
Typical Period	0.09***	0.09***	0.03**	0.01	-6.52***	-3.10***	-6.29***	-9.51***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.50)	(0.27)	(0.64)	(0.79)
Inc 35-59k	0.00	-0.07***	0.05***	0.09***	2.77***	-0.61*	0.74	2.17**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.51)	(0.34)	(0.73)	(0.88)
Inc 60k+	-0.02	-0.02	0.18***	0.14***	4.49***	-0.77**	6.56***	5.89***
	(0.02)	(0.02)	(0.02)	(0.01)	(0.60)	(0.31)	(0.76)	(0.95)
Some College	0.11***	0.02	0.04**	0.01	-1.32	-0.89**	-1.81*	-0.50
	(0.02)	(0.02)	(0.02)	(0.02)	(0.86)	(0.37)	(0.97)	(1.19)
College+	0.06**	0.11***	0.19***	0.06***	-2.26***	-1.11***	2.36**	1.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.85)	(0.37)	(0.96)	(1.25)
Age 35-54	-0.07***	-0.03	-0.02	0.12***	0.73	-0.53	0.67	-0.35
	(0.02)	(0.02)	(0.02)	(0.02)	(0.55)	(0.37)	(0.79)	(1.10)
Age 55+	-0.25***	-0.12***	-0.00	0.19***	-0.73	-0.94**	0.63	2.76**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.58)	(0.38)	(0.80)	(1.15)
ST q2	0.08***	0.13***	0.16***	0.08***	0.64	-0.08	0.15	0.59
	(0.02)	(0.02)	(0.02)	(0.02)	(0.65)	(0.35)	(0.89)	(1.04)
ST q3	0.13***	0.21***	0.21***	0.14***	-1.01	-0.15	0.92	1.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.62)	(0.37)	(0.93)	(1.13)
ST q4	0.15***	0.22***	0.26***	0.19***	0.06	-0.35	0.97	4.06***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.72)	(0.41)	(1.02)	(1.36)
N	12030	12033	12028	12033	6600	7390	5755	6208

For Probit regressions, the dependent variables are indicators for non-zero payments. For OLS regressions, the dependent variables are the reported amounts spent in yearly equivalents expressed in thousands of dollars. Regressions are run excluding the top 1% of the dependent variable's distribution. *ST* $q(k)$ is an indicator for the kth quartile of the survey time distribution. The omitted categories are the indicator for "Year," the indicator for "Specific Past" period, $Income < 35k$, $Education \leq High\ School$, $18 \leq Age < 35$, the indicator for $Survey\ Time \leq q1$. The specification allows for interactions $Recall\ Period \times Income \times Education$. Controls for gender and the order of the recall period sequence are included. Standard errors are clustered at the individual level. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Second, conditional on non-zero payments, answering about short recall periods significantly increases the reported amount in yearly equivalents. When they refer to a day, individuals report \$13,500 more spent by debit card and \$15,500 more spend by credit card than when they refer to a year. Similarly, when they answer about a week, survey participants report \$3,600 more spent by debit card and \$5,00 more spent by credit card than when they answer about a year. Discrepancies between month and year questions are substantially smaller, but still economically sizable. Across the four payment instruments, reported amounts spent are systematically lower for "typical" recall periods. The interaction terms (omitted for brevity) reveal that this result is not driven by large differences for one specific recall period (such as a day, for instance), but applies to all possible time frames. Not surprisingly, estimated differences are larger, the shorter the length of the recall period and range, on average, from around \$16,000 for a day, to \$7,500 for a week, and \$2,000 for a month. It is also interesting to notice that the smallest differential effect is estimated for cash (roughly \$3,000 in yearly equivalent), undoubtedly the most common payment method, while the largest one (around \$9,500 in yearly equivalents) is found for personal checks, which are used rather less frequently.

Income and education are positively related to spending amounts, particularly through credit cards and checks. Compared to those whose income is less than \$35,000, individuals with more than \$60,000 are 18 and 14 percentage points more likely to use credit cards and checks, respectively. Accordingly, they report spending \$6,500 more by credit card and \$5,900 more by check in a year. At the same time, their purchases in cash fall short of roughly \$750. Having a college degree increases the probability of using any of the four payment methods. As for the amount spent, instead, the effect is negative for debit cards and cash, positive for credit cards, and non statistically significant for checks. The results in Table 12 also confirm that relatively older individuals rely more heavily on checks, while using debit card less frequently. Finally, it is worth pointing out that survey time has a strong, positive effect on the likelihood of reporting non-zero payments, but has virtually no impact on the reported amount, conditional on this being positive.

In Table 13, we complement the statistical analysis estimating a Tobit model for the amount spent. The most relevant difference between the OLS regressions in Table 10 and the Tobit estimates in Table 13 is the change of sign – from positive to negative – for most of the recall period indicators. This is due to the fact that the Tobit model takes explicitly into account the probability mass at zero. Essentially, when asked about their spending habits in a day or a

week, individuals are significantly more likely to report a zero amount than when they are asked to refer to a year (as confirmed by the Probit results in Table 12). At the same time, whenever they provide positive values to daily and weekly questions, respondents tend to report higher amounts in yearly equivalents (as shown by the OLS coefficients in Table 12). The estimates of the Tobit model indicate that, overall, the large mass of zero responses to short recall periods dominates and leads to negative coefficients.

Table 13: Tobit Regressions for Amount Spent – Marginal Effects

	Debit	Cash	Credit	Check
Day	-0.68***	-0.24**	-2.54***	-7.43***
	(0.17)	(0.10)	(0.17)	(0.34)
Week	-0.16	0.20***	-0.86***	-2.69***
	(0.11)	(0.06)	(0.13)	(0.23)
Month	-0.03	0.06	0.04	-0.11
	(0.07)	(0.05)	(0.09)	(0.13)
Typical Period	-0.37*	-0.26**	-0.71***	-2.12***
	(0.22)	(0.11)	(0.26)	(0.30)
Inc 35-59k	0.73***	-0.66***	0.70**	2.03***
	(0.28)	(0.15)	(0.29)	(0.38)
Inc 60k+	0.79***	-0.41***	3.83***	3.61***
	(0.29)	(0.15)	(0.33)	(0.42)
Some College	1.01***	-0.15	0.16	-0.43
	(0.37)	(0.16)	(0.37)	(0.53)
College+	0.18	0.29*	3.14***	0.76
	(0.36)	(0.17)	(0.40)	(0.54)
Age 35-54	-0.61**	-0.33**	-0.19	2.40***
	(0.30)	(0.17)	(0.35)	(0.38)
Age 55+	-3.14***	-1.00***	-0.03	4.37***
	(0.30)	(0.17)	(0.35)	(0.41)
ST q2	1.12***	0.70***	2.29***	1.52***
	(0.30)	(0.15)	(0.33)	(0.39)
ST q3	1.28***	1.20***	3.28***	2.67***
	(0.29)	(0.16)	(0.34)	(0.41)
ST q4	1.78***	1.20***	3.97***	4.60***
	(0.33)	(0.17)	(0.39)	(0.51)
N	12030	12033	12028	12033

The dependent variables are the reported amount spent in yearly equivalents expressed in thousands of dollars. Regressions are run excluding the top 1% of the dependent variable's distribution. $ST\ q(k)$ is an indicator for the kth quartile of the survey time distribution. The omitted categories are the indicator for "Year," the indicator for "Specific Past" period, $Income < 35k$, $Education \leq High\ School$, $18 \leq Age < 35$, the indicator for $Survey\ Time \leq q1$. The specification allows for interactions $Recall\ Period \times Income \times Education$. Controls for gender and the order of the recall period sequence are included. Standard errors are clustered at the individual level. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

The estimates for the "typical" frame indicator can be explained along the same line. As described above, while respondents are more likely to report non-zero payments when referring

to a "typical" period, they tend to provide lower values of their purchases, conditional on these being positive. Since the latter effect is more sizable, the resulting Tobit coefficient for the "typical" frame indicator is negative.

4 Conclusion

In this paper we investigate the role of different time frames in survey questions measuring household payment and spending habits. For this purpose, we have designed and fielded an experimental module in the American Life Panel (ALP) where we ask individuals to report the frequency of their purchases and the amount spent using four common payment instruments, debit cards, cash, credit cards, and personal checks. Three different groups of sample participants are randomly assigned to an entry month (July, August, or September, 2011) and interviewed four times during a year, once every quarter. For each method of payment, a sequence of questions elicits spending behavior during a day, week, month, and year. At the time of the first interview, this sequence is randomly assigned to refer to "specific" time spans or to "typical" time spans. In all subsequent interviews, a "specific" sequence becomes a "typical" sequence and vice versa.

Accounting for all possible payment instruments we compute that the median (average) consumer makes 22 (36) transactions in the previous month, spending $1,320 ($1,839), and 29 (40) in a typical month, spending $1,300 ($1,599). Respondents rely most heavily on debit cards and cash to make their transactions, while credit cards and personal checks are used less frequently to pay for relatively large expenses.

Regression analysis shows that, when referring to periods shorter than a year, respondents tend to increase the reported number of payments and the amount spent in yearly equivalents. The difference with "yearly" answers is smaller, the longer the length of the recall period.

Within a "typical" framework the probability of reporting non-zero payments increases significantly for debit cards, cash, and credit cards, while there is no differential effect for checks. At the same time, reported amounts spent are systematically lower for "typical" than for "specific" recall periods across the four payment instruments.

The present analysis is very preliminary as it only uses the data from the first completed wave of our survey. Further evidence will be provided as data from subsequent waves will become available. Notably, given our experimental design, we will exploit in the future both cross-section and within-subject variations to assess the effect of different time frames on individual

reporting behavior.

References

[1] Blundell, R. and Meghir, C. (1987), "Bivariate Alternatives to the Tobit Model," *Journal of Econometrics*, Vol. 34, pp. 179-200.

[2] Cameron, A. C. and Trivedi, P. K. (1998), "Regression Analysis of Count Data." Cambridge University Press, Cambridge.

[3] Chang, L. and Krosnick, J. A. (2003), "Measuring the Frequency of Regular Behaviors: Comparing the Typical Week to the Past Week," *Sociological Methodology*, Vol. 33, pp. 55-80.

[4] Chesher, A. and Irish, M. (1987), "Residual Analysis in the Grouped and Censored Normal Linear Model," *Journal of Econometrics*, Vol. 34, pp. 33-61.

[5] Deaton, A. and Irish, M. (1984), "Statistical Models for Zero Expenditures in Household Budgets," *Journal of Public Economics*, Vol. 23, pp. 59-80.

[6] Foster, K., Meijer, E., Schuh, S., and Zabeck, M. (2009), "The 2009 Survey of Consumer Payment Choice," Public Policy Discussion Paper, Federal Reserve Bank of Boston.

[7] Foster, K., Meijer, E., Schuh, S., and Zabeck, M. (2008), "The 2008 Survey of Consumer Payment Choice," Public Policy Discussion Paper, Federal Reserve Bank of Boston.

[8] Ham, J., Li, X., and Sheppard, L. (2007), "Correcting for Seam Bias when Estimating Discrete Variable Models, with an Application to Analyzing the Employment Dynamics of Disadvantaged Women in the SIPP," *mimeo*, USC.

[9] Moore, J., Bates, N., Pascale, J., and Okon, A. (2009), "Tackling seam bias through questionnaire design," in *Methodology of Longitudinal Surveys*, , edited by Lynn, P., John Wiley & Sons, Ltd.

[10] Rips, L., Conrad, F., and Fricker, S. (2003), "Straightening the Seam Effect in Panel Surveys," *The Public Opinion Quarterly*, Vol. 67(4), pp. 522554.

[11] Robin, J. M. (1993), "Econometric Analysis of the Short-run Fluctuations of Households Purchases," *Review of Economic Studies*, Vol. 60, pp. 923934.