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	0	2	12	0	1	4	26
	3rd quartile	1	4	10	100	1	5	15	175
	Mean	.56	2.6	7.5	85	.73	2.9	11	144
	N of obs.	1,365	1,387	1,384	1,353	1,442	1,433	1,468	1,466
Cash	*1st quartile*	0	0	0	0	0	0	0	3
	2nd quartile	0	1	3	20	0	2	5	50
	3rd quartile	1	4	10	100	1	5	13	155
	Mean	.57	2.4	6.9	74	.73	2.9	9.6	138
	N of obs.	1,387	1,387	1,388	1,367	1,460	1,454	1,461	1,463
Credit	*1st quartile*	0	0	0	0	0	0	0	0
	2nd quartile	0	0	1	7	0	0	1	12
	3rd quartile	0	2	7	60	1	2	6	100
	Mean	.35	1.7	6	67	.37	1.8	5.8	80
	N of obs.	1,386	1,376	1,390	1,371	1,437	1,472	1,478	1,472
Check	*1st quartile*	0	0	0	1	0	0	0	3
	2nd quartile	0	0	2	18	0	0	2	24
	3rd quartile	0	2	5	55	0	1	5	60
	Mean	.16	1.1	3.5	41	0	.72	3.5	42
	N of obs.	1,375	1,381	1,384	1,378	1,279	1,465	1,472	1,466

Statistics are computed excluding the top 5% 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	0	100	500	0	25	150	1,000
	3rd quartile	15	150	500	5,000	20	100	500	5,000
	Mean	22	100	333	3,247	13	69	317	3,525
	N of obs.	1,396	1,398	1,398	1,396	1,484	1,471	1,480	1,469
Cash	*1st quartile*	0	0	0	0	0	0	0	0
	2nd quartile	0	15	60	400	0	20	80	750
	3rd quartile	10	75	240	2,000	10	56	250	2,500
	Mean	12	54	160	1,304	7	39	158	1,623
	N of obs.	1,394	1,393	1,397	1,384	1,471	1,481	1,482	1,453
Credit	*1st quartile*	0	0	0	0	0	0	0	0
	2nd quartile	0	0	52	500	0	0	60	550
	3rd quartile	0	129	500	5,000	15	100	400	5,000
	Mean	13	100	418	3,988	10	70	348	3,985
	N of obs.	1,386	1,390	1,395	1,398	1,474	1,484	1,483	1,484
Check	*1st quartile*	0	0	0	0	0	0	0	25
	2nd quartile	0	0	200	1,645	0	0	200	2,000
	3rd quartile	0	185	780	8,000	0	75	730	8,000
	Mean	18	157	529	5,363	4	53	487	5,055
	N of obs.	1,398	1,397	1,397	1,396	1,480	1,470	1,478	1,470

Statistics are computed excluding the top 5% 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*	382	155	107	105	292	187	139	120
	W/M/D/Y	285	143	96	73	312	204	167	163
	M/W/D/Y	138	89	58	62	194	96	63	85
Cash	*D/W/M/Y*	107	56	39	39	47	34	44	46
	W/M/D/Y	166	129	89	86	261	159	152	175
	M/W/D/Y	116	124	75	65	215	143	131	119
Credit	*D/W/M/Y*	104	105	84	61	126	82	50	62
	W/M/D/Y	34	67	47	41	0	37	42	38
	M/W/D/Y	119	111	89	84	162	120	90	99
Check	*D/W/M/Y*	142	102	68	66	175	130	85	111
	W/M/D/Y	34	62	63	51	71	62	54	71
	M/W/D/Y	0	55	44	46	0	41	40	41

Amount Spent

		Specific Past Period				Typical Period			
		Day	Week	Month	Year	Day	Week	Month	Year
Debit	*D/W/M/Y*	13,946	5,409	3,817	3,114	4,738	3,464	3,205	3,087
	W/M/D/Y	6,917	3,418	1,646	1,256	2,555	1,835	1,836	1,715
	M/W/D/Y	7,896	5,221	4,396	3,449	4,255	3,449	3,955	3,893
Cash	*D/W/M/Y*	11,842	7,471	6,358	5,782	1,222	2,297	5,557	5,168
	W/M/D/Y	5,399	5,903	3,522	2,828	3,946	3,748	4,391	4,588
	M/W/D/Y	2,525	2,749	1,669	1,292	2,043	1,989	1,865	1,415
Credit	*D/W/M/Y*	4,620	7,150	5,543	4,140	3,240	3,018	3,708	3,724
	W/M/D/Y	2,976	10,708	6,992	5,731	1,639	2,997	5,732	5,945
	M/W/D/Y	4,300	4,195	4,451	3,965	3,843	3,193	3,803	3,219
Check	*D/W/M/Y*	2,356	2,217	1,855	1,162	1,710	1,956	1,979	1,898
	W/M/D/Y	1,948	3,565	4,191	3,106	3,522	4,328	4,432	3,530
	M/W/D/Y	1,933	7,290	6,362	5,497	1,878	4,077	6,081	5,096

Statistics are computed excluding the top 5% 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 number 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, particularly when individuals are asked about "typical" periods. As far as the amount spent is concerned, the results show a tendency to report from 200 to 700 dollars more when referring to a month than to a year. There is similar evidence when confronting "weekly" and "yearly" measures, but only within the "specific past" frame. The negative coefficients on the day indicator for credit cards and personal checks may be driven by a fairly large number of observations taking value zero (Deaton and Irish, 1984), an issue which we will address below.

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	60.7***	50.9***	18.9***	-11.9***	134.2***	120.6***	51.9***	-43.7***
	(8.6)	(7.3)	(5.9)	(3.3)	(7.8)	(7.9)	(5.1)	(1.5)
Week	44.1***	51.4***	32.4***	12.0***	50.4***	39.4***	8.5***	-0.2
	(5.5)	(5.2)	(3.8)	(2.1)	(5.6)	(5.1)	(2.9)	(1.5)
Month	4.4	3.6	13.6***	3.3***	5.4	-2.6	2.1	5.3***
	(4.3)	(4.1)	(2.8)	(1.2)	(4.2)	(4.4)	(2.4)	(1.1)
Inc 35-59k	15.2	-17.6**	7.3	7.5**	13.9	-14.9	14.0	6.9**
	(11.6)	(9.0)	(7.7)	(3.6)	(15.0)	(12.5)	(9.0)	(3.0)
Inc 60k+	25.2**	19.8**	61.3***	17.0***	30.2**	12.2	59.2***	13.1***
	(11.5)	(9.7)	(8.7)	(3.8)	(15.1)	(12.5)	(8.9)	(2.9)
Some College	32.4**	-10.4	-7.7	-4.8	51.6***	17.6	27.1***	2.9
	(12.6)	(11.1)	(9.3)	(4.5)	(16.6)	(13.8)	(7.3)	(2.9)
College+	27.6**	28.9**	49.1***	-0.0	10.1	51.8***	86.9***	7.0**
	(12.8)	(11.7)	(10.5)	(4.6)	(16.6)	(14.6)	(8.8)	(3.1)
Age 35-54	-3.3	-1.9	-0.3	17.3***	-70.9***	-0.8	2.0	12.5***
	(13.3)	(9.8)	(8.5)	(3.1)	(17.7)	(13.3)	(9.1)	(2.3)
Age 55+	-91.5***	-35.2***	-6.8	35.9***	-145.7***	-16.0	7.8	27.1***
	(12.7)	(9.5)	(9.0)	(3.6)	(17.7)	(14.0)	(9.5)	(2.6)
ST q2	36.8***	37.1***	32.3***	5.3	63.7***	29.5**	24.6***	6.3**
	(12.8)	(9.5)	(8.2)	(3.7)	(15.3)	(12.4)	(8.6)	(2.6)
ST q3	45.0***	69.0***	57.1***	12.0***	58.7***	55.7***	31.5***	10.5***
	(12.6)	(10.4)	(9.5)	(3.8)	(15.1)	(13.6)	(8.8)	(2.7)
ST q4	60.2***	67.3***	78.9***	31.4***	94.6***	50.6***	51.6***	24.2***
	(13.9)	(10.2)	(10.3)	(4.3)	(19.9)	(17.4)	(12.4)	(3.9)
N	5512	5485	5532	5537	5838	5825	5862	5766

The dependent variable is the reported number of payments in yearly equivalents. Regressions are run excluding the top 5% of the dependent variable's distribution. *ST q* is an indicator for the quartiles 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 recall periods and the one assigned to 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 47 more debit card transactions and $700 more in debit 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 only 5 more debit card transactions and $400 more in debit 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	-0.19	0.41***	-1.20***	-4.26***	0.69***	0.09	-0.43**	-3.92***
	(0.27)	(0.14)	(0.27)	(0.36)	(0.16)	(0.08)	(0.18)	(0.21)
Week	1.36***	1.07***	0.36	0.16	0.41***	0.08	-0.13	-2.21***
	(0.22)	(0.12)	(0.23)	(0.37)	(0.12)	(0.07)	(0.13)	(0.18)
Month	0.61***	0.38***	0.69***	0.61***	0.26***	0.15**	0.16	0.34***
	(0.17)	(0.09)	(0.19)	(0.23)	(0.09)	(0.06)	(0.11)	(0.12)
Inc 35-59k	1.02***	-0.84***	0.42	1.41***	0.68**	-0.20	0.92***	1.37***
	(0.39)	(0.20)	(0.41)	(0.48)	(0.31)	(0.15)	(0.32)	(0.32)
Inc 60k+	1.14***	-0.47**	3.48***	3.08***	0.60**	-0.12	3.15***	1.95***
	(0.40)	(0.21)	(0.45)	(0.50)	(0.30)	(0.15)	(0.35)	(0.32)
Some College	1.06**	-0.14	-0.37	-0.39	0.79**	-0.10	0.33	0.05
	(0.47)	(0.23)	(0.45)	(0.57)	(0.36)	(0.17)	(0.38)	(0.37)
College+	0.53	0.16	2.57***	0.74	-0.16	0.21	2.81***	0.44
	(0.47)	(0.24)	(0.53)	(0.61)	(0.36)	(0.17)	(0.43)	(0.38)
Age 35-54	-0.22	-0.21	-0.14	1.38***	-0.81**	-0.01	0.13	0.91***
	(0.45)	(0.22)	(0.41)	(0.41)	(0.32)	(0.16)	(0.36)	(0.30)
Age 55+	-3.25***	-0.78***	0.15	3.48***	-2.32***	-0.28*	0.35	1.81***
	(0.41)	(0.22)	(0.44)	(0.47)	(0.33)	(0.16)	(0.37)	(0.31)
ST q2	0.81*	0.76***	1.83***	1.04**	0.99***	0.34**	1.09***	0.81***
	(0.44)	(0.21)	(0.43)	(0.47)	(0.31)	(0.16)	(0.35)	(0.31)
ST q3	1.32***	1.20***	3.09***	1.92***	0.90***	0.44***	1.34***	1.14***
	(0.44)	(0.22)	(0.46)	(0.50)	(0.31)	(0.16)	(0.35)	(0.32)
ST q4	1.77***	0.92***	3.73***	4.45***	1.28***	0.33*	1.63***	2.33***
	(0.45)	(0.22)	(0.48)	(0.54)	(0.38)	(0.19)	(0.48)	(0.42)
N	5585	5586	5576	5578	5885	5910	5906	5908

The dependent variable is the reported amount spent in yearly equivalents expressed in thousands of dollars. Regressions are run excluding the top 5% of the dependent variable's distribution. *ST q* is an indicator for the quartiles 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, 51 more debit card payments and $660 more debit card expenses. Similarly they report 40 more cash transactions and $330 more purchases paid in cash. As for credit cards, while the number of payments is slightly higher, the amount spent is not statistically different from the one reported within the "specific past" period framework. Finally, there is no differential effect for personal checks.

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 less than $35,000, individuals with $60,000 or more of family income make around 60 more transactions by credit card and spend around $3,250 more per year. Individuals with a college degree make 70 more transactions by credit card than their high school counterparts and spend $2,500 more per year.

Table 10: OLS Regressions – Marginal Effects

	Number of Payments				Amount Spent			
	Debit	Cash	Credit	Check	Debit	Cash	Credit	Check
Day	98.5***	108.5***	38.1***	-44.4***	-0.07	0.03	-1.29***	-4.08***
	(5.8)	(5.8)	(3.8)	(1.1)	(0.14)	(0.07)	(0.15)	(0.18)
Week	47.4***	45.6***	26.2***	5.1***	0.72***	0.52***	-0.24*	-1.34***
	(3.9)	(3.7)	(2.3)	(1.2)	(0.11)	(0.06)	(0.13)	(0.18)
Month	5.0*	0.1	7.6***	4.6***	0.44***	0.24***	0.41***	0.46***
	(3.0)	(3.0)	(1.7)	(0.8)	(0.09)	(0.05)	(0.10)	(0.11)
Typical Period	51.2***	40.3***	12.3**	-2.5	0.66***	0.33***	0.07	-0.09
	(7.4)	(6.5)	(4.9)	(1.6)	(0.18)	(0.09)	(0.21)	(0.21)
Inc 35-59k	14.6	-16.6**	10.6*	6.6***	0.72***	-0.37***	0.90***	1.37***
	(9.5)	(8.1)	(5.9)	(2.1)	(0.23)	(0.12)	(0.24)	(0.27)
Inc 60k+	28.9***	14.5*	60.6***	14.1***	0.89***	-0.15	3.26***	2.39***
	(9.6)	(8.2)	(6.3)	(2.1)	(0.24)	(0.12)	(0.26)	(0.27)
Some College	41.4***	4.2	12.0**	0.2	1.09***	-0.16	-0.02	-0.08
	(10.6)	(9.2)	(5.9)	(2.2)	(0.27)	(0.14)	(0.28)	(0.31)
College+	18.0*	41.4***	68.8***	4.6**	0.39	0.11	2.57***	0.58*
	(10.6)	(9.7)	(6.8)	(2.3)	(0.27)	(0.15)	(0.32)	(0.32)
Age 35-54	-37.6***	-2.1	-0.9	12.9***	-0.69***	-0.01	0.05	1.03***
	(11.2)	(8.6)	(6.2)	(1.7)	(0.26)	(0.13)	(0.26)	(0.24)
Age 55+	-118.2***	-27.1***	0.7	28.9***	-2.58***	-0.40***	0.26	2.51***
	(10.9)	(8.8)	(6.6)	(1.9)	(0.25)	(0.13)	(0.27)	(0.27)
ST q2	50.9***	33.9***	29.6***	6.8***	0.99***	0.49***	1.33***	1.01***
	(10.1)	(8.2)	(6.0)	(1.9)	(0.25)	(0.13)	(0.26)	(0.26)
ST q3	51.1***	65.1***	44.0***	11.1***	1.01***	0.72***	1.96***	1.48***
	(9.9)	(9.0)	(6.5)	(2.0)	(0.25)	(0.13)	(0.26)	(0.28)
ST q4	76.3***	59.9***	64.7***	26.9***	1.58***	0.60***	2.57***	3.37***
	(11.7)	(9.9)	(7.8)	(2.6)	(0.28)	(0.14)	(0.31)	(0.34)
N	11350	11378	11396	11165	11460	11490	11428	11492

The dependent variables are the reported number of payments and the amount spent in yearly equivalents. The latter is expressed in thousands of dollars. Regressions are run excluding the top 5% of the dependent variable's distribution. *ST q* is an indicator for the quartiles 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 estimated effect of age reveals an interesting pattern. Relatively older respondents report significantly less payments by debit cards and more by personal checks. Specifically, being in the group of those age 55 and over decreases the number of debit card transactions

by 118 and the amount of debit card expenses by $2,500. On the other hand, it increases the number of check payments by 30 and the amount spent by check by $2,500.

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	103.0***	113.3***	49.0***	-5.4**	101.2***	112.4***	49.4***	-8.3***
	(6.0)	(6.2)	(4.5)	(2.7)	(6.4)	(6.4)	(4.8)	(2.8)
Week	48.3***	45.6***	30.0***	14.7***	47.5***	44.6***	32.7***	13.0***
	(3.9)	(3.7)	(2.5)	(1.8)	(4.2)	(4.0)	(3.0)	(1.9)
Month	5.3*	-0.2	9.3***	2.6**	5.2	-0.7	12.1***	3.6**
	(3.0)	(3.1)	(1.8)	(1.2)	(3.2)	(3.3)	(2.2)	(1.4)
Typical Period	50.9***	41.7***	13.2***	-1.9	52.0***	45.0***	13.7**	-1.6
	(7.3)	(6.5)	(5.1)	(2.6)	(7.8)	(6.9)	(5.9)	(2.8)
Inc 35-59k	14.8*	-25.6***	5.2	13.5***	14.1	-27.2***	11.0*	18.2***
	(9.0)	(8.0)	(5.9)	(3.3)	(9.5)	(8.5)	(6.3)	(3.5)
Inc 60k+	28.5***	6.4	52.4***	19.9***	27.0***	6.7	64.4***	24.8***
	(9.2)	(8.5)	(6.6)	(3.2)	(9.6)	(9.1)	(7.1)	(3.3)
Some College	45.5***	12.8	15.2***	2.9	45.2***	10.5	20.8***	4.8
	(10.2)	(8.5)	(5.3)	(3.5)	(10.2)	(8.2)	(5.5)	(3.9)
College+	21.9**	59.0***	85.6***	9.4**	18.3*	54.5***	83.5***	7.2*
	(10.4)	(9.6)	(7.0)	(3.7)	(10.2)	(9.4)	(6.9)	(3.9)
Age 35-54	-44.5***	-9.4	1.5	22.5***	-40.6***	-12.5	0.9	23.4***
	(13.2)	(10.3)	(7.3)	(2.8)	(13.0)	(10.6)	(8.7)	(3.0)
Age 55+	-128.2***	-37.0***	7.2	46.8***	-122.4***	-41.1***	2.6	42.7***
	(12.3)	(10.2)	(7.5)	(3.3)	(12.3)	(10.5)	(8.7)	(3.2)
ST q2	47.6***	39.9***	37.8***	12.6***	44.5***	39.1***	42.0***	9.3***
	(9.9)	(8.6)	(6.0)	(3.3)	(9.8)	(8.3)	(6.3)	(3.6)
ST q3	51.3***	77.8***	51.7***	20.6***	52.8***	76.3***	57.3***	16.6***
	(10.3)	(9.7)	(6.7)	(3.5)	(10.6)	(9.5)	(7.2)	(3.7)
ST q4	82.9***	78.1***	84.3***	42.8***	74.1***	71.3***	90.9***	36.4***
	(12.7)	(10.9)	(8.7)	(4.4)	(12.8)	(10.7)	(9.5)	(4.5)
N	11350	11378	11396	11639	11350	11378	11396	11639

The dependent variables is the reported number of payments in yearly equivalents. Regressions are run excluding the top 5% of the dependent variable's distribution. *ST q* is an indicator for the quartiles 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.

A further interesting result is the effect of survey time on individual reported spending habits. As mentioned above, we include in our regression a control for the time employed by the respondent to complete the questionnaire. 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 ($STq1$ corresponding to 5 minutes) of the survey time distribution to

the fourth ($STq4$ corresponding to 12 minutes) increases the number of reported credit card payments by 64 and the amount of credit card expenses by $2,570. 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.

Table 12: Tobit Regressions for Amount Spent – Marginal Effects/Semi-Elasticities

	Levels				Logs			
	Debit	Cash	Credit	Check	Debit	Cash	Credit	Check
Day	-1.16***	-0.61***	-2.44***	-5.14***	-0.30***	-0.37***	-0.41***	-0.82***
	(0.09)	(0.05)	(0.10)	(0.13)	(0.01)	(0.01)	(0.01)	(0.02)
Week	-0.05	0.06	-0.92***	-2.13***	-0.08***	-0.07***	-0.15***	-0.33***
	(0.07)	(0.04)	(0.08)	(0.11)	(0.01)	(0.01)	(0.01)	(0.01)
Month	0.10**	0.05*	-0.03	-0.04	-0.01	-0.01**	-0.03***	-0.03***
	(0.05)	(0.03)	(0.06)	(0.07)	(0.00)	(0.01)	(0.01)	(0.01)
Typical Period	0.73***	0.35***	0.32**	0.17	0.13***	0.14***	0.06***	0.05***
	(0.13)	(0.06)	(0.15)	(0.14)	(0.02)	(0.02)	(0.02)	(0.01)
Inc 35-59k	0.34**	-0.31***	0.53***	1.28***	0.01	-0.08***	0.06***	0.14***
	(0.16)	(0.08)	(0.17)	(0.17)	(0.02)	(0.02)	(0.02)	(0.02)
Inc 60k+	0.27*	-0.10	2.13***	1.76***	-0.02	-0.01	0.19***	0.16***
	(0.16)	(0.08)	(0.18)	(0.17)	(0.02)	(0.02)	(0.02)	(0.02)
Some College	0.87***	-0.04	0.31*	0.25	0.12***	0.02	0.06***	0.04*
	(0.16)	(0.08)	(0.17)	(0.19)	(0.02)	(0.02)	(0.02)	(0.02)
College+	0.32*	0.27***	2.20***	0.68***	0.06**	0.13***	0.24***	0.08***
	(0.17)	(0.09)	(0.20)	(0.20)	(0.02)	(0.02)	(0.02)	(0.02)
Age 35-54	-0.62***	-0.03	-0.00	1.17***	-0.08***	-0.02	-0.01	0.16***
	(0.18)	(0.08)	(0.20)	(0.18)	(0.02)	(0.02)	(0.02)	(0.02)
Age 55+	-2.10***	-0.35***	0.16	2.10***	-0.28***	-0.11***	0.01	0.24***
	(0.18)	(0.08)	(0.20)	(0.19)	(0.02)	(0.02)	(0.02)	(0.02)
ST q2	0.72***	0.43***	1.46***	0.91***	0.10***	0.15***	0.20***	0.11***
	(0.17)	(0.08)	(0.19)	(0.19)	(0.02)	(0.02)	(0.02)	(0.02)
ST q3	0.95***	0.68***	1.97***	1.42***	0.15***	0.23***	0.26***	0.18***
	(0.17)	(0.08)	(0.20)	(0.19)	(0.02)	(0.02)	(0.02)	(0.02)
ST q4	1.25***	0.65***	2.46***	2.58***	0.17***	0.24***	0.31***	0.26***
	(0.20)	(0.09)	(0.22)	(0.23)	(0.03)	(0.02)	(0.03)	(0.02)
N	11460	11490	11428	11492	11460	11490	11428	11492

The dependent variables is the reported amount spent in yearly equivalents expressed in thousands of dollars. Regressions are run excluding the top 5% of the dependent variable's distribution. $ST\ q$ is an indicator for the quartiles 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.

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 ze-

ros 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.

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 a Tobit model for the amount spent, experimenting with specifications in levels (left panel of Table 12) and logs (right panel of Table 12).[4] Most of the estimated coefficients are in line with the previous OLS estimates. In particular, answering about "typical" periods has a positive effect on the reported amount spent using any of the payment instruments. The effect is larger for debit cards and cash purchases than for credit and checks, but always economically sizeable (from $350 to $700 per year depending on the payment method) and statistically significant. As for the OLS regressions, income and education are positively related to spending amounts particularly through credit cards and checks. Also, individuals tend to report significantly more for each of the payment methods the more time they spend answering the questionnaire.

The most relevant difference between the Tobit and the OLS regressions is given by the change of sign on 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. It is still the case that those who provide positive values to daily and weekly questions tend to report higher amounts in yearly equivalents. Overall, however, the large mass of zero responses to short recall periods dominates and leads to negative Tobit coefficients.

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

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

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 the "typical" period framework individuals report, on average, 51 more debit card payments and \$660 more debit card expenses. Similarly they report 40 more cash transactions and \$330 more purchases paid in cash. As for credit cards, while the number of payments is slightly higher, the amount spent is not statistically different from the one reported within the "specific past" period framework. There is no differential effect for personal checks.

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.

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