An Experimental Analysis of the Demand for Payday Loans

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Abstract

The payday loan industry is one of the fastest growing segments of the consumer financial services market in the United States. The purpose of our study is to design an environment similar to the one that payday loan customers face. We then conduct a laboratory experiment to examine what effect, if any, the existence of payday loans has on individuals' abilities to manage and to survive financial setbacks. Our primary objective is to examine whether access to payday loans improves or worsens the likelihood of financial survival in our experiment. We also test the degree to which people's use of payday loans affects their ability to survive financially. We find that payday loans help the subjects to absorb expenditure shocks and, therefore, survive financially. However, subjects whose demand for payday loans exceeds a certain threshold level are at a greater risk than a corresponding subject in the treatment in which payday loans do not exist.

JEL Classifications: D14 (Personal Finance), C9 (Design of Experiments)

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I. INTRODUCTION

The payday loan industry is one of the fastest growing segments of the consumer financial services market in the United States. It sprung up in the early 1990's when commercial check cashing stores began offering customers the option of taking out a short-term loan to help them meet unplanned expenses until their next payday. Payday loans are short-term loans of $100 to $500 that typically must be paid back within two weeks or by the borrower's next payday. The fees for these loans vary from $10 to $25 per $100 borrowed. Although the loan is unsecured, the borrower must be employed, provide personal identification, and have a checking account. While some payday lenders conduct cursory credit checks using services provided by, for example, Teletrack, payday loans are generally provided without any formal credit check. One of the appeals of these loans, as documented in a number of studies (see, for example, Elliehausen and Lawrence (2001)), is the speed with which individuals can obtain these loans.[1] While relatively easy to obtain, payday loans are expensive when compared to the interest rates charged on other consumer loans.

The typical payday loan customer is relatively young with a high school education but little or no college education. They have little money in their checking account and few, if any, alternative sources of credit because they are at (or have exceeded) their credit limit, or previously have been turned down for more conventional consumer loans. Payday loan customers' most frequently cited reason for using the loans is to meet unplanned expenses. Rapid growth of the payday loan industry suggests that this industry evolved to fill a gap in the consumer credit market not being served by more traditional lending institutions.

Two aspects of payday loans draw significant attention in the policy arena: (1) interest rates charged for these loans; and (2) the potential effect of these loans on the "cycle of debt" faced by some consumers.[2] Interest rates on the majority of payday loans exceed 300% on an annual percentage rate (APR) basis, causing some to claim that payday lending is predatory. For example, Stegman and Faris (2003, p. 20) note that "if repeated, chronic borrowing is as commonplace as it appears, then the triple-digit APRs charged by most payday lenders may go beyond what is fair and become abusive and predatory." Because of these high interest rates, some critics suggest that interest rate ceilings should be implemented or propose that the industry be banned altogether. There is also

[1] One of us took out a payday loan in less than 25 minutes.

[2] For a more detailed discussion of these and other criticisms of the payday loan industry, see www.responsiblelending.org. The Center for Responsible Lending, as stated on this website, serves as "a resource for predatory lending opponents."

evidence suggesting that a number of consumers rely frequently on these loans and, therefore, potentially become caught in what critics call a "cycle of debt." In these situations, borrowers can find themselves paying fees for a loan that exceed the initial loan amount.

Despite these and other criticisms, supporters of the industry contend that payday lenders are simply providing credit to individuals who otherwise would not be able to obtain it in the more formal financial sector. Supporters further argue that the credit obtained in this industry allows individuals to weather short-term financial disruptions caused by, for example, unexpected expenditures. Additionally, a comparison of the costs of payday loans with, for example, the costs of bounced checks indicates that payday loans may not be the most expensive choice individuals face.[3]

The objective of our study is to design an environment similar to the one that payday loan customers face and conduct a laboratory experiment to examine what effect, if any, the existence of payday loans has on individuals' abilities to manage and to survive financial setbacks. In our experiment, we control a number of features that allow us to examine the effect of payday loans in different treatments. Each participant faces the same payday loan fee, the same distribution of anticipated monthly expenditures, and the same distribution of unanticipated shocks. The supply of payday loans is also exogenously imposed so as to focus solely on the demand-side of the equation.

In contrast to field studies that cannot directly measure the welfare of individuals, all individuals start off on the exact same footing and thus we can directly measure how well different sets of subjects manage their induced financial circumstances. By randomly assigning participants to different treatment conditions, our results allow us to comment on how payday loans affect an individual's ability to adjust financially to unexpected expenditures.[4] Our analysis also allows us to comment on the extent to which individuals' consumption decisions result in a demand for payday loans that potentially creates and/or compounds financial difficulties.

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[3] In the May 2005 issue of *Consumer Reports*, a comparison of the implicit APR on bounced checks, overdraft protection, and several other forms of overdraft protection were compared. Depending on the total cost assumed, the APR for overdraft protection ranged from 608% to 791% and the APR for bounced check fees ranged from 487% to 730%.

[4] There is no random assignment of people to conditions with and without payday loans in field studies.

The paper is organized as follows: the next section, Section II briefly summarizes the literature on payday loans. Section III describes the experimental design and procedures. Then in the next section we present hypotheses and the semi-parametric model to evaluate them. Section V discusses our results, and the final section summarizes our conclusions.[5]

II. Previous Research

Among the earliest research, Caskey (1994) describes the features of fringe banking and describes those who use fringe banks to obtain financial services.[6] A growing number of studies examine in more detail various aspects of the industry. Several papers focus on the determinants of the location decision of payday lenders (Graves (2003), Burkey and Simkins (2004), Graves and Peterson (2005), Prager (2009), and Damar (2009)). The results of several of these papers are consistent with claims that payday lenders may fill a void created by the departure of more traditional lending institutions. These results would also partly explain the rapid growth in the demand for payday loans. Several other studies focus on the cost and revenue structure of payday lenders, on payday loan pricing behavior, on the profitability of payday lenders, and on payday lender and borrower behavior (Stegman and Faris (2003), Flannery and Samolyk (2005), Skiba and Tobacman (2007), DeYoung and Phillips (2009), Agarwal, Skiba, and Tobacman (2009), and Bertrand and Morse (2009a, 2009b)). The remainder of the most recent research on payday lending focuses on why individuals might use payday loans and on the effects of payday lending on a variety of economic outcomes.

The evidence concerning whether access to high interest rate loans has a beneficial or adverse effect on economic outcomes is mixed. A number of studies have found that payday lending has a harmful effect on individuals or causes an increase in adverse economic outcomes (Carrell and Zinman (2008), Campbell,

[5] Appendix A provides the instructions for the experiment. Another appendix, available upon request, includes a discussion of three subjects in one of the treatments as examples of how payday loans aided, harmed, or could have aided subjects.

[6] Fringe banks also include, for example, check-cashing establishments and pawn shops. A number of recent studies provide additional descriptive analyses of the growth of payday lending, the characteristics of payday borrowers, and public policy issues related to the industry (Fox (1999/2000), Caskey (2001, 2002, and 2005), Stegman (2001), Barr (2004), Bair (2005), Pyper (2007), Stegman (2007), and Lawrence and Elliehausen (2008)). While Chin (2004), Chessin (2005), Butler and Park (2005), Mann and Hawkins (2007), and Huckstep (2007) also include descriptions of payday lending and further document its growth, these studies focus more on the legal and regulatory aspects of the industry. Skiba and Tobacman (2008) offer several theoretical explanations (e.g., high discount rates) for why individuals use high interest rate loans and conclude (p. 16) that "the naïve and sophisticated quasi-hyperbolic models perform better than the exponential model at explaining payday borrowing, repayment, and default."

Martinez Jerez, and Tufano (2008), Melzer (2009), Melzer and Morgan (2009), Skiba and Tobacman (2009). At the same time, several other studies find that access to higher interest rate loans and payday loans in particular have a beneficial effect or cause a reduction in adverse economic outcomes (Morgan (2007), Morgan and Strain (2008), Morse (2009), Karlan (2010), and Karlan and Zinman (2010)).

The results of two studies on the effect of payday loans on personal bankruptcy are also mixed. Skiba and Tobacman (2009) find that payday loans increase the incidence of personal bankruptcy, while Lefgren and McIntyre (2009) find that the existence of payday loans has no effect on bankruptcy rates.

III. Experimental Design and Procedures

In this paper, we use a laboratory experiment to examine the extent to which the existence and use of payday loans affect an individual's ability to manage and survive financial setbacks with uncertain and unforeseeable expenditures and a certain fixed income.[7] We consider two economic treatments: the *Loan* (*L*) treatment, in which payday loans are a financing option; and (2) the *No Loan* (*NL*) treatment, in which payday loans do not exist. This second treatment is motivated by our interest in examining whether the existence of payday loans alters subject welfare. Given that we did not know ex ante the extent to which subjects would put themselves into financially tight circumstances, we conducted our first sessions with a liberal maximum number of overdraft checks, eight. This maximum kicked in after the first experimental month in a session of 30 months, so as to not penalize the subjects too harshly for poor decisions in their first month. After observing 45 subjects in this treatment, we then introduced a treatment that could increase the demand for payday loans by reducing the availability of the alternative, namely we limited each subject to a maximum of two instead of eight overdraft checks after the first month.

An additional treatment variable is whether or not each participant loses utility from writing a check when there are insufficient funds in the participant's account. In the *Overdraft Protection* treatment, the participant is charged a fee and, implicitly, the bank covers the check so that the participant does not incur any negative consequences from the payee for writing a check with insufficient funds in her account. In this paper, we refer to these types of checks as overdrafts. 111 participants faced this treatment condition, 54 without access to

[7] See Smith (1994) for an excellent discussion of using experimental economics to evaluate policy prescriptions in general and Wilson (2007) for a discussion on the use of experimental economics to examine issues in antitrust.

loans and 57 with access to loans. We subsequently conducted a harsher treatment, the *No Overdraft Protection* treatment, which penalizes participants who "bounce checks" on bills. The penalty, however, is delayed until the next month as it takes time for the check to fail to clear.[8] In the treatment without overdraft protection, we refer to checks written without sufficient funds and, therefore, checks that incur *both* a fee and a subsequent penalty as bounced checks. 162 participants faced this treatment, half without access to payday loans and half with access to payday loans. The 2^3 design is summarized in Table 1.

Table 1. Experimental Design
(Number of Subjects)

Overdraft Protection Treatment

	No Loan	*Loan*	Total
8 Overdrafts	*NL8* (23)	*L8* (22)	45
2 Overdrafts	*NL2* (54)	*L2* (57)	111
Total	77	79	156

No Overdraft Protection Treatment

	No Loan	*Loan*	Total
8 Bounced Checks	*NL8* (41)	*L8* (41)	82
2 Bounced Checks	*NL2* (40)	*L2* (40)	80
Total	81	81	162

Each subject earns cash based on a series of financial and consumption decisions over thirty 28-day months, or 840 periods. Each day lasts four seconds. Participants are seated at visually-isolated carrels, with each subject using a computer to access information, such as the instructions (see Appendix A) and their financial situation (e.g., historical payments, current balance, bills due), and to enter their decisions (e.g., which bills to pay). Subjects earn US dollars by consuming goods for which they have bills to pay in experimental dollars. Each bill appears 28 days before it is due. When a bill appears, a subject receives "consumption points", or "utility" in the vernacular of economics, for a good or service. Each consumption point equals one US cent in earnings for the subject.

[8] The penalties associated with bouncing a check represent any costs imposed on individuals by merchants. In addition to charging individuals for bounced checks, merchants may post the individual's name and/or refuse to conduct business with that individual in the future.

Failure to pay bills on time leads to penalties in the form of deductions from a subject's accumulated consumption points.

Each subject is endowed with a starting balance of 50 experimental dollars (E$) and collects biweekly paychecks of 475 experimental dollars. The final balance of experimental dollars is converted into US dollars at the rate of E$400 = US$1. For ease of discussion, $ will denote experimental dollars, except for any reference to actual payouts of cash to the subjects at the end of each session.

We chose bill and income parameters to place subjects in tight financial situations so that failure to survive financially results in the termination of the ability to earn money during the session. Each month a subject must accrue a minimum of 100 consumption points. If a subject fails to meet the monthly minimum of 100, the subject may no longer participate in the session. We chose this monthly minimum to induce a reason for the subjects to pay bills. We also chose it to create an incentive for subjects to continue to participate in the experiment to increase their earnings. This minimum threshold, therefore, conveniently serves as the primary means for us to measure how loans affect the ability of subjects to extend their participation and, as we discuss later, to survive financially.

A bar graph at the bottom portion of the screen continuously updates the number of consumption points that a subject has accumulated in a month (see Figure 1 for a screenshot for a subject in the *Loan* treatment). Once a subject is eliminated, he or she can no longer make decisions or earn money in the remaining periods. However, in an effort to not disrupt those subjects who continue to participate, these subjects remain at their computer terminals until all subjects in the laboratory complete the session. Eliminated subjects may surf the Internet or participate in a quiet activity, such as reading, without leaving their carrel.

The series of monthly bills faced by each subject is given in Table 2. Over time, subjects become familiar with these basic monthly bills, as they appear each month 28 days before their due date. As mentioned in the introduction, meeting unplanned expenses is the most frequently cited reason for why payday loan customers' take out payday loans. To capture this feature in the experiment we implemented large bill shocks that yield no consumption points but carry hefty penalties if they are not paid. These additional bills are more irregular and infrequent, and are not known to the subjects until the bills appear on each subject's computer screen 28 days before they are due. Table 3 lists these bill shocks.

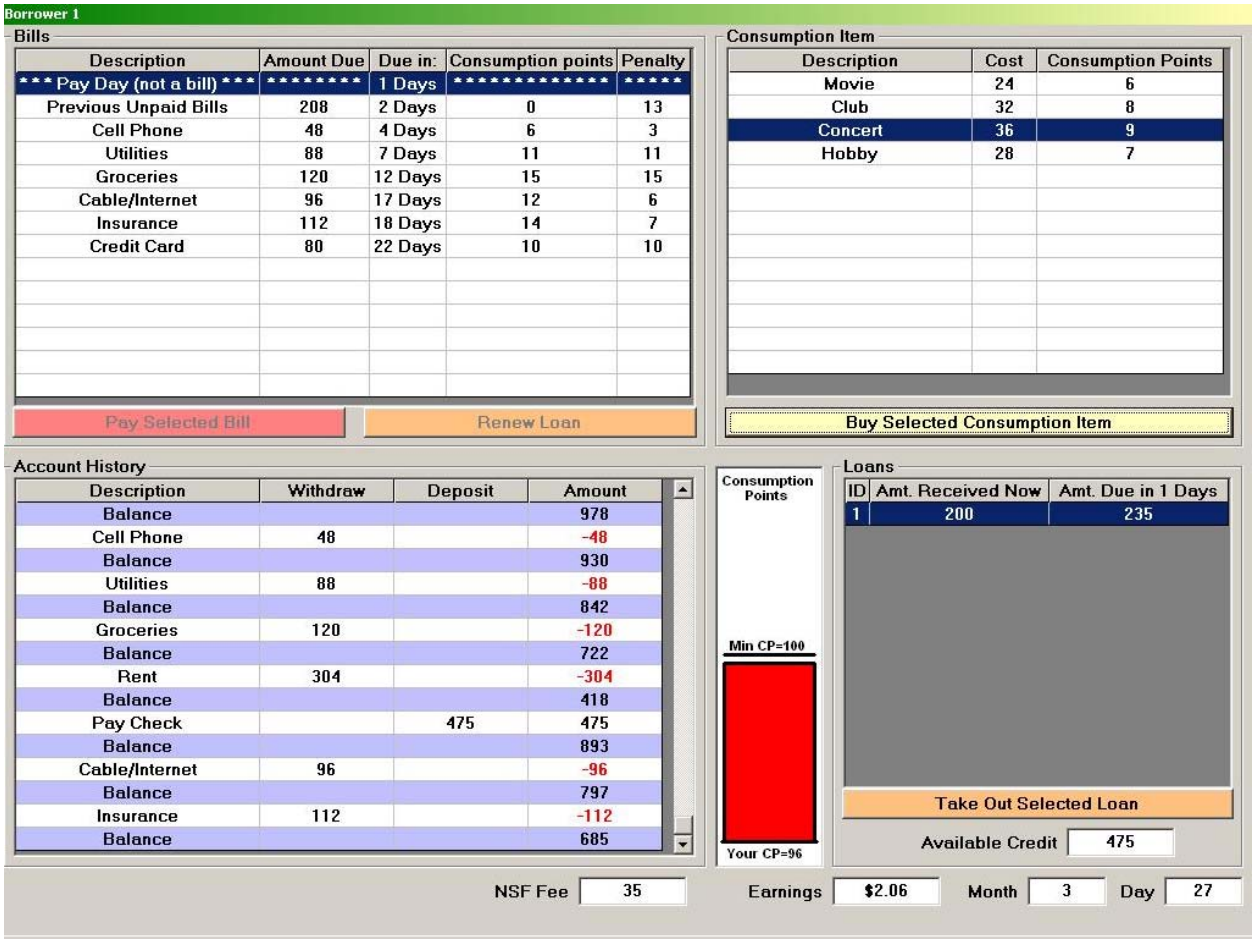

Figure 1. Screenshot for Subject in the *Loan* Treatment

*N.B. The only difference for subjects in the *No Loan* treatment is that they did not have the loan frame in the bottom right corner. The consumption point counter in the bottom middle portion of the screen turned from red to green when the subject met the minimum threshold of 100 consumption points to continue on to the next month.

Table 2. Monthly Bills

Day	Description	Amount	Days until due	Consumption Points	Penalty
2	Rent	304	28	38	38
3	Cell Phone	48	28	6	5
6	Utilities	88	28	11	11
11	Groceries	120	28	15	15
16	Cable/Internet	96	28	12	6
17	Insurance	112	28	14	7
21	Credit Card	80	28	10	10

Table 3. Other Unexpected Bills (or Shocks)

Month/Day	Description	Amount	Days until due	Consumption Points	Penalty
4/7 and 21/7	Vet Visit	180	28	0	45
10/7 and 26/7	Dentist Appointment	190	28	0	48
15/7	Car Repair	200	28	0	50
18/7	Taxes	212	28	0	53
23/7	Appliance Repair	148	28	0	37
24/7	Car Repair	152	28	0	38
26/7	Driving Violation	200	28	0	50

An individual decides which bills to pay and when to pay them. The total amount of bills to be paid over the course of the experiment is $26,244 and the total amount of income (plus the starting balance) is $28,075.[9] Thus bills comprise 93.5% of a subject's income, leaving just 6.5% for discretionary spending. As presented in Table 4, subjects also can choose to purchase optional consumption items at a take-it-or-leave-it price when they become available. Subjects are not informed of the frequency or type of consumption items offered in advance. Purchase of consumption items provide consumption points, which accrue to each subject's earnings. If a (frugal) subject refrains from buying any optional consumption items (and pays all bills on time), he or she will survive until the end of the experiment without taking out a payday loan, bouncing a check, or relying on overdraft protection.

Payment for consumption items is due at the time of purchase. Notice that optional consumption items generate consumption points at twice the rate that bills do. This is meant to capture the more hedonistic pleasure of leisure activities relative to the mundane consumption of utilities, for example. We assume that a vendor has no recourse if a participant bounces a check on an optional consumption item. However, the treatment conditions limit the total number of bounced checks (or overdrafts) to two or eight, so that bouncing checks (or writing overdrafts) eventually catches up with a participant.

Bounced checks or overdrafts are permitted in all of the experimental sessions, though as described at the onset of this section, the maximum number permitted varies with the treatment. Each bounced check or overdraft leads to a

[9] Since the experiment ends after 30 experimental months, this calculation omits the last paycheck on day 28 of month 30 which could not be used to pay bills, nor the last month's set of bills to appear which would come due the following month.

fee of $35, regardless of the amount of the check. When a participant bounces a check on a bill in the *No Overdraft Protection* treatment, he avoids the consumption point penalty in the current month, but this is only temporary as the penalty then hits the participant on day 23 of the following month. The bill also remains unpaid. The *Overdraft Protection* treatment differs in that the participant avoids the consumption point penalty in the next month. The bill, however, remains unpaid and the participant is still assessed the $35 fee for the overdraft.[10]

Table 4. Consumption Item Purchase Opportunities

Month/Day Introduced	Frequency Item is Offered	Description	Price	Consumption Points
1/7	Monthly	Movie	24	6
1/17	Monthly	Club	32	8
2/22	Monthly	Hobby	28	7
3/19	Monthly	Concert	36	9
5/9	Bi-Monthly	Sporting Event	80	20
6/2	Tri-Monthly	Vacation	200	50

All unpaid bills for the month appear as a lump sum item, "Previous Unpaid Bills", on the first day of the following month and are due 28 days later. If a participant fails to pay the previously unpaid bills, he or she incurs the associated consumption point penalty (in the case of utilities, 11 points) and the amount is rolled over to the next month until it is paid.

The computer serves as the payday loan lender in this experiment. The payday loans offered in this experiment are always $200 at a fee of $35, which is typical of the rate found in naturally occurring markets. No subject may take out a loan more than twice ($470) per biweekly pay period (recall the $475 paycheck). Note that the fee for bouncing a check or writing an overdraft is the same as the fee for taking out a $200 loan. All loans automatically are repaid on the next payday. All sessions begin without loans available and then on day 27 in month 2, the subjects in the *Loan* treatment receive the additional instructions on the availability of loans and how they work. Loans always are referred to in the experiment as "loans" and not "payday loans."

A total of 318 subjects participated in the experiment conducted at a large state university in the spring and fall of 2006 and the spring of 2007. Subjects were undergraduate students recruited from the university at large, many from a

[10] In the *Overdraft Protection* treatment, the "unpaid" bill represents the sum the individual must implicitly pay the bank which has "covered" the check.

table in front of a cafeteria. Participants received $7.00 for showing up on time and additional earnings from the experiment itself. Table 5 reports the summary statistics on the subject earnings by treatment.

Table 5. Summary Statistics on Earnings in US$*

	Overdraft Protection			
	L2	*NL2*	*L8*	*NL8*
Mean	23.59	23.40	20.99	20.58
Median	26.09	24.32	17.94	16.27
Minimum	3.05	2.29	2.69	3.24
Maximum	37.57	37.48	37.30	37.47
	No Overdraft Protection			
	L2	*NL2*	*L8*	*NL8*
Mean	7.38	13.48	17.78	17.71
Median	11.13	6.86	16.61	17.16
Minimum	3.01	2.87	2.86	2.75
Maximum	37.57	37.57	36.74	36.93

* Does not include $7.00 show-up payment.

Each subject was seated at a computer terminal and privately read the self-paced instructions on the screen. The experiment began after every subject had completed reading the instructions. Each session typically lasted approximately 75 minutes and no subject participated in more than one session (though several attempted to do so). The subjects were told that the experiment would not last longer than 90 minutes and so ended well in advance of this limit even if they survived until month 30. Earnings were paid privately at the conclusion of the experiment.

Before discussing the results we briefly comment on what we can learn about payday loans in the laboratory vis-à-vis the field. A natural question might be, how can we compare the consumption in the experiment with the consumption in the naturally occurring economy? The answer to this question lies not in explaining how the benefit of paying a grocery bill in our one hour computer exercise somehow corresponds to the benefit of supermarket purchases by a 30-year old single mother of two in rural Virginia. Our aim is to observe what groups of cash-motivated participants do and do not do when faced with a focused task; and here's the key, when replicated under a common set of initial conditions. The typical consumer of payday loans is scraping by month to month and lives in a world full of financial shocks whose frequency and magnitude cannot be

anticipated. The policy question that is debated is whether payday loans help or hinder these people scrape by. To this end we designed a novel computer exercise in which each subject must also scrape by from period to period to continue earning money.[11] The objectives of the single mother of two and our typical undergraduate participant are clearly different, but how they go about satisfying their objectives involves analogous trade-offs. Both can indulge in or forego optional consumption purchases when they are affordable, and both can or cannot take out loans to finance optional purchases when they are not affordable.

The most important feature of our design is that, despite their meager means, our subjects are strongly induced to strive to participate further in the experiment in much the same way that a single mother of two in Virginia strives to make ends meet as a basis for further striving. Furthermore, no data, that we are aware of, has been collected on the number of payday customers that make *good* decisions with payday loans. One benefit of experimental economics is that in the laboratory, the counterfactual, which is unseen in the naturally occurring economy, comes to light. While field data sets may reflect the circumstances of actual payday loan customers, they cannot control for the circumstances under which these customers may need to use them. Nor can they randomly assign people to conditions with and without access to payday loans to assess the efficacy of payday loans. In sum, a laboratory experiment complements field studies with actual payday loan customers by providing data on what cannot be studied in the field.

IV. HYPOTHESES

Our primary objective is to examine whether access to payday loans influences individual welfare and, more specifically, the likelihood of financial survival in our experiment. There are other measures of welfare on which to assess the impact of payday loans in the naturally occurring economy, but the key feature of our design is the necessity of surviving month to month to earn more money in the experiment. By design participants must earn $1 by making ends meet to continue on in the experiment. Hence, the likelihood of survival is the most important determinant of a subject's earnings. All other measures are secondary to this primary determinant of participant earnings.

To examine what effect the existence and use of payday loans have on the likelihood of financial survival, we employ the popular proportional hazards

[11] To our knowledge this is the first economic experiment in the laboratory to employ an endogenous survival mechanism.

model developed by Cox (1972).[12] In the presence of right censoring, this method of analyzing the effect of covariates on the hazard rate assumes that $\lambda(t_i) = e^{\beta' x_i}\lambda_0(t_i)$, where λ is the hazard function for individual *i* at time *t*, **x** is the covariate vector associated with the parameter vector β, and λ_0 is the baseline hazard. For a treatment dummy variable, the Cox model affords a simple interpretation of the "relative risk" for our *No Loan* treatment. Subjects in the *No Loan* treatment are $e^{\beta_{NL}}$ times less likely to survive financially than those in the *Loan* treatment. In other words, we have a measure of the difference in survivability between those who do and those who do not have access to payday loans. For continuous covariates, the exponentiated estimated coefficients are interpreted as the effect of a unit change in the covariate on the relative hazard. For example, $e^{\hat{\beta}_1}$ implies that a one-unit increase in the first covariate changes the hazard by $(e^{\hat{\beta}_1} - 1) \times 100$ percent. An attractive feature of the semi-parametric Cox regression is that it makes no assumption about the parametric distribution of the length of financial survival.

Specifically, we include a number of covariates in our Cox regression. The first covariate, *CIPercent*, measures the expenditures on optional consumption items as a percentage of total income.[13] *NumberLoans* equals the number of loans that subject *i* took out in the *Loan* treatment.[14] *EarlyPenalties* measures the number of consumption point penalties that the subject incurred in the first two months. We also include several dummy variables as covariates. *No Loan* equals 1 if the subject is in the *No Loan* treatment, and equals zero if the subject is in the *Loan* treatment. *2BC* equals 1 if the subject is in either of the

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[12] Kiefer (1988) presents a thorough introduction to the analysis of duration data and subsequent use of hazard models in economics. For a less formal discussion of duration models, see Kennedy (2003).

[13] Because the set of opportunities for optional consumption items is fixed over a six month cycle and is the same cycle for every subject, the danger is minimal that the length of financial survival affects the covariate *CIPercent*, which is measured as a percentage over all months of survival.

[14] If the duration of financial survival definitionally (or involuntarily) determined the *NumberofLoans* that a subject would take out, then we would have the problem of an endogenous covariate and hence a biased interpretation of the hazard ratio for this covariate. For example, a Cox model to assess whether casualties affect the duration of war has the endogeneity problem that war duration also causes deaths. Each subject in our experiment, however, has a choice of whether or not to put themselves into a position to need a payday loan at any time during the experiment: early, middle, or late. In other words, *NumberofLoans* is independent of time. Just because a subject survives longer doesn't mean that the subject is going to put, or not put, him- or herself into a financially precarious position of needing to take out a loan. A scatterplot of *NumberofLoans* against months of survival reveals no uniform relationship across our subjects, and a simple OLS regression of *NumberofLoans* on months of survival (for all the subjects in the *Loan* treatment) confirms this with an R^2 of 0.01 and a $F_{1,158} = 1.95$ (*p*-value of 0.1649).

maximum of two bounced checks or maximum of two overdraft checks treatments. *2BC*, therefore, equals zero if the subject is in a treatment that allows her to bounce up to eight checks or write up to eight overdraft checks. *NoOverdraft* equals 1 if the subject is in the *No Overdraft Protection* treatment, and equals zero if the subject is in the *Overdraft Protection* treatment. And finally, *Female* equals 1 if the subject's gender matches the variable's name.

Our hypotheses are as follows. Our primary hypothesis is that the *No Loan* treatment decreases the likelihood of financial survival because those subjects do not have access to the loans to absorb the bill shocks ($\beta_1 > 0$). Critics of payday loans contend that people subjects may be caught in a "cycle of debt." Thus, an increase in the *NumberLoans* variable is hypothesized to decrease the likelihood of financial survival. Similarly, an increase in the use of loans results in more expenditures on loan fees and, therefore, results in fewer funds available to pay for expected bills and unexpected shocks. Both of these interpretations suggest that increases in the number of loans will reduce the likelihood of financial survival ($\beta_4 > 0$).

We also expect that those subjects who can bounce no more than two checks or write no more than two overdrafts are less likely to survive financially. *2BC,* therefore, decreases the likelihood of financial survival because the subjects have fewer opportunities to use bounced checks or overdrafts as a means to absorb bill shocks ($\beta_2 > 0$). We also expect that *NoOverdraft* will decrease the likelihood of financial survival because, all else fixed, subjects incur additional penalties when bouncing checks (in comparison to overdrafts). We hypothesize that the additional penalties in the *No Overdraft Protection* treatment will make it more difficult to survive ($\beta_3 > 0$).

We also hypothesis that increases in the *CIPercent* variable will decrease the likelihood of financial survival, as purchasing optional consumption items results in fewer funds available to pay for expected bills and unexpected shocks as they arise ($\beta_5 > 0$). Further, an increase in the *EarlyPenalties* variable is expected to decrease the likelihood of financial survival as it difficult to continue in the experiment if one incurs penalties early in the experiment.[15] And finally, we have no reason to predict a gender effect in this experiment.

[15] Because *EarlyPenalties* measures the number of penalties only in the first two months and a subject cannot die until the end of the second month, months of survival cannot affect *EarlyPenalties*. Hence, *EarlyPenalties* is not an endogenous covariate.

Before proceeding further we note that in analyzing the data we found a software bug that differentiated the environmental conditions of a small subset of the subjects (11%) from the others in the *Overdraft Protection* treatment only. Specifically, if a subject attempted to repay his or her "Previous Unpaid Bills" exactly on the first of the month, the software recorded the payment in the accounting ledger of the subject, but this line item for "Previous Unpaid Bills" would appear again in the next month to be repaid a second time. Thus, to survive these subjects would have to pay their unpaid bills twice, making their financial survival that much more difficult.[16] This software problem affected four subjects in the *NL8* treatment, seven in the *L8* treatment, twelve in the *NL2* treatment, and thirteen in the *L2* treatment. Fortunately, we can include these subjects in the Cox regression as "alive" or surviving for the month *before* the software bug affected them. That is, in the month prior to the problem they are in exactly the same circumstances as all the other subjects in the experiment with the observation that they are still surviving in the experiment.[17]

V. RESULTS

The estimates from the Cox regression are reported in Table 6. We report the results of the three primary treatment conditions in two model specifications, with and without the behavioral variables and gender. The estimated hazard ratio for the *No Loan* treatment is 1.31 and is statistically different from one (p-value = 0.0550) in the full model. The estimate in the treatment dummy only model is 1.24 (p-value = 0.0650). The interpretation of this estimate is that the *No Loan* treatment increases the relative hazard of financial survival in our experiment by 31 percent. After controlling for the expenditures on the optional consumption items, the subjects without access to loans are at a nontrivially higher risk. Hence we find that the existence of payday loans, all else fixed, increases the probability of financial survival by 31%. In the specification that only includes the treatment dummy variables, the probability of financial survival by 24%. Payday loans,

[16] Amazingly some subjects did.

[17] Medical studies that utilize this model often have many subjects coded similarly. The Cox survival model explains how long a subject survived since a treatment condition began and takes as an input whether or not the subject is currently alive at the time of monitoring. In a cross section of individuals it is *not* necessary that the individuals all have the same opportunity to survive, which in our case is 30 months, nor furthermore does the model assume that all subjects must have enough time to expire (in medical studies this means actually dying) for there to be useful information for the proportional hazard. Thus, if we "monitor" the subjects before the software bugs hits, they are coded as alive up until this point. We cannot simply drop these subjects without introducing a bias into results as there may be a latent variable that selects these individuals to pay their bills on the first day of the month.

therefore, are a means for the subjects to absorb shocks when, for example, they do not sufficiently save for the unexpected "rainy days".

Taking out the loans, however, does not come without its risk. The estimated coefficient for the *NumberLoans* variable indicates that each additional loan increases the relative hazard by 3 percent and is highly statistically significant (*p*-value = 0.0090).[18] Thus, we find that a sparing use of loans enhances the survivability of the subject relative to the *No Loan* treatment. The model predicts that a subject taking out ten or fewer loans in the *Loan* treatment has a lower hazard rate than a corresponding subject in the *No Loan*. However, taking out more than ten loans puts the subjects at a greater risk than a corresponding subject in the *No Loan* treatment.

Table 6. Estimates of the Cox Proportional Hazard Model for Months Survived

	$\hat{\beta}_j$	$e^{\hat{\beta}_j}$	z-stat	*p*-value	$\hat{\beta}_j$	$e^{\hat{\beta}_j}$	z-stat	*p*-value
No Loan	0.2137	1.24	1.516	0.0650	0.2666	1.31	1.58	0.0550
2BC	0.0689	1.07	0.468	0.3200	0.2315	1.26	1.55	0.0600
NoOverdraft	0.9343	2.55	6.086	<0.0001	0.3974	1.49	2.37	0.0090
NumberLoans					0.0249	1.03	2.37	0.0090
CIPercent					0.1017	1.11	4.41	<0.0001
EarlyPenalties					0.0844	1.09	14.05	<0.0001
Female					0.0849	1.09	0.58	0.5600
			LR(3) = 42.8 318 Obs.	<0.0001			LR(7) = 230 318 Obs.	<0.0001

The interpretation of the *No Loan* and *NumberLoans* variables provides us with an opportunity to offer some comments about what effect both the existence and use of payday loans has on the subjects' abilities to survive financially in our experiment. In our experiment, 160 subjects had access to payday loans. Of those 160 subjects, 35 of them took out more than ten payday loans. Based on the results of the above hazard model, the predicted probability of survival for these 35 subjects (i.e., 21.9% of the subjects with access to payday loans) was lower than that for otherwise identical subjects in the *No Loan* treatment. At the same time, the predicted probability of financial survival for the remaining 125 subjects for whom payday loans exist was higher than that for otherwise identical subjects in the *No Loan* treatment. In other words, while some subjects' financial survival was adversely affected by their use of payday loans, the majority of subjects in our experiment (i.e., 78.1% of the subjects with access to payday loans) benefited from both the existence of and their subsequent use of payday loans.

[18] The additional covariates of the square of *NumberLoans* and an interaction variable of *NumberLoans* × *CIPercent* are both highly insignificant.

The restriction of the number of bounced checks (and overdrafts) to two has a significant impact on the ability of our subjects to survive financially. Relative to the *8BC* treatment, the *2BC* treatment increases the probability of failure by 26 percent (p-value = 0.0600). Even after taking into account the costs associated with bounced checks and overdrafts, this result implies that subjects' abilities to survive financially are greater when the subjects are allowed to bounce more checks or to write more overdraft checks. This result, however, is not robust to the different models. In the streamlined model, *2BC* is not statistically different from 1 (p-value = 0.3200).

As hypothesized, the estimated coefficient for the *NoOverdraft* variable is positive and statistically significant (p-value = 0.0090) in the full model. This result indicates that those subjects in the *NoOverdraft* treatment are 49% less likely to survive financially. Without the behavioral variables, the *NoOverdraft* variable has an extremely large impact ($e^{\hat{\beta}_3} = 2.55$, p-value < 0.0001).

We also find that an increase in the *CIPercent* variable increases the probability of financial failure. Specifically, a one percentage point increase in the share of income used to purchase optional consumption items will increase the probability of financial failure by 11% (p-value < 0.0001). Figures 2 and 3 plot the expenditures on optional consumption items as a percentage of income against the number of months of financial survival and reveals a rather clear linear relationship between the two variables for subjects when the *CIPercent* is greater than 6.5% in the *2BC* treatment.[19] This figure clearly shows that the frugal participants who spend less than 6.5% of their income on optional items generally survive until the end of the experiment; the exceptions are the subjects that make early mistakes by failing to pay a bill associated with a large penalty.[20] Furthermore, the more that subjects spend on optional items beyond 6.5% the fewer months they survive.

The estimated coefficient for the *EarlyPenalties* variable is also positive and statistically significant (p-value < 0.0001). As expected, increases in the number of penalty points in the first two experimental months cause an increase in the probability of financial failure. Specifically, each additional penalty point

[19] Recall that monthly bills and other shocks represent 93.5% of the subjects' income. The subjects, therefore, can use 6.5% of their income for optional/discretionary spending (or saving).

[20] For example, often if a subject fails to pay the rent bill early in the experiment, there is little that a subject can do in the early months to overcome its associated penalty.

causes the probability of financial failure to increase by 9%.[21] And finally, we find that gender has no effect (*p*-value = 0.5600).

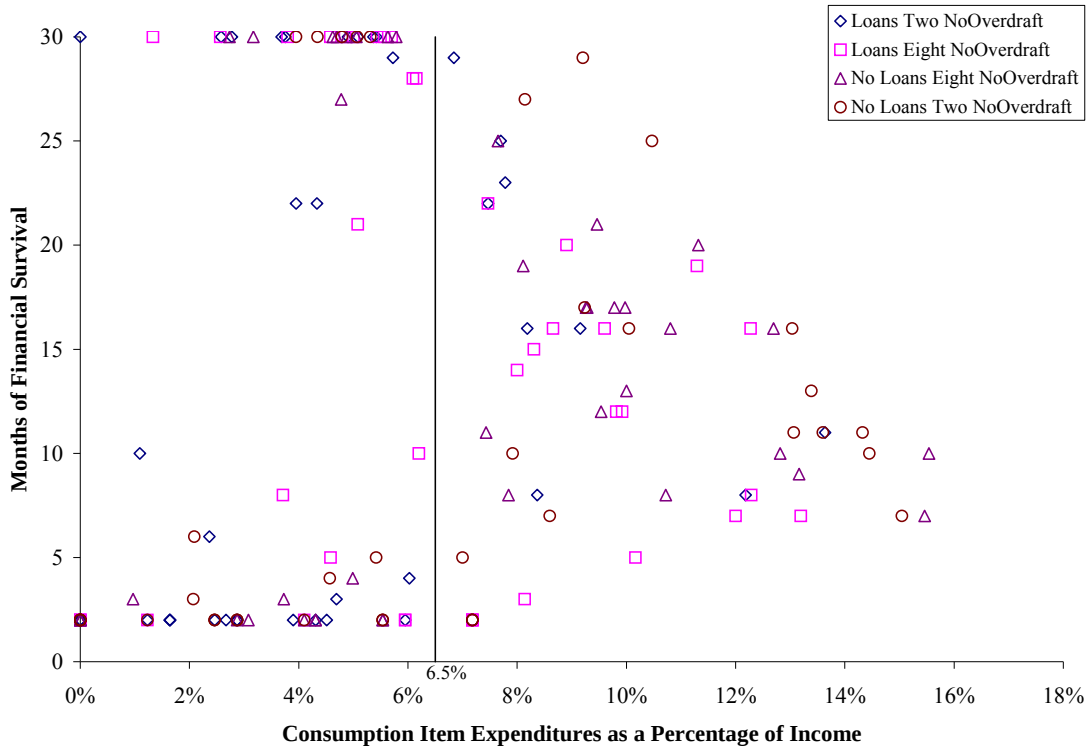

Figure 2. *CIPercent* Plotted Against Months of Financial Survival for *No Overdraft* Treatment

We conclude this section with observations on the spontaneous order plotted in Figures 2 and 3. Notice how uniformly people survive until the end of the experiment (once they make it past the first 5 months), *if they restrain their purchases of optional consumption items to less than 6.5% of income*. Recall that by design a solvent subject can only spend 6.5% of income on discretionary spending over a full 30 months of the experiment. For subjects who more liberally spend their income on the optional consumption items, there is a near linear inverse relationship between the months survived and the percentage of

[21] One possible explanation for this result is that the *EarlyPenalties* variable may capture the effects of the financial skills that each subject brings with her/him to the experiment. We would expect that subjects who know how to pay bills, manage their financial situation, … etc. are less likely to incur penalties early on in the experiment. Hence, the *EarlyPenalties* variable may also serve as proxy for personal finance skills. Regardless of the interpretation, increases in this variable have a negative effect on the probability of financial survival.

income used to purchase optional consumption items. Considering that people whose *CIPercent* < 6.5% take out very few loans, the above analysis indicates that loans are an effective tool to allow people with *CIPercent* > 6.5% to survive longer, as long as they do not overuse them.

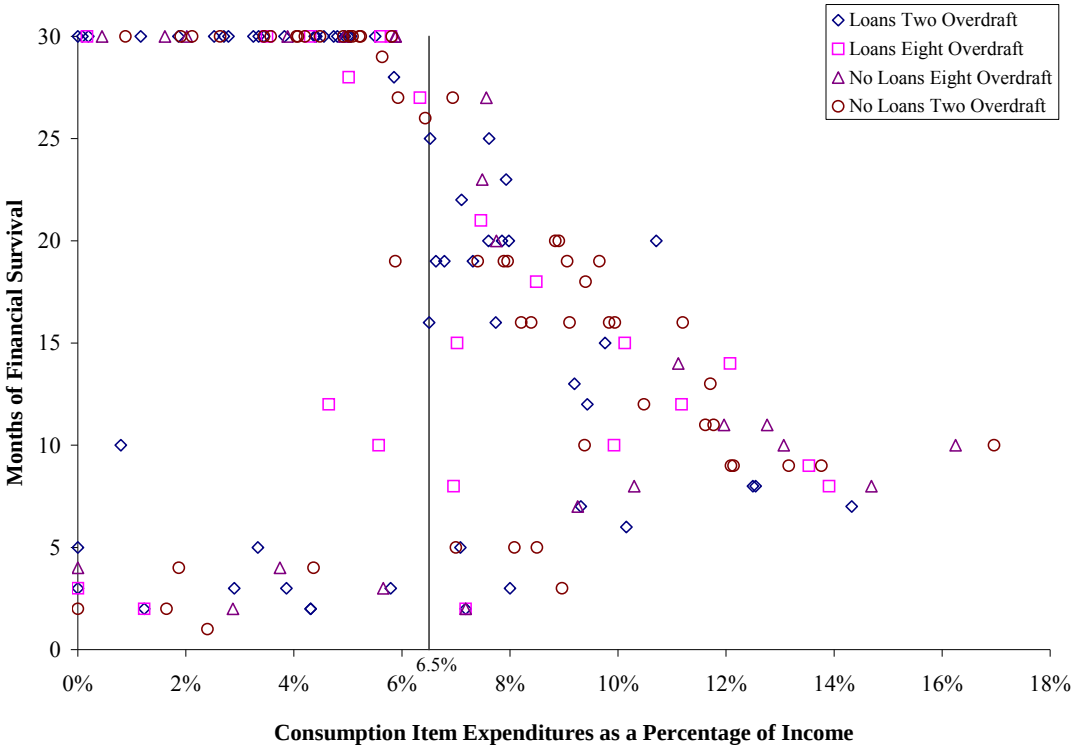

Figure 3. *CIPercent* Plotted Against Months of Financial Survival for the *Overdraft* Treatment

VI. CONCLUSION

The payday loan industry has received intense scrutiny by policy makers and consumer advocacy groups. This is not a surprising development given the industry's growth, the high interest rates charged on payday loans, and the much-publicized news accounts of those individuals whose repeated renewals of just one payday loan resulted in finance charges that far exceed the initial loan. Given both these high interest rates and allegations of excessive borrowing by some payday loan customers, a number of critics conclude that the payday loan industry represents abusive if not predatory lending. Not surprisingly, some of these same

critics have suggested interest rate caps as a remedy while others have argued that the industry should be banned altogether.

In this paper, we design an environment similar to the one that payday loan customers face. We then conduct a laboratory experiment to examine what effect, if any, the existence of payday loans has on individuals' abilities to manage and to survive financial setbacks (as represented by unexpected expenditures). Our primary finding addresses the question as to whether access to payday loans improves or worsens the likelihood of financial survival in our experiment. We also test the degree to which people's use of payday loans affects their ability to survive financially. We find that payday loans are a means for the subjects to absorb expenditure shocks and, therefore, survive financially. Taking out payday loans, however, does not come without its own risks. Subjects whose demand for payday loans exceeds a certain threshold level are at a greater risk than a corresponding subject in the treatment in which payday loans do not exist. While some subjects' financial survival was adversely affected by their use of payday loans, we found that the majority of subjects in our experiment benefited from the existence of and their subsequent use of payday loans.

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APPENDIX A: EXPERIMENT INSTRUCTIONS

<page 1>

Welcome

This is an experiment in the economics of decision-making. The instructions are simple. If you read them carefully and make good decisions, you may earn a

considerable amount of money that will be paid to you in cash at the end of the experiment.

From this point on, all references are in terms of computer dollars. In this experiment you will have a series of bills you must pay over the course of some days and months. Some bills will come on a monthly basis and some will be one time only.

Bills are located in the upper left portion of the screen and will appear throughout the experiment. Each bill will be due in some number of days after it appears. This means it must be paid on or before the due date. To pay a bill, highlight it by clicking on it and press the Pay Selected Bill button.

Each bill will have an amount due. Your account balance is located in the "Account History" frame in the bottom left portion of your screen. This section of your screen records a history of your transactions and your current balance.

<page 2>

Consumption Points

When a bill appears you will earn consumption points. You can think of consumption points as the benefit you receive from consuming the item on the bill. The consumption points you earn from any given bill is located under the "Consumption points" column in the bills frame.

Every consumption point you have at the end of each month will earn you one cent that will paid to you at the end of the experiment. Your monthly consumption point total will be reset to zero at the beginning of the month.

If you do not pay a bill, you may incur a consumption point penalty. The penalty for not paying a bill is located under the "Penalty" column in the Bills section. The penalty will be subtracted from your monthly consumption point total. That bill will then appear next month as "Previous Unpaid Bills" in bill section. You will continue to incur the consumption point penalty each month until you pay it off.

<page 3>

Consumption Points Continued

Each month consumption items will also be available for purchase. These items are located in the top right portion of your screen.

Consumption items are optional purchases; there is no penalty if you do not purchase them. If you do purchase a consumption item, then the cost will be subtracted from your balance and the consumption points will be added to your monthly total.
At the end of each month, which is every 28 days, your consumption points will be added to your earnings. They will then be cleared out.

Each month you must consume a minimum of **100** consumption points. *It is important to note that if you do not reach this minimum by the end of each month, your participation in the experiment will end.*

<page 4>
Bills continued
If you pay a bill that is greater than your account balance, meaning you don't have enough money to pay for it, you will incur a non sufficient fund (NSF) fee. If this occurs, only the NSF fee of 35 dollars will be subtracted from your balance, and you will avoid the consumption penalty. However, the amount of the bill and its associated penalty will appear next month as part of the "Previous Unpaid Bills".

You can only incur 2 NSF fees.

On the 14th and 28th of every month you will receive a paycheck in the amount of **475**. This will be added to your account balance.

<page 5>
At the end of the experiment your balance will be converted to cash at a rate of 4 computer dollars to one US cent. This cash will be added to your "Earnings" from the consumption points, which is displayed at the bottom of your screen.

Important Items for Review

(1) Every consumption point you have at the end of a month will earn you one US cent.
(2) If you do not accumulate the minimum number of consumption points by the end of a month, your participation in this experiment will end.

If you feel you are prepared to proceed with the actual experiment, click on the Start button. The experiment will begin once everyone has clicked on the Start button. If you have a question that you feel was not adequately answered by the instructions, please raise your hand and ask the monitor before proceeding.

<*Loan* treatment instructions on day 27, month 2>

Loans

At any time you can take out a loan from one of the *x* different lenders, located in the bottom right portion of your screen.[22] All of the loans will give you the same amount, 200 computer dollars. But the different lenders may offer different rates for their loans, located in the "Amt. Due in X Days" column.

Suppose the rate in this column is 225, then if you took out that loan you would receive 200 immediately which would be available to spend. Then you would owe 225 on the next payday (the 14th or the 28th).

The loan will be automatically repaid at the price the amount the lender offered at the time of purchase. On the day the loan is due you can choose to renew it by clicking the "Renew Loan" button. This will renew the loan at the current lender's rate. The original loan will also be automatically paid back.

[22] The software has been programmed to implement subjects as lenders. We chose to first implement a robot lender for this initial project. Each lender has a maximum capacity of twelve loans, so depending upon how many subjects were in a session, we included enough computer lenders to accommodate two loans per subject per pay period.