Payment Rewards and Credit Card Debt: Experimental Evidence

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Abstract

We report on a controlled laboratory experiment in which participants make consumption, saving, and credit card repayment decisions when credit card purchases earn cash-back rewards. Our treatment offers identical cash-back rewards on checking account purchases, thereby eliminating the rewards advantage of credit cards. The treatment reduces revolving debt, interest payments, and fees among participants assigned to an unemployment-first path, where temporary early borrowing is optimal. It has little effect under an employment-first path, where borrowing is not optimal. Effects are concentrated among participants who typically do not carry credit card debt, facilitating faster repayment of temporary debt after income recovers.

Keywords: Credit Cards, Cash-Back Rewards, Consumer Debt, Consumption, Savings, Lifecycle Model, Borrower–Saver Behavior, Behavioral and Experimental Economics
JEL Codes: C91, D14, D91, G51.

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1 Introduction

According to the Federal Reserve's Survey and Diary of Consumer Payment Choice, credit cards have become the most frequently used payment instrument for U.S. consumer purchases in recent years (Foster et al., 2025). A growing empirical literature shows that card rewards increase credit card use. Using administrative data from a large U.S. financial institution, Agarwal et al. (2010) find that cash-back rewards increase spending and debt on the rewarded card, while Agarwal et al. (2023) show that reward cards increase spending and unpaid balances, especially among less sophisticated consumers. Because credit card rewards are bundled with access to unsecured borrowing, rewards may encourage consumers to use credit cards not only as a payment instrument but also as a source of revolving debt.

This paper asks whether comparable rewards on checking account purchases reduce credit card reliance and improve debt outcomes. The question is increasingly relevant given the recent expansion of financial products that provide cash-back rewards on debit card and checking account purchases.[1] We study this question using a controlled laboratory experiment in which participants make repeated consumption, saving, and repayment decisions while managing checking, savings, and credit card accounts. The treatment offers the same cash-back rewards on checking account purchases as on credit card purchases, thereby eliminating the rewards-based payment advantage of credit cards while leaving the rational-choice benchmark unchanged.

This question matters because credit card borrowing is both widespread and costly in the United States. As of 2022, 82% of U.S. adults held at least one credit card (GAO, 2023). Between June 2013 and 2019, nearly half of all active credit card accounts carried revolving balances, and from 2018 to 2020 households paid roughly $120 billion in credit card interest and fees, or about $1,000 per household annually (CFPB, 2022).

Additionally, many households simultaneously hold liquid assets and revolving credit card debt, a pattern known as borrower–saver behavior. In a nationally representative 2019 sample, 42% of credit card users held at least $100 in revolving credit card debt and at least $100 in liquid assets (Greene and Stavins, 2022). Our controlled environment is useful for studying this behavior because it provides a known rational-choice benchmark and shuts down three prominent rational explanations for the borrower–saver phenomenon: the need to hold liquid assets for expenditures that cannot be paid by credit card (Telyukova and Wright,

[1] Recent industry reporting notes that airlines, hotel brands, Fintech firms, and smaller banks have introduced debit cards offering cash back, points, and other perks to attract consumers who prefer not to rely on credit; see, for example, Moise (2025). Appendix C1 provides examples of such programs.

2008; Telyukova, 2013; Boutros and Mijakovic, 2024), preemptive borrowing in anticipation of a declining credit limit (Fulford, 2015), and the use of credit card debt to control spouses' impulsive spending (Bertaut et al., 2009; Vihriälä, 2025).[2]

Our decision environment captures the monthly financial decisions of a young worker over a ten-year period, from ages 25-34. Participants manage three financial accounts—checking, savings, and credit card—while making consumption, saving, and debt-repayment decisions over 120 periods, with each period corresponding to one month. Participants are assigned to exogenous employment-status paths that determine their monthly endowment income. Before making decisions in each period, they observe their current employment status, endowment income, and account balances. The control environment is calibrated to reflect common real-world conditions: the checking account pays no interest, the savings account earns a 2% annual percentage rate (APR), and the credit card carries a 17% APR as well as late and returned-payment fees. If a participant fails to make the minimum payment for two consecutive months, the credit card APR rises to a 30% penalty rate. Credit card purchases earn 2% cash-back rewards.

We calibrate the control environment to U.S. economic conditions during 2018–2019 and randomly assign participants to one of two income paths. In the employment-first (EF) path, participants begin employed, and credit card borrowing is not optimal. In the unemployment-first (UF) path, participants begin unemployed, making temporary borrowing optimal early on. Period consumption is converted into monetary earnings through a known concave function, and participants receive a terminal payment based on their final net worth—defined as accumulated checking and savings balances minus outstanding credit card debt—converted into monetary earnings through a second concave function. Together, these induced utility functions generate unique rational-choice predictions that serve as benchmarks for evaluating participants' behavior.

The treatment modifies the control environment along a single dimension: checking-account purchases earn the same cash-back rewards as credit-card purchases.[3] In the control environment, credit cards have an exclusive rewards advantage for purchases. In the treatment environment, that advantage is eliminated. Participants can therefore earn the same

[2]Gathergood and Olafsson (2024) and Batista et al. (2025) show that mental accounting can lead individuals to allocate different types of purchases across financial accounts, generating borrower–saver behavior. In our environment, however, consumption is fully fungible across payment methods, ruling out this behavioral channel.

[3]An alternative treatment would remove cash-back rewards on credit card purchases. We do not implement this design because it alters the optimal benchmark and may induce loss-aversion-driven behavior. Participants accustomed to such rewards may reduce credit card use due to perceived losses, rather than because checking account purchases become equally attractive.

rewards while using checking for routine purchases and reserving credit cards primarily for borrowing.

We find that participants assigned to the EF path behave largely in line with the rational-choice benchmark, and the treatment has no significant effect on behavior. In contrast, participants assigned to the UF path borrow more than predicted by rational-choice theory and are more likely to exhibit borrower–saver behavior. Providing cash-back rewards on checking account purchases substantially mitigates these deviations. Among those assigned to the UF path, over the course of the experiment, average credit card interest and fee charges—our primary outcome variable—are approximately 82 points per period lower in the treatment relative to the control. This decrease corresponds to about 6% of the endowment received in the unemployment state. Significant treatment effects also emerge across all four secondary outcome variables: revolving balances, penalty interest, fees, and a borrower–saver index.

A heterogeneity analysis indicates that the treatment effect is concentrated among participants who report that they typically do not carry credit card balances in real life, i.e., "real-world non-revolvers". Under the EF path, non-revolvers rarely carry debt, and consequently the treatment has little effect. Under the UF path, however, most non-revolvers initially carry credit card balances in the early periods to smooth consumption, and the treatment reduces their average credit card interest and fees by 101 points.

This paper relates to three strands of literature. First, it contributes to work showing that consumers' payment choices respond to cash-back rewards. Agarwal et al. (2023) show that, relative to otherwise similar classic credit cards, reward cards increase spending and unpaid credit balances, especially among lower-FICO consumers, suggesting that rewards affect both payment choice and indebtedness. We complement this evidence by asking whether adding rewards to checking account (debit) purchases, thereby making such purchases more competitive with rewards-based credit cards, shifts spending away from credit cards and improves borrowing outcomes. We find that, under both the EF and UF paths, cash-back rewards on checking account purchases significantly reduce the amount of consumption charged to credit cards. In contrast to Agarwal et al. (2023), our laboratory environment uses induced utility and a fully specified intertemporal decision problem, allowing us to know the benchmark for optimal borrowing behavior directly.

Second, a growing body of field experimental research highlights the substantial influence of nudges, defaults, and moral incentives on credit card payment behavior. For example, Keys and Wang (2019) and Wang (2024) show that modifications to minimum payment formulas

and automated payment setups can significantly affect repayment behavior. Bursztyn et al. (2019) find that invoking moral norms can reduce delinquency rates and promote more responsible debt management, while Guttman-Kenney et al. (2025) find that shrouding the autopay minimum option does not significantly reduce credit card debt. Medina and Pagel (2025) find that nudging households to save more exacerbates the co-holding of low-interest savings and high-interest debt. Recent work also explores novel mechanisms for improving repayment outcomes. Donnelly et al. (2024) find that allowing consumers to allocate payments toward specific purchases significantly increases overall repayment. Roll et al. (2024) show that targeted reminder interventions can effectively reduce debt payment delinquencies. Our contribution is to study, in a controlled setting, an emerging and policy-relevant intervention—cash-back rewards on checking account purchases—that may improve debt outcomes by weakening the rewards advantage of credit cards.

The final strand of the literature uses laboratory experiments to study life-cycle financial decisions; see Arifovic and Duffy (2018) for a survey. Related studies examine consumption, saving, borrowing, and default in laboratory settings (Duffy and Li, 2019; Meissner, 2016; Ahrens et al., 2022; Pavan and Barreda-Tarrazona, 2020). Within this literature, only a few papers (Amar et al., 2011; Hirshman and Sussman, 2022; Gärtner et al., 2023; Bague-Sampson, 2025) explicitly study credit card borrowing and repayment behavior. They find that human participants deviate significantly from the predictions of rational choice theory—for example, exhibiting borrower–saver patterns and failing to follow optimal repayment strategies. Our study builds on and extends this literature in several important ways. First, we develop a user interface that closely resembles the decision-making process that households face in the real world. Second, our environment combines incentives to smooth consumption across periods with incentives to save for the future—two considerations that closely mirror real-world financial decision-making. Third, our decision task spans a longer time horizon than other studies, allowing us to capture both the short-term and long-term effects of the treatment interventions.

2 Theoretical Framework

Time is divided into discrete periods, with each period representing one month. Individuals live for a finite horizon of J periods. In period j, an individual receives an endowment $e_j(z_j)$, where z_j is an idiosyncratic endowment shock that follows a two-state Markov process with transition probabilities $\Pi(z_j, z_{j+1})$. The endowment represents after-tax income net of

essential expenses, such as rent and utilities, which cannot be financed using credit cards.

Each period has two decision phases, indexed by $k = 1, 2$, matching the timing of the experimental environment. Let

$$\mathbf{b}_{j,k} = \left(b_{j,k}^{chk}, b_{j,k}^{sav}, b_{j,k}^{cc}\right), \qquad k = 1, 2,$$

denote the vector of checking ($b_{j,k}^{chk}$), savings ($b_{j,k}^{sav}$), and credit card balances ($b_{j,k}^{cc}$) at the end of phase k in period j. The credit card balance represents credit card borrowing and must be non-negative.

At the beginning of phase 1, the individual observes the state

$$s_{j,1} = \left(\mathbf{b}_{j-1,2}, \eta_j, z_j, l_{j-1}, f_{j-1}\right),$$

where $\mathbf{b}_{j-1,2}$ is the balance vector carried over from the previous period, η_j is the fraction of the current-period endowment deposited into checking, with the remaining share, $1 - \eta_j$, deposited into savings. z_j is the current endowment shock, l_{j-1} records the number of consecutive periods before period j in which the individual missed the minimum payment, and f_{j-1} denotes fees carried over from the previous period. In the initial period, η_1 is chosen before the phase 1 consumption decision. In subsequent periods, this choice is carried forward unless actively changed.

In phase 1, the individual chooses consumption purchases made from checking, c_j^{chk}, consumption purchases charged to the credit card, c_j^{cc}, and a transfer $t_{j,1}$ from checking to savings. A negative value of $t_{j,1}$ represents a transfer from savings to checking. Purchases made from checking earn the cash-back reward ζ^{chk}, while purchases made with the credit card earn ζ^{cc}. In the control, $\zeta^{cc} > \zeta^{chk} = 0$, while in the treatment, the checking reward is raised to match the credit card reward. The phase 1 problem is

$$V_j(s_{j,1}) = \max_{c_j^{chk}, c_j^{cc}, t_{j,1}} \left\{u(c_j^{chk} + c_j^{cc}) + W_j(s_{j,2})\right\}, \tag{1}$$

where $s_{j,2}$ is the phase 2 state implied by the phase 1 choices and the phase 1 laws of motion.

In phase 2, the individual receives the credit card statement, observes the required minimum payment, and chooses credit card payments from checking and savings, transfers between checking and savings, and the fraction of next period's endowment to deposit into

checking. The phase 2 state is

$$s_{j,2} = (\mathbf{b}_{j,1}, m_j, \eta_j, z_j, l_{j-1}),$$

where $\mathbf{b}_{j,1}$ is the balance vector carried over from phase 1 and m_j is the required minimum credit card payment. The minimum payment is observed only after the credit card statement arrives in phase 2. Let ap_j^{chk} and ap_j^{sav} denote automatic credit card payments made from checking and savings, respectively, and let mp_j^{chk} and mp_j^{sav} denote manual credit card payments made from checking and savings. Manual payments must be chosen each period, whereas automatic payment settings carry over unless the individual updates them. Let $t_{j,2}$ denote the phase 2 transfer from checking to savings, with a negative value representing a transfer from savings to checking. Finally, η_{j+1} denotes the fraction of next period's endowment deposited into checking. The phase 2 problem is

$$W_j(s_{j,2}) = \max_{ap_j^{chk}, ap_j^{sav}, mp_j^{chk}, mp_j^{sav}, \eta_{j+1}, t_{j,2}} E_j \left[V_{j+1}(s_{j+1,1}) \right], \tag{2}$$

where $s_{j+1,1}$ is the next period's phase 1 state implied by the phase 2 choices, payment processing rules, fees, account balances, the endowment allocation choice η_{j+1}, and the transition of the endowment shock according to $\Pi(z_j, z_{j+1})$.

The full recursive formulation, including the choice sets, account balance laws of motion, payment processing rules, fee rules, and terminal value, is given in Appendix A. The rational-choice benchmark used in the experiment is obtained by solving this finite-horizon dynamic problem under the parameterization described below.

3 Parameterization and Experimental Design

3.1 Parameterization

Participants make decisions over $J = 120 = 12 \times 10$ periods, corresponding to a ten-year financial planning horizon at monthly frequency from ages 25-34. This monthly interpretation is a modeling device: in the experiment, periods occur sequentially without any real-time delay between them, and the theoretical benchmark therefore does not include discounting across periods. For simplicity, the balances of all three accounts are initialized at zero, consistent with Survey of Income and Program Participation (SIPP) evidence that median net worth is very low at the start of this age range.

To calibrate the income process, we use the 2018 and 2019 SIPP panels for labor-force participants aged 25 to 34, excluding later panels because they may be affected by the COVID-19 pandemic. A respondent is classified as employed if he or she is paid for all weeks in a month. The probability of transitioning from employment to unemployment is 2 percent, and from unemployment to employment is 26 percent. These transition probabilities imply an average unemployment duration of 16.7 weeks and a median duration of 13 weeks, broadly in line with Bureau of Labor Statistics estimates for the same age group in 2018. The experimental endowment is constructed to match median after-tax income net of essential expenses, such as rent, mortgage payments, and utilities, which are generally not paid using credit cards: approximately 1,400 when unemployed and 2,800 when employed.[4]

The interest rate on the savings account is set to 2%, consistent with rates offered by high-yield savings accounts in 2018.[5] The initial interest rate for credit card borrowing is set to 17%, which matches the average rate for the year 2018, as reported by the Consumer Financial Protection Bureau. Following industry practice, the minimum payment is set at 1% of the statement balance plus interest and fees. If an individual fails to meet the minimum payment requirement for two consecutive months, the interest rate increases to the penalty rate of 30%. Both late payment and returned payment fees are set to 40. The credit limit is 20,000, a rounded figure approximating the average credit limit of $20,647 for Millennials (individuals aged 23-38) based on Experian data from Q2 2019. The credit card cash-back rate is set at 2%, consistent with rates offered by several major banks on unlimited cash-back cards, such as Citi, Wells Fargo, and PNC. Reflecting the current practices of the leading financial institutions, the control arm assumes no cash-back rewards for purchases made using checking accounts.

The period utility function $u(\cdot)$, illustrated in Appendix B, is defined as:

$$u(c_j^{chk} + c_j^{cc}) = \begin{cases} 0.4(1 - e^{-\frac{c_j^{chk} + c_j^{cc} - 2000}{800}}) & \text{if } c_j^{chk} + c_j^{cc} \geq 2000 \\ 0.0005(c_j^{chk} + c_j^{cc} - 2000) & \text{otherwise} \end{cases}$$

Here, 2,000 represents the minimum consumption required to meet basic needs. As explained to our participants, consuming below this threshold leads to an "unpleasant sacrifice." The penalty for sub-threshold consumption is applied linearly at a rate approximating

[4] In the experiment, endowment, consumption, and account balances are all expressed in terms of "points". We convert points into dollar earnings at a fixed rate as explained below.

[5] See `https://www.cnbc.com/2019/01/08/high-yield-savings-account-can-now-outperform-the-market-.html`.

the marginal utility at the 2,000 threshold. This formulation increases the penalty for very low levels of consumption while ensuring that the maximum loss per period does not exceed \$1.

To encourage long-term savings, participants' final net worth is converted into a terminal payment equivalent to nine months of equal consumption. This incentive allows the model to generate a median final net worth of 24,678, closely matching the empirical estimate of \$25,760 from the SIPP.

3.2 Experimental Treatments

The control arm is designed to capture the financial environment of a young individual with access to both checking and savings accounts, a relatively high credit limit, and cash-back rewards on credit card purchases. The treatment arm differs from the control only by offering equivalent rewards on checking account purchases. The random assignment of participants to the two different income paths, EF and UF, allows us to examine whether early liquidity stress has persistent effects on borrowing and repayment behavior. We set the total number of unemployment periods to match the average duration implied by the income process, conditional on the initial state: 8 periods for the EF path, occurring in periods 22–26 and 106–108, and 12 periods for the UF path, occurring in periods 1–4, 20–22, and 88–92.

Figure 1 plots the two income paths together with the associated optimal consumption and net worth profiles. Under the EF path, borrowing is never optimal. Under the UF path, by contrast, it is optimal to use credit card debt to smooth consumption during the initial unemployment spell, with debt peaking at 3,345 at the end of period 4. Once employment begins, this debt is gradually repaid, and net worth turns positive in period 12.

Regardless of the income path assignment, it *is* optimal to use a credit card for consumption expenditures in the control arm.[6] Along the EF path, the optimal strategy is to automatically pay the statement balance in full from the outset, requiring no further adjustments. Along the UF path, the optimal strategy is to set a fixed payment equal to the period endowment for the first 11 periods and then switch to paying the full statement balance. It is never optimal to be a borrower–saver, i.e., to hold liquid assets in the checking or savings account while simultaneously carrying positive credit card debt.

[6] Although equal cash-back rewards remove the direct reward advantage of credit card purchases, using the credit card may still be more convenient in the treatment arm. With autopay from savings, participants can keep liquid assets in the interest-bearing savings account, whereas using the checking account for consumption requires maintaining non-interest-bearing balances in the checking account.

3.3 Experimental Procedures

Participants were recruited through Prolific. Eligibility was restricted to U.S. residents aged 25–34 who were fluent in English and reported having at least one credit card. Participants were randomly assigned, in a between-subjects design, to one of two treatment arms and one of two income paths: employment first (EF) and unemployment first (UF). The experiment was computerized and implemented in oTree (Chen et al., 2016).

The experiment began with an instruction phase and a comprehension quiz, followed by a single life-cycle decision sequence lasting 120 periods. Appendix B presents the experimental instructions and screenshots for the treatment arm, with differences from the control arm highlighted in red boxes. Final payment consisted of earnings from the main decision task and from the risk elicitation task.[7]

Each period consisted of two decision screens. On the first screen, shown in Appendix Figure B2, participants observed their current employment status, endowment income, and their allocation of that endowment between checking and savings. They also saw a reminder of the transition probabilities governing future employment status. Before period 1, participants chose a direct-deposit allocation for their endowment (Appendix Figure B1). They could revise this allocation at any time via the direct-deposit tab in the top bar, which also provided access to the bank account login page and experimental instructions. Participants then chose how much to consume using either their checking account or their credit card. Since period earnings depended on total consumption, a "calculate" button allowed them to preview how alternative consumption choices affected both their current-period and cumulative earnings before submitting a final decision. To capture potential habit formation, consumption fields defaulted to the previous period's choices, with an initial default of zero consumption in period 1.

The second screen, shown in Appendix Figure B3, displayed the participant's credit card balance, cash-back rewards, minimum payment due, scheduled payments, and, in the treatment arm, their checking account cash-back rewards. Participants were not required to take any action on this screen, but they were instructed that they could log into their bank account to make credit card payments. As shown in Appendix Figure B7, they could make up to two manual payments per period, one from checking and one from savings. They could also choose one of three automatic payment options: the minimum payment, the full statement balance, or a fixed custom amount, with withdrawals from either a checking or savings account. If the fixed custom amount was below the required minimum payment,

[7] To meet Prolific's minimum wage requirement, we guaranteed a payment floor of $18.

it was automatically adjusted upward; if it exceeded the statement balance, it was reduced accordingly. Automatic payment choices took effect immediately and remained active until changed. When participants clicked "Proceed to Next Period," they received an alert if they had missed a minimum payment or triggered a returned payment.

The design deliberately preserves several sources of complexity that are central to real-world financial decision-making. First, participants had to log into their bank account to transfer funds, make credit card payments, and access past statements. Usernames and passwords were simple and provided in the instructions, but forgotten login information could only be recovered later by completing a small task. Second, consistent with industry practice, credit card accounts included fees for returned payments and missed minimum payments, as well as penalty interest rates after consecutive missed minimum payments. These terms were introduced in the instructions and reiterated through on-screen alerts when relevant. Third, the decision screen made cash-back rewards highly salient, reflecting the way financial institutions often emphasize rewards in communications to consumers. Finally, participants' final net worth was converted into an additional monetary payment to create incentives to save for major long-term financial goals such as a down payment for a house or a child's education. Participants were shown a real-time projection of this payment based on current net worth during the final 36 periods.[8]

At the end of the session, participants completed the Bomb Risk Elicitation Task (Crosetto and Filippin, 2013), four Cognitive Reflection Test (CRT) questions (Frederick, 2005; Toplak et al., 2014), and three financial-literacy (FL) questions (Lusardi and Mitchell, 2011). Only the risk-elicitation task was incentivized. We also collected demographic information, including age, gender, employment status, education, income, and credit card payment habits. Appendix B.3 provides further details on the end-of-experiment questionnaire.

4 Findings

We recruited 100 participants from Prolific and randomly assigned them to the two treatment arms, which differed only in the availability of cash-back rewards on checking account purchases. We further randomly assigned participants to either the EF or UF income paths. The experimental protocol was pre-registered on AsPredicted.[9] Appendix Table C2 reports

[8] As net worth below 18,000 points implied a negative separate payment, to avoid discouraging participants early in the task, we withheld the calculation in earlier periods.

[9] The pre-registered plan also included an additional treatment arm without a savings account. This arm required several related changes to the decision environment and is therefore less directly comparable to

participant characteristics by treatment; no between-treatment differences are significant at the 5% level. As reported in Table C4, participants are actively engaged in the decision task. For example, they frequently log in to their bank account and they repeatedly choose consumption levels that differ from their defaults. None of the attention measures varies significantly across treatment conditions.

The primary outcome is credit card interest and fees, which measure the direct monetary cost of revolving credit. This outcome also serves as the gatekeeper for confirmatory analysis of secondary outcomes: revolving balances, penalty interest, fees, and a borrower–saver index. Following Anderson (2008), we summarize borrower–saver behavior with an index combining three measures: (i) borrower–saver status, (ii) whether the participant carries credit card debt despite sufficient assets to repay it, and (iii) the net interest cost associated with this behavior. The index is normalized to have mean zero in the control arm. The corresponding weights on the three components are 0.23, 0.41, and 0.36. We conduct confirmatory analysis of the individual components only if the treatment has a significant effect on the overall index.

Figure 2 presents the average value of our primary outcome variable—credit card interest and fee charges—by period, treatment, and income path. As the figure reveals, for the EF path, the treatment and control groups have very similar trends. However, for participants assigned to the UF path, average credit card interest and fee charges begin to diverge after the first unemployment spell, with interest and fees approximately 100 points higher in the control relative to the treatment. Appendix Figure C1 displays the trends for the four secondary outcome variables, and similarly shows evidence of a strong treatment effect under the UF path.

To formally quantify these treatment effects, we use the following regression specification

$$y_{isj} = \text{Const.} + \beta_1 T_i \times EF_s + \beta_2 UF_s + \beta_3 T_i \times UF_s + X_i\zeta + \gamma_j + \epsilon_{isj}. \tag{3}$$

The dependent variable, y_{isj}, denotes the outcome variable for participant i assigned to income sequence s in period j. The indicator T_i equals one in the treatment arm, while EF_s and UF_s indicate assignment to the EF and UF income paths, respectively. The vector X_i includes individual controls, such as CRT and FL, each normalized by subtracting the

the other arms. We focus the main analysis on the two arms that vary only the cash-back incentive while preserving a common environment. Results including the additional treatment arm are reported in Appendix Table C3. Relative to the control, this arm does not generate statistically significant effects on the primary outcome for either income path.

median values.[10] The term γ_j denotes age fixed effects. Robust standard errors are clustered at the participant level.

As reported in Table 1 (columns 1-4), the treatment does not significantly affect the deviation of credit card interest and fee charges from theoretical predictions for participants assigned to the EF path. For those assigned to the UF path, however, the treatment reduces this deviation by 82 points, more than fully offsetting the effect of assignment to the UF path (col. 1). This decrease amounts to about 6% of the endowment received in the unemployment state. Similarly, revolving debt (col. 2) does not deviate significantly from the theoretical prediction for those on the EF path. In contrast, assignment to the UF path increases revolving debt in the control arm by an average of 3,037 points, more than twice the monthly endowment received in the unemployment state. The treatment arm almost fully eliminates this increase. Participants assigned to the EF path do not pay significantly more penalty interest than the theoretical prediction of zero (col. 3). In the control arm, penalty interest rises by an average of 34 points per period under the UF path. Once again, the treatment more than fully offsets this increase. Fees paid are significantly higher than the theoretical prediction of zero for all treatment and income paths (col. 4). As with the previous outcomes, fees are higher in the control arm under the UF path, and are significantly reduced by the treatment.

Table 1 columns 5-8 report treatment effects on measures of borrower–saver behavior. These include the Anderson index (col. 5) and its three components (cols. 6–8). In the control arm under the EF path, participants display borrower–saver behavior in 36% of periods. In 15% of periods, they hold sufficient assets to fully repay their debt, though the associated interest cost is not statistically different from zero. Consistent with the other outcomes, the treatment has no significant effect for participants assigned to the EF path. For those assigned to the UF path, however, the treatment almost fully offsets the effect of being assigned to the UF path on all four measures of borrower–saver behavior. Notably, for participants assigned to the UF path, the cost of being a borrower–saver averages 57 points in the control arm—equivalent to 4% of the endowment received in the unemployment state—but declines to an insignificant 2 points in the treatment arm. This suggests that most of the increase in interest and fees observed in the control arm under the UF path is avoidable by using liquid assets to pay down credit card debt. The treatment primarily operates by steering some participants away from co-holding liquid assets and credit card debt.

Panel A of Table 2 reports additional outcomes that capture other dimensions of partici-

[10] Appendix Table C5 reports estimates with additional controls and shows similar treatment effects.

pant behavior and help place the treatment effects in Table 1 in context. The treatment does not affect total consumption under either income path (col. 1). Instead, it shifts purchases away from credit cards (col. 2) and toward checking accounts. As the treatment provides equivalent cash-back rewards for checking account purchases, more cash-back rewards are earned (col. 3). The treatment leads to a statistically insignificant reduction in checking account balances, as participants purchase more consumption using their checking account (col. 4). However, under the UF path, the treatment significantly raises savings account balances by 9,031 points, increases the likelihood of paying credit card balances in full (PIF) by 25 percentage points and narrows the gap between the payment and credit card statement balance by 2,984 points (cols. 5-7).

Panel B of Table 2 reports the treatment effect on several individual-level outcome variables. Participants assigned to the UF path accumulate 21,060 points less in final net worth, but the treatment more than fully offsets this reduction (col. 8). There is no significant treatment effect on cumulative utility from consumption, total utility, the probability that participants ever use a credit card, or the probability of always PIF (cols. 9-12). But the treatment marginally increases the probability of PIF for the last 60 periods by 24 percentage points among those assigned to the UF path (col. 13). On average, participants in the control arm spend 15 periods in debt in the EF path. In the UF path, they spend 35 more periods in debt, and the treatment reduces this number by 30 periods (col. 14).

To identify which participants drive the treatment effects, we conduct a heterogeneity analysis conditioning on pre-existing attitudes toward credit card debt. We proxy for these attitudes using participants' self-reported real-world repayment behavior, distinguishing between "real-world revolvers"—respondents who answer "no" to our question: *"Do you typically pay your credit card balance in full each month?"*—and "real-world non-revolvers". Specifically, we estimate

$$\begin{aligned} y_{isj} =& \text{Const.} + \beta_1 T_i \times EF_s \times R_i + \beta_2 UF_s \times R_i + \beta_3 T_i \times UF_s \times R_i + \beta_4 NR_i \\ &+ \beta_5 T_i \times EF_s \times NR_i + \beta_6 UF_s \times NR_i + \beta_7 T_i \times UF_s \times NR_i + X_i\zeta + \gamma_j + \epsilon_{isj}. \end{aligned} \quad (4)$$

Here, $R_i = 1$ denotes real-world revolvers, who comprise 27% of the sample (see Appendix Table C2), and $NR_i = 1 - R_i$ denotes real-world non-revolvers. As shown in Table 3, the treatment effects on both primary and secondary outcomes are concentrated among real-world *non-revolvers* assigned to the UF path. In particular, under the UF path, the treatment reduces average credit card interest and fees among non-revolvers by 101 points.

As shown in Appendix Figures C2 and C3, under the UF path, the divergence in interest

and fee charges between non-revolvers and revolvers emerges after the transition to employment. To examine how the treatment affects behavior and facilitates debt repayment during this first employment spell, periods 5–19, Appendix Table C7 reports mean outcomes for several payment and consumption decisions by real-world revolver status for these periods. The key outcome is the difference between current credit card payments and new credit card charges since the previous payment (second-to-last line). Among real-world revolvers, the treatment reduces credit card consumption by over 900 points (marginally significant), but does not increase payments relative to new charges. By contrast, among real-world non-revolvers, the treatment significantly increases payments relative to new charges by 406 points. Of this increase, approximately 63% (= 254.46/406.53) is attributable to lower consumption, 21% (= 86.94/406.53) to higher payments, and the remainder to reduced interest and fees.

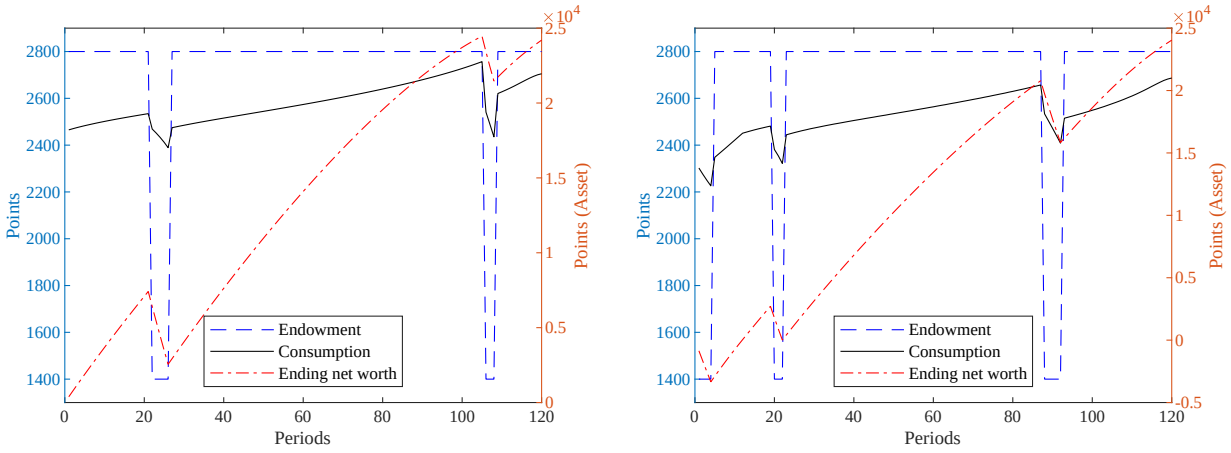
These results suggest that eliminating the rewards advantage of credit cards helps participants who usually avoid revolving debt repay their balances more quickly particularly after the UF path induces them to borrow early in the experiment.[11] By contrast, the treatment has little effect on participants who are more comfortable carrying revolving debt. One possible interpretation is that when rewards can be earned equally through checking account purchases, the credit card becomes less psychologically associated with routine spending and more strongly associated with outstanding debt obligations. This can lead non-revolvers to repay their debt more quickly.

5 Conclusion

We use a controlled laboratory experiment to study how cash-back rewards on credit card and checking account purchases affect household financial decisions in an environment designed to capture key features of real-world consumption, saving, and borrowing decisions. We find that offering cash-back rewards on checking account purchases reduces credit card debt and associated interest and fee charges under the UF path. The effect is driven by real-world non-revolvers: for these participants, the treatment facilitates faster deleveraging after the transition into employment. The external validity of these findings depends on two competing considerations. On the one hand, only some households begin working life in unemployment and rely on credit cards to smooth consumption during an initial income shortfall. On the

[11] As reported in Appendix Table C6, real-world non-revolvers assigned to the EF path repay their balances in full in 83% of periods, indicating that they largely avoid borrowing in the control arm and therefore have limited scope for further debt reduction under the treatment.

other hand, many households also carry other forms of debt, such as student loans, auto loans, or mortgages, which are abstracted from our experimental environment. Managing multiple debt obligations during negative income shocks may increase reliance on credit card borrowing and may therefore amplify the relevance of transaction-account incentives. These considerations suggest several directions for future research. One is to study credit card behavior in laboratory environments where participants face multiple debt obligations, rather than credit card debt alone. Another is to use administrative data to examine the real-world effects of cash-back debit or checking account rewards, which are becoming more prevalent. Future experimental work could also examine how reward design affects borrowing and repayment behavior, including the salience, timing, liquidity, and framing of rewards as cash-back, points, miles, or statement credits. We leave these extensions to future research.



(a) Employment First (EF)

(b) Unemployment First (UF)

Figure 1: Optimal decisions conditional on initial conditions

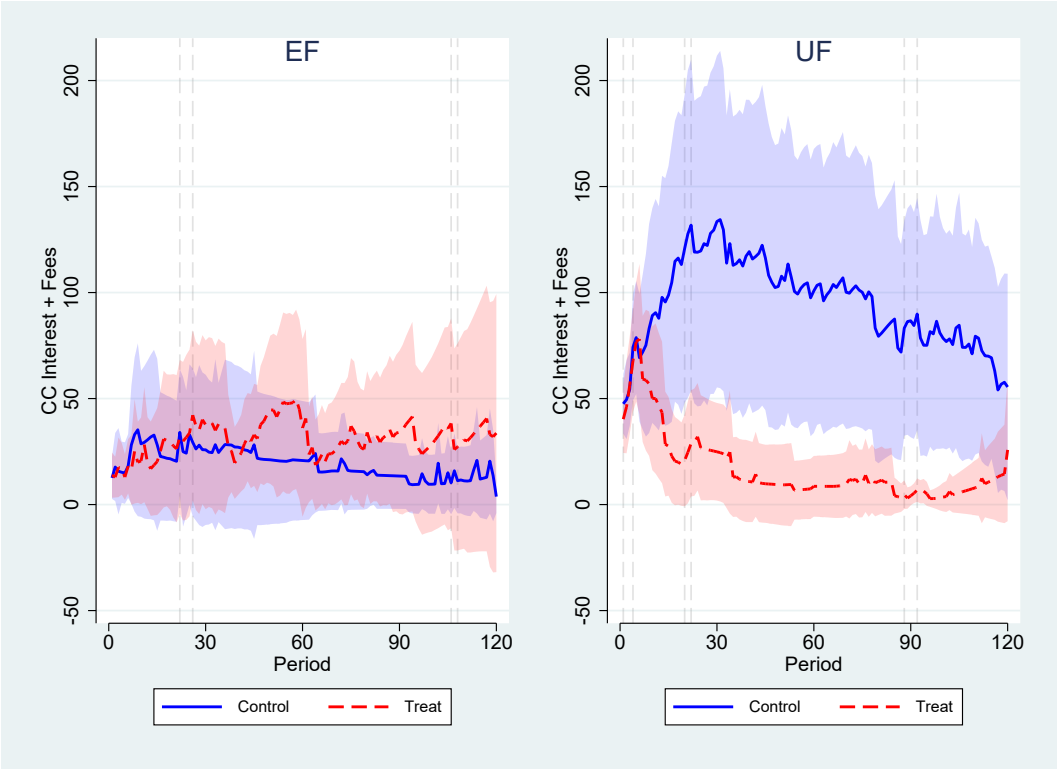


Figure 2: Average Credit Card Interest and Fees by Treatment and Income Path

Note: Shaded areas indicate the 95% confidence interval of the mean.

Table 1: Treatment Effect on Credit Card Costs and Borrower–Saver Behavior

	Deviation from Theory				Borrower–Saver Outcomes			
	Interest + Fees (1)	Revolving Debt (2)	Penalty Interest (3)	Fees (4)	Anderson Index (5)	B–S Ind. (6)	Suff. Assets (7)	Interest Cost (8)
Cons	-1.68	-89.96	-4.73	4.33***	-0.19*	0.36***	0.15**	1.32
	(10.81)	(498.63)	(4.36)	(0.98)	(0.11)	(0.07)	(0.06)	(7.53)
T×EF	14.60	624.33	3.73	2.01	0.25	0.11	0.13	16.94
	(16.18)	(706.05)	(6.47)	(1.40)	(0.18)	(0.09)	(0.09)	(13.76)
UF	79.40***	3036.79***	34.48***	1.80***	0.50**	0.28***	0.12	55.59**
	(27.32)	(1106.39)	(11.66)	(0.60)	(0.20)	(0.09)	(0.09)	(22.53)
T×UF	-81.56***	-2985.44**	-37.73***	-1.43**	-0.49**	-0.24**	-0.14*	-54.75**
	(27.45)	(1161.45)	(11.33)	(0.56)	(0.20)	(0.09)	(0.08)	(22.89)
CRT	0.53	-50.19	0.88	0.36	-0.01	-0.01	-0.01	0.51
	(5.25)	(218.66)	(2.17)	(0.33)	(0.05)	(0.03)	(0.02)	(4.02)
FL	-34.24**	-1441.69**	-12.88**	-0.88	-0.16*	-0.14***	-0.04	-10.40
	(13.91)	(573.51)	(6.09)	(0.58)	(0.09)	(0.05)	(0.05)	(8.01)
R^2	0.1506	0.1312	0.1636	0.0318	0.0844	0.1461	0.0407	0.0845

Note: This table reports estimates from Equation (3). Columns (1)–(8) report, respectively, deviations of credit card interest and fees, deviations of revolving balances, penalty interest, fees, the Anderson borrower–saver index, a borrower–saver indicator, an indicator for assets exceeding debt, and the interest cost of borrower–saver behavior. Standard errors are clustered at the participant level. $N = 12,000$ *** p<0.01, ** p<0.05, and * p<0.10.

Table 2: Treatment Effects on Other Variables

Panel A: Other Individual × Period Outcomes

	Total Cons. (1)	CC Cons. (2)	Cash Back (3)	Checking Bal. (4)	Savings Bal. (5)	PIF (6)	Pay-Bal. (7)
Cons	2258.33***	1544.43***	28.95***	4060.16*	2124.02	0.62***	-642.39
	(44.97)	(192.21)	(3.75)	(2219.94)	(2331.22)	(0.07)	(503.52)
T×EF	-0.14	-546.98**	18.37***	-4232.47	5373.94	-0.11	-622.32
	(51.73)	(246.25)	(3.81)	(2979.89)	(3831.96)	(0.09)	(705.37)
UF	25.88	-529.32**	-10.49*	-4000.24	-6654.02**	-0.29***	-3198.71***
	(52.36)	(266.60)	(5.32)	(3116.02)	(3119.85)	(0.09)	(1106.07)
T×UF	-55.47	-380.38	28.55***	-1566.35	9031.27***	0.25***	2984.00**
	(52.17)	(237.40)	(3.88)	(1989.86)	(2817.65)	(0.09)	(1161.14)
CRT	-36.31**	-66.78	-1.77*	960.15	1756.14*	0.01	50.55
	(14.06)	(64.07)	(1.04)	(690.93)	(914.33)	(0.03)	(218.49)
FL	40.01	218.88*	4.27**	-643.80	1436.89	0.14***	1440.81**
	(25.75)	(125.69)	(1.63)	(920.50)	(1624.09)	(0.05)	(573.23)
R^2	0.0237	0.1122	0.3780	0.1087	0.3727	0.1532	0.1347

Panel B: Individual-level Outcomes

	Final Net Worth (8)	Cons. Utility (9)	Total Utility (10)	No CC Use (11)	PIF Always (12)	PIF Last 60 (13)	Debt Periods (14)
Cons	46562.64***	14.56***	17.38***	0.08	0.38***	0.71***	15.36**
	(4792.26)	(1.52)	(1.43)	(0.05)	(0.10)	(0.10)	(7.11)
T×EF	1577.94	-0.98	-0.93	-0.03	-0.11	-0.20	12.84
	(6498.72)	(1.95)	(1.82)	(0.07)	(0.13)	(0.14)	(11.18)
UF	-21059.58***	-0.72	-4.06*	-0.05	-0.33***	-0.30**	34.71***
	(6397.61)	(2.09)	(2.05)	(0.07)	(0.11)	(0.13)	(11.65)
T×UF	21638.04***	-0.01	2.78	0.05	0.05	0.24*	-29.87***
	(6758.05)	(1.99)	(1.79)	(0.07)	(0.07)	(0.14)	(11.33)
CRT	4439.14**	-1.50***	-1.22**	0.03*	0.02	0.01	-1.47
	(1777.74)	(0.51)	(0.50)	(0.01)	(0.03)	(0.04)	(3.08)
FL	101.59	1.69	2.15***	0.03*	0.08*	0.21***	-17.19***
	(3831.11)	(1.02)	(0.76)	(0.01)	(0.04)	(0.07)	(6.14)
R^2	0.1441	0.0362	0.0919	-0.0079	0.0992	0.0852	0.1274

Note: This table reports estimates from Equation (3). Columns (1)–(7) report, respectively, outcomes measured at the individual × period level: total consumption, credit card consumption, cash-back rewards, checking and savings balances, an indicator for paying credit card balances in full, and payment minus statement balances. Columns (8)–(14) report individual-level outcomes: final net worth, cumulative consumption utility, total utility, indicators for no credit card use, always paying balances in full, paying balances in full in the last 60 periods, and the number of periods with revolving debt. For Panel A, standard errors are clustered at the participant level and N=12,000. For Panel B, regressions exclude age indicators and N=100. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 3: Treatment Heterogeneity by Real-World Revolver Status

	Deviation from Theory				Borrower–Saver Outcomes			
	Interest + Fees	Revolving Debt	Penalty Interest	Fees	Anderson Index	B–S Ind.	Suff. Assets	Interest Cost
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cons	24.93	1319.87	1.99	4.20***	0.07	0.50***	0.26*	21.18
	(28.51)	(1383.83)	(11.89)	(1.08)	(0.25)	(0.14)	(0.14)	(18.33)
T×EF×R	-0.62	352.43	-7.12	1.50	0.27	0.20	0.19	0.32
	(30.75)	(1655.25)	(11.69)	(0.92)	(0.37)	(0.21)	(0.21)	(22.40)
UF×R	6.52	-253.96	8.81	1.32	0.07	0.16	0.02	-5.78
	(38.94)	(1740.37)	(16.34)	(0.81)	(0.31)	(0.18)	(0.18)	(21.00)
T×UF×R	-40.27	-1415.23	-19.14	-1.04	-0.33	-0.28*	-0.14	-14.41
	(30.23)	(1318.84)	(11.98)	(0.64)	(0.26)	(0.17)	(0.15)	(13.95)
NR	-32.31	-1744.66	-7.75	0.21	-0.33	-0.18	-0.15	-23.74
	(28.92)	(1391.19)	(12.13)	(0.73)	(0.26)	(0.14)	(0.15)	(18.34)
T×EF×NR	19.21	744.24	6.52	2.11	0.26	0.09	0.13	21.59
	(18.28)	(714.20)	(7.28)	(1.80)	(0.19)	(0.09)	(0.09)	(16.01)
UF×NR	109.69***	4373.03***	45.54***	2.05***	0.66**	0.32***	0.16	81.47**
	(35.85)	(1431.14)	(15.35)	(0.74)	(0.27)	(0.11)	(0.11)	(31.77)
T×UF×NR	-101.37***	-3741.24**	-46.62***	-1.63**	-0.56**	-0.22**	-0.14	-74.05**
	(36.71)	(1548.36)	(15.26)	(0.74)	(0.27)	(0.11)	(0.10)	(32.23)
CRT	-0.55	-98.02	0.50	0.35	-0.02	-0.01	-0.01	-0.38
	(5.60)	(230.41)	(2.32)	(0.34)	(0.05)	(0.02)	(0.02)	(4.23)
FL	-29.74**	-1261.83**	-10.99*	-0.83	-0.14	-0.14***	-0.04	-6.35
	(12.74)	(537.43)	(5.59)	(0.58)	(0.10)	(0.05)	(0.05)	(8.68)
R^2	0.1811	0.1660	0.1905	0.0323	0.1038	0.1711	0.0576	0.1206

Note: This table reports estimates from Equation (4). Columns (1)–(8) report, respectively, deviations of credit card interest and fees, deviations of revolving balances, penalty interest, fees, the Anderson borrower–saver index, a borrower–saver indicator, an indicator for assets exceeding debt, and the interest cost of borrower–saver behavior. Standard errors are clustered at the participant level. $N = 12,000$ *** p<0.01, ** p<0.05, and * p<0.10.

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Online Appendix (Not Intended for Publication)

A Recursive Problem

This appendix provides the full recursive formulation of the decision problem summarized in Section 2. Time is divided into discrete periods, with each period representing one month. Individuals live for a finite horizon of J periods. In period j, an individual receives an endowment $e_j(z_j)$, where z_j is an idiosyncratic endowment shock that follows a two-state Markov process with transition probabilities $\Pi(z_j, z_{j+1})$. The endowment represents after-tax income net of essential expenses, such as rent and utilities, which cannot be financed using credit cards.

Each period has two decision phases, indexed by $k = 1, 2$, matching the timing of the experimental environment. Let

$$\mathbf{b}_{j,k} = \left(b_{j,k}^{chk}, b_{j,k}^{sav}, b_{j,k}^{cc}\right), \qquad k = 1, 2,$$

denote the vector of checking ($b_{j,k}^{chk}$), savings ($b_{j,k}^{sav}$), and credit card balances ($b_{j,k}^{cc}$) at the end of phase k in period j. Credit card balances represent borrowing and are therefore nonnegative. Let $t_{j,1}$ and $t_{j,2}$ denote transfers from checking to savings in phases 1 and 2, respectively. A negative transfer denotes a transfer from savings to checking. Let $\bar{b}$ denote the credit limit, LF the late-payment fee, RF the returned-payment fee, and $I[\cdot]$ the indicator function.

At the beginning of phase 1, the state is

$$s_{j,1} = \left(\mathbf{b}_{j-1,2}, \eta_j, z_j, l_{j-1}, f_{j-1}\right),$$

where $\mathbf{b}_{j-1,2}$ is the balance vector carried over from the previous period, η_j is the fraction of the current-period endowment deposited into checking, and the remaining fraction, $1-\eta_j$, of the endowment is deposited into savings. z_j is the current endowment shock, l_{j-1} records the number of consecutive periods before period j in which the individual missed the minimum payment , and f_{j-1} denotes fees carried over from the previous period.

In phase 1, the individual chooses consumption purchases made from checking, c_j^{chk}, consumption purchases charged to the credit card, c_j^{cc}, and a transfer $t_{j,1}$ from checking to savings. Purchases made from checking earn the cash-back reward ζ^{chk}, while purchases made with the credit card earn ζ^{cc}. In the control, $\zeta^{cc} > \zeta^{chk} = 0$, while in the treatment, the checking reward is raised to match the credit card reward. The phase 1 problem is

$$V_j(s_{j,1}) = \max_{c_j^{chk}, c_j^{cc}, t_{j,1}} \left\{u(c_j^{chk} + c_j^{cc}) + W_j(s_{j,2})\right\}, \tag{5}$$

where the phase 2 state $s_{j,2}$ is implied by the phase 1 choices and the phase 1 laws of motion below.

The phase 1 choices are subject to

$$-\left[(1 + r^{sav})b_{j-1,2}^{sav} + (1 - \eta_j)e_j(z_j)\right] \leq t_{j,1} \leq b_{j-1,2}^{chk} + \eta_j e_j(z_j), \tag{6}$$

$$0 \leq c_j^{chk} \leq b_{j-1,2}^{chk} + \eta_j e_j(z_j) - t_{j,1}, \tag{7}$$

$$0 \leq c_j^{cc} \leq \max\left\{0, \bar{b} - (1 + r^{cc}(l_{j-1}))b_{j-1,2}^{cc}\right\}. \tag{8}$$

where r^{sav} denotes the savings account interest rate, and $r^{cc}(l_{j-1})$ is the credit card interest rate. Conditions (6)–(7) define the feasible transfer and checking-consumption choices. Condition (8) ensures that new credit card consumption does not cause the balance to exceed the credit limit $\bar{b}$.

The phase 1 laws of motion are

$$b_{j,1}^{chk} = b_{j-1,2}^{chk} + \eta_j e_j(z_j) - t_{j,1} - (1-\zeta^{chk})c_j^{chk}, \tag{9}$$

$$b_{j,1}^{sav} = (1+r^{sav})b_{j-1,2}^{sav} + (1-\eta_j)e_j(z_j) + t_{j,1}, \tag{10}$$

$$b_{j,1}^{cc} = (1+r^{cc}(l_{j-1}))b_{j-1,2}^{cc} + (1-\zeta^{cc})c_j^{cc}. \tag{11}$$

Equations (9)–(11) define the phase 1 account-balance laws of motion. Cash-back rewards are modeled as rebates that reduce the net balance impact of purchases.

At the beginning of phase 2, the individual receives the credit card statement and observes the required minimum payment. The phase 2 state is

$$s_{j,2} = (\mathbf{b}_{j,1}, m_j, \eta_j, z_j, l_{j-1}),$$

where $\mathbf{b}_{j,1}$ is the balance vector carried over from phase 1 and m_j is the required minimum credit card payment. The required minimum payment is 1% of the statement balance plus interest and fees, but cannot exceed the total outstanding balance:

$$m_j = \min\{b_{j,1}^{cc}, 0.01b_{j,1}^{cc} + r^{cc}(l_{j-1})b_{j-1,2}^{cc} + f_{j-1}\}.$$

The phase 2 problem is

$$W_j(s_{j,2}) = \max_{ap_j^{chk}, ap_j^{sav}, mp_j^{chk}, mp_j^{sav}, \eta_{j+1}, t_{j,2}} E_j\left[V_{j+1}(s_{j+1,1})\right], \tag{12}$$

where

$$s_{j+1,1} = (\mathbf{b}_{j,2}, \eta_{j+1}, z_{j+1}, l_j, f_j).$$

The phase 2 choices are subject to

$$ap_j^{chk} ap_j^{sav} = 0, \tag{13}$$

$$m_j \le ap_j^{chk} + ap_j^{sav} \le b_{j,1}^{cc}. \tag{14}$$

$$ap_j^{chk} \ge 0, \qquad ap_j^{sav} \ge 0, \qquad mp_j^{chk} \ge 0, \qquad mp_j^{sav} \ge 0, \tag{15}$$

$$0 \le \eta_{j+1} \le 1, \tag{16}$$

$$-b_{j,1}^{sav} \le t_{j,2} \le b_{j,1}^{chk}, \tag{17}$$

Here ap_j^{chk} and ap_j^{sav} denote automatic credit card payments from checking and savings, respectively, while mp_j^{chk} and mp_j^{sav} denote manual credit card payments from checking and savings. Condition (13) reflects the restriction that automatic payments can be made from at most one account (checking or savings). Condition (14) reflects an adjustment rule: if the selected fixed amount falls below the minimum payment requirement, it is automatically adjusted upward to meet the requirement; if it exceeds the statement balance, it is reduced accordingly. The variable η_{j+1} is the fraction of next period's endowment deposited into checking, with the previous choice carried forward unless actively changed. $t_{j,2}$ is the transfer from checking to savings initiated in phase 2.

Manual payment choices are adjusted so that total intended payments do not exceed the current credit card balance:

$$amp_j^{chk} = \min\left\{b_{j,1}^{cc} - ap_j^{chk} - ap_j^{sav}, mp_j^{chk}\right\}, \tag{18}$$

$$amp_j^{sav} = \min\left\{b_{j,1}^{cc} - ap_j^{chk} - ap_j^{sav} - amp_j^{chk}, mp_j^{sav}\right\}. \tag{19}$$

Here amp_j^{chk} and amp_j^{sav} are the adjusted manual payments from checking and savings, respectively.

The automatic payment is processed before manual payments. Hence, the payments that are actually

processed are

$$fp_j^{chk} = I\left[ap_j^{chk} \leq b_{j,1}^{chk} - t_{j,2}\right] ap_j^{chk} + I\left[ap_j^{chk} + amp_j^{chk} \leq b_{j,1}^{chk} - t_{j,2}\right] amp_j^{chk}, \tag{20}$$

$$fp_j^{sav} = I\left[ap_j^{sav} \leq b_{j,1}^{sav} + t_{j,2}\right] ap_j^{sav} + I\left[ap_j^{sav} + amp_j^{sav} \leq b_{j,1}^{sav} + t_{j,2}\right] amp_j^{sav}. \tag{21}$$

Thus, fp_j^{chk} and fp_j^{sav} denote the credit card payments actually processed from checking and savings, respectively, after taking into account the available balances in each account.

The fee incurred in period j is

$$\begin{aligned} f_j = {} & I\left[fp_j^{chk} + fp_j^{sav} < m_j\right] LF \\ & + I\left[ap_j^{chk} + amp_j^{chk} > b_{j,1}^{chk} - t_{j,2} \text{ or } ap_j^{sav} + amp_j^{sav} > b_{j,1}^{sav} + t_{j,2}\right] RF. \end{aligned} \tag{22}$$

The first term is the late-payment fee, incurred when the processed payments do not meet the required minimum payment. The second term is the returned-payment fee, incurred when intended payments exceed the available balance in the corresponding payment account.

The law of motion for the missed-payment state is

$$l_j = \begin{cases} 2, & \text{if } l_{j-1} = 2, \\ l_{j-1} + 1, & \text{if } l_{j-1} < 2 \text{ and } fp_j^{chk} + fp_j^{sav} < m_j, \\ 0, & \text{otherwise.} \end{cases} \tag{23}$$

Thus, once the individual misses the minimum payment for two consecutive periods, the credit card remains subject to the penalty interest rate.

The end-of-period account balances are

$$b_{j,2}^{chk} = b_{j,1}^{chk} - t_{j,2} - fp_j^{chk}, \tag{24}$$

$$b_{j,2}^{sav} = b_{j,1}^{sav} + t_{j,2} - fp_j^{sav}, \tag{25}$$

$$b_{j,2}^{cc} = b_{j,1}^{cc} - fp_j^{chk} - fp_j^{sav} + f_j. \tag{26}$$

Equations (24)–(26) determine the balance vector $\mathbf{b}_{j,2}$ carried into the next period.

The initial conditions are

$$b_{0,2}^{chk} = 0, \qquad b_{0,2}^{sav} = 0, \qquad b_{0,2}^{cc} = 0, \qquad l_0 = 0, \qquad f_0 = 0. \tag{27}$$

For the terminal period,

$$V_{J+1}\left(s_{J+1,1}\right) = V_{J+1}\left(\mathbf{b}_{J,2}, \eta_{J+1}, z_{J+1}, l_J, f_J\right) = 9 \times u\left(\frac{b_{J,2}^{chk} + b_{J,2}^{sav} - b_{J,2}^{cc}}{9}\right) \tag{28}$$

This formulation creates an incentive for participants to save for financial goals beyond age 35.

B Experimental Instructions and Screenshots

B.1 Instructions for the Treatment Arm

Welcome to this study on how people make economic decisions. This study is expected to take about 90 minutes, so please allow for that amount of time. This study involves a main individual decision-making task and a follow-up questionnaire. Your total earnings will largely depend on how effectively you make consumption and savings decisions in the main task. While a minimum payment of $18.00 is assured, making good strategic decisions can significantly boost your earnings. We encourage you to thoroughly

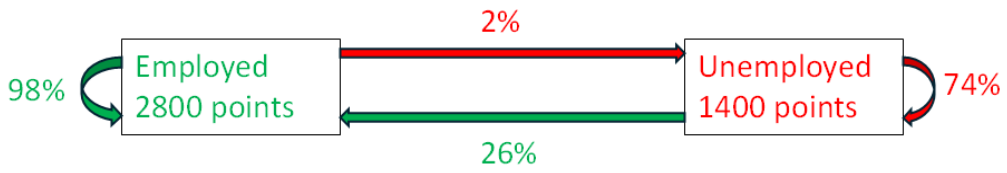
understand the task environment and strategize wisely to maximize your potential rewards.

Each period in the decision task represents one month, simulating financial choices that a young worker faces from ages 25 to 34 (**120 months total**). Your monthly endowment, given in points, depends on your employment status: you receive 2800 points in months/periods in which you are employed and 1400 points in months/periods when unemployed. These amounts are based on the after-tax income minus housing costs for the median U.S. household, but are shown here in **points** instead of dollars. In this study, points aren't the same as dollars—you'll earn real money at the end of the study based on how many points you use for consumption as explained below.

In the first period of the main task, you will be randomly assigned to be either employed (2800 points) or unemployed (1400 points). Thereafter, in all subsequent periods,

- If you are employed (2800 points), there is a 98% chance that you remain employed in the next period and a 2% chance you become unemployed in the next period.
- If you are unemployed (1400 points), there is a 74% chance that you remain unemployed in the next period and a 26% chance that you become employed in the next period.

The figure below illustrates these transition probabilities.



At the start of each period, you will see your current employment status along with this transition probability figure. Employment outcomes are pre-determined based on these transition probabilities.

Throughout the task, you will manage three financial accounts:

1. **Checking Account** – Can be used for consumption and credit card repayments but earns no interest. Purchases made with this account qualify for **2.00% cash back**, automatically applied to your statement balance each month. Credit card payments do not earn cashback.
2. **Savings Account** – Earns an **Annual Percentage Rate (APR) of 2.00%** or 0.17% monthly interest. Can be used for credit card repayments and for savings, but not for consumption.
3. **Credit Card** – Has a **20,000-point limit** and can be used for consumption. Consumption purchased using the credit card qualifies for **2.00% cash back**, which is automatically applied to your statement balance monthly. No interest is charged if your credit card balance is paid in full, but unpaid balances accrue an **APR of 17.00%** (1.42% monthly interest). Additional credit card details will be provided later.

Each period has two screens, both with a top bar for reviewing instructions and accessing your bank account. On the second screen, you can also use the top bar to adjust your direct deposit allocation for future periods—a decision you will set before the first period begins. **To log in to your bank account, use the username of "s" and the password "r". Write this down now, as retrieving it later will require completing a small task.**

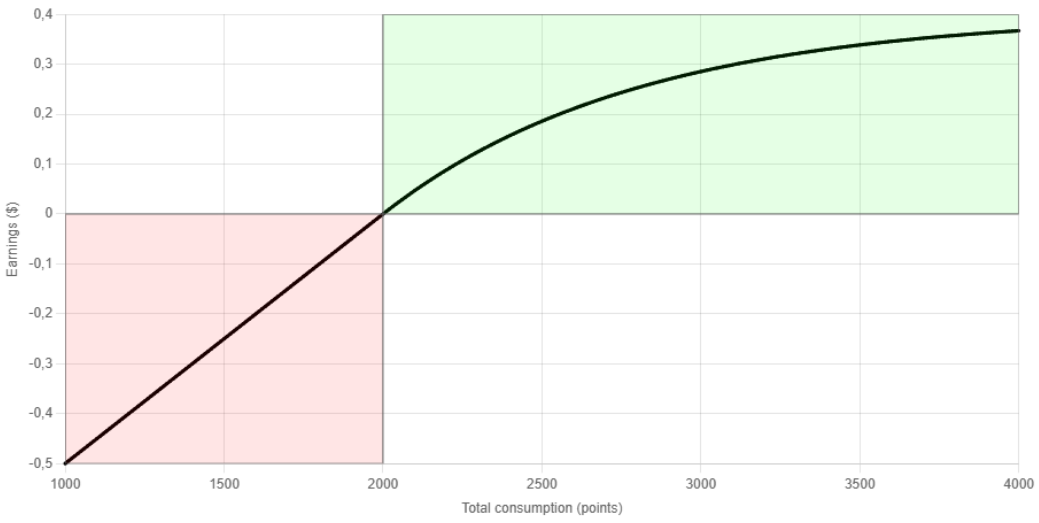
After logging in, you can view your checking, savings, and credit card balances, access past statements, and transfer funds between checking and savings instantly. Credit card payments, whether one-time or recurring,

can only be set up on the second screen. Each period, the system updates your bank account statements between the first and second decision screens. **To proceed to the next screen, you must return to the 'Decision' page (on the first screen) or the 'Summary' page (on the second screen) using the top navigation bar. The button to continue will only appear on those pages.**

On the first screen, you will see your employment status and endowment for the period. You will then decide how much consumption to purchase using your checking account or your credit card. Your monetary earnings each period are based on total consumption (tc), which is the sum of consumption purchased using your checking account and your credit card. Total consumption (tc) is then converted into a monetary payment using the function $u(\cdot)$.

$$\text{Current Period Earnings} = u(tc) = 0.4\left\{(1 - e^{-(tc-2000)/800}), tc \geq 2000; 0.0005(tc - 2000), tc < 2000\right\}$$

- The minimum consumption is 0, but **consuming less than 2000 points results in a negative payment**. Think of 2000 points as the basic monthly need—consuming less than this amount leads to an "unpleasant sacrifice."
- Figure 1 illustrates the $u(tc)$ function – the relationship between total consumption in points and earnings in dollars. Note that tc below 2000 points results in negative earnings (red) while tc above 2000 points results in positive earnings (green).
- **While higher consumption (tc) increases your earnings for the current period, it also reduces resources for future periods and for your final net worth.**
- **Earnings from consumption exhibit diminishing returns**: the gain from consuming 2100 points rather than 2000 points is larger than the gain from consuming 3100 points rather than 3000 points, and so on.



In this experiment, your earnings are calculated using precise mathematical formulas. While the system computes values with high precision, only the first four decimal places will be displayed on your screen for clarity. At the end of the experiment, final earnings will be rounded to the nearest cent for payment.

Before submitting your decisions, you can click the 'Calculate' button to see your monetary earnings for the period and your cumulative earnings based on past and current choices.

In addition to your payoffs from consumption, your total money payoff will also depend on your final net worth at the end of 120 periods, as detailed below.

The second screen displays your credit card balance, cash-back rewards, minimum payment due, and scheduled payment. The minimum payment is 1% of the outstanding balance plus interest and fees. **You can log into your bank account via the "Bank Account" tab to set up payments.** Each period, you may make up to two one-time payments—one from your checking account and one from your savings account. You may also adjust your automatic payment plan by selecting one of three options: minimum payment, full statement balance, or a custom fixed amount. If the fixed amount is below the minimum payment, it will be adjusted to meet the minimum requirement. If it exceeds the statement balance, it will be reduced accordingly. All changes immediately update the scheduled payment.

For each withdrawal account (e.g., checking or savings), automatic payments are processed first, followed by manual payments. If your checking or savings account lacks funds for the scheduled payment when you click "Continue to Next Period," a 40-point returned payment fee will be charged to your credit card, and you will receive an alert. Only one returned payment fee per period applies, regardless of failed payments.

If the minimum payment is not met, you will receive an alert and incur a 40-point late payment fee. Missing the minimum payment for two consecutive periods increases your credit card APR to 30.00% (2.50% monthly) for all future periods.

Carried-over balances between periods accrue interest in points, either credited for savings or charged for credit card debt.

After 120 periods, your final net worth will be converted into an additional payment using the formula below.

Final net worth = checking account balance + savings account balance − credit card balance

Earnings from final net worth $= 9 \times u\left(\frac{\text{final net worth}}{9}\right)$

Your final net worth is divided into 9 months of equal consumption, and this payment equals the total earnings calculated using the previously introduced function $u(\cdot)$. **This setup encourages you to save enough over 10 years (the 120 periods) to cover 9 months of consumption expenses.** You will receive additional monetary earnings if your net worth exceeds 18000 points (2000 points per month for basic needs × 9 months) and you will face a deduction in your money earnings if your net worth falls below this threshold. However, **regardless of any such reductions, you are guaranteed to earn $18.00 upon completing the study.**

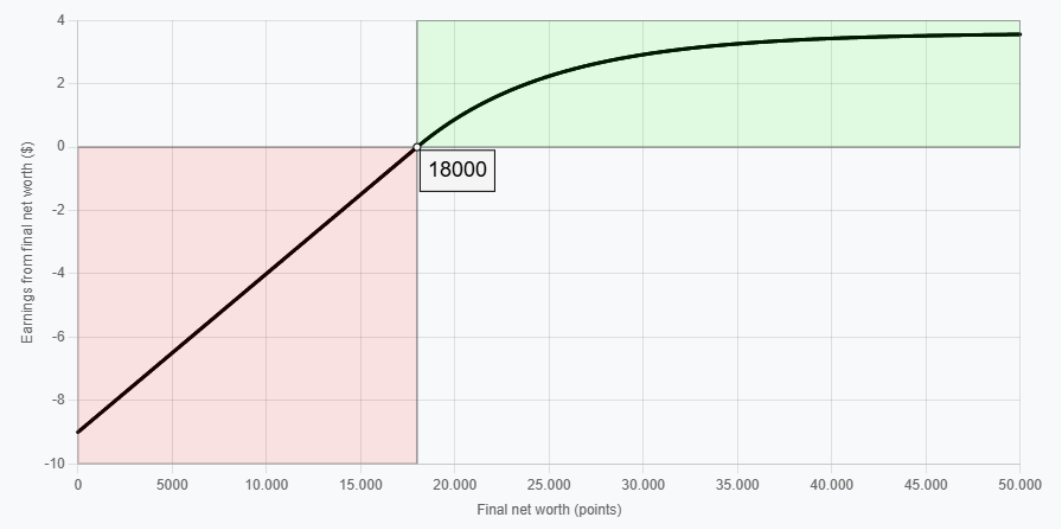
Figure 2 illustrates the relationship between your final net worth and additional money earnings using the formula given above. Below 18k in final net worth (red), your additional money earnings are negative, while above 18k in final net worth (green), your additional money earnings are positive.

During the final 36 periods (3 years), you can log into your bank account to see your current net worth and how it contributes to either increasing or decreasing your total money earnings.

At the end of the experiment, the program will calculate the sum of your period consumption earnings from all 120 periods along with your additional earnings from your final net worth.

Before starting the study, you must complete a quiz to test your understanding of these instructions. If you are unsure, you can revisit the "Instructions" tab in the top bar.

- If you provide an incorrect answer, you will be notified and given a chance to correct your response.



- Your quiz performance does **not** affect your payoff, but you must answer all questions correctly to proceed.

Quiz Questions

1. How many periods will you have to complete for the main decision task?
   - 40
   - 80
   - 120 [Answer]
   - 160

   Participants could use an on-screen calculator to compute earnings from consumption and final net worth before submitting their answers and had access to a clickable link to review the instructions.
2. Suppose you consume 2000 points. Your earnings for the current period are: [Answer: 0.00]
3. Suppose you consume 2400 points. Your earnings for the current period are: [Answer: 0.16]
4. Suppose you consume 2800 points. Your earnings for the current period are: [Answer: 0.25]
5. Suppose your final net worth is 10000 points. Your earnings from final net worth are: [Answer: -4.00]
6. Suppose your final net worth is 20000 points. Your earnings from final net worth are: [Answer: 0.87]
7. Suppose your final net worth is 40000 points. Your earnings from final net worth are: [Answer: 3.43]
8. If you miss a minimum payment, a 40-point fee will be charged. [Answer: True]
9. If you pay your credit card balance in full, you do not pay any interest. [Answer: True]
10. If you miss the minimum payment for two consecutive periods, your credit card APR will increase from 17% to 30%. [Answer: True]
11. If your withdrawal account lacks sufficient funds for a scheduled credit card payment, a 40-point returned payment fee will be charged. [Answer: True]

12. Consumption paid by the checking account qualifies for 2% cashback, just like credit card purchases. [Answer: True]
13. Your checking account balance earns a 2% APR. [Answer: False]
14. Your savings account balance earns a 2% APR. [Answer: True]
15. Payments made to credit cards do not earn cashback. [Answer: True]

Quiz completed

You will first complete a three-period practice session to get familiar with the decision environment. These three practice periods are unpaid and differ from the main task in two key ways:

1. You will make decisions for 3 periods instead of 120 periods.
2. In these practice rounds there are no earnings from your final net worth.

As in the main task, in these three practice periods:

1. Consuming less than **2,000 points** in each period will result in a **negative payment** for that period.
2. Credit card payments are **not automatic** and must be set up by logging into your bank account on the second decision screen.

The checkbox below will become active after 8 seconds. Once you check the box, the "Next" button will be enabled.

☐ I understand that the upcoming practice rounds are designed to help me become familiar with the decision task, including how to log in to my bank account to make credit card payments. I will use the practice rounds to test and understand these features before the main task begins.

B.2 Screenshots for the Treatment Arm

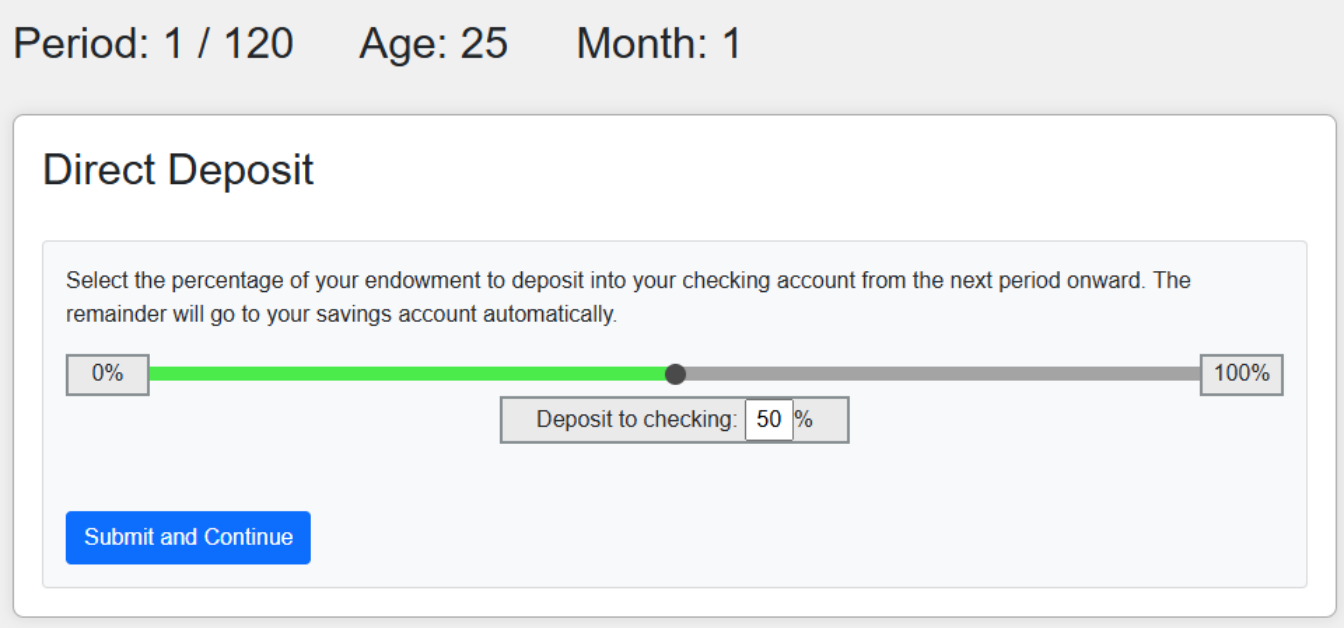


Figure B1: Direct Deposit Selection Screen

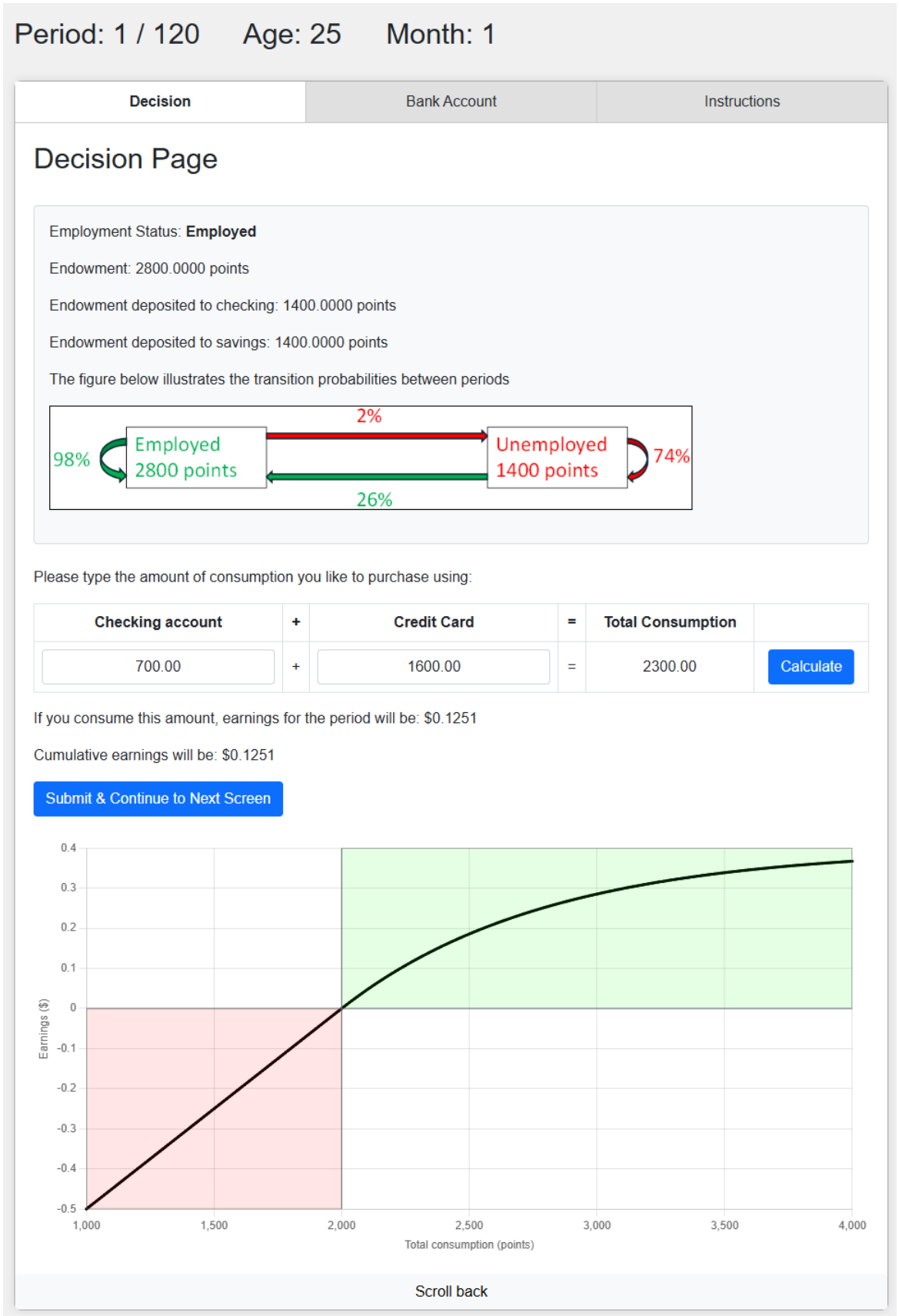


Figure B2: First Screen

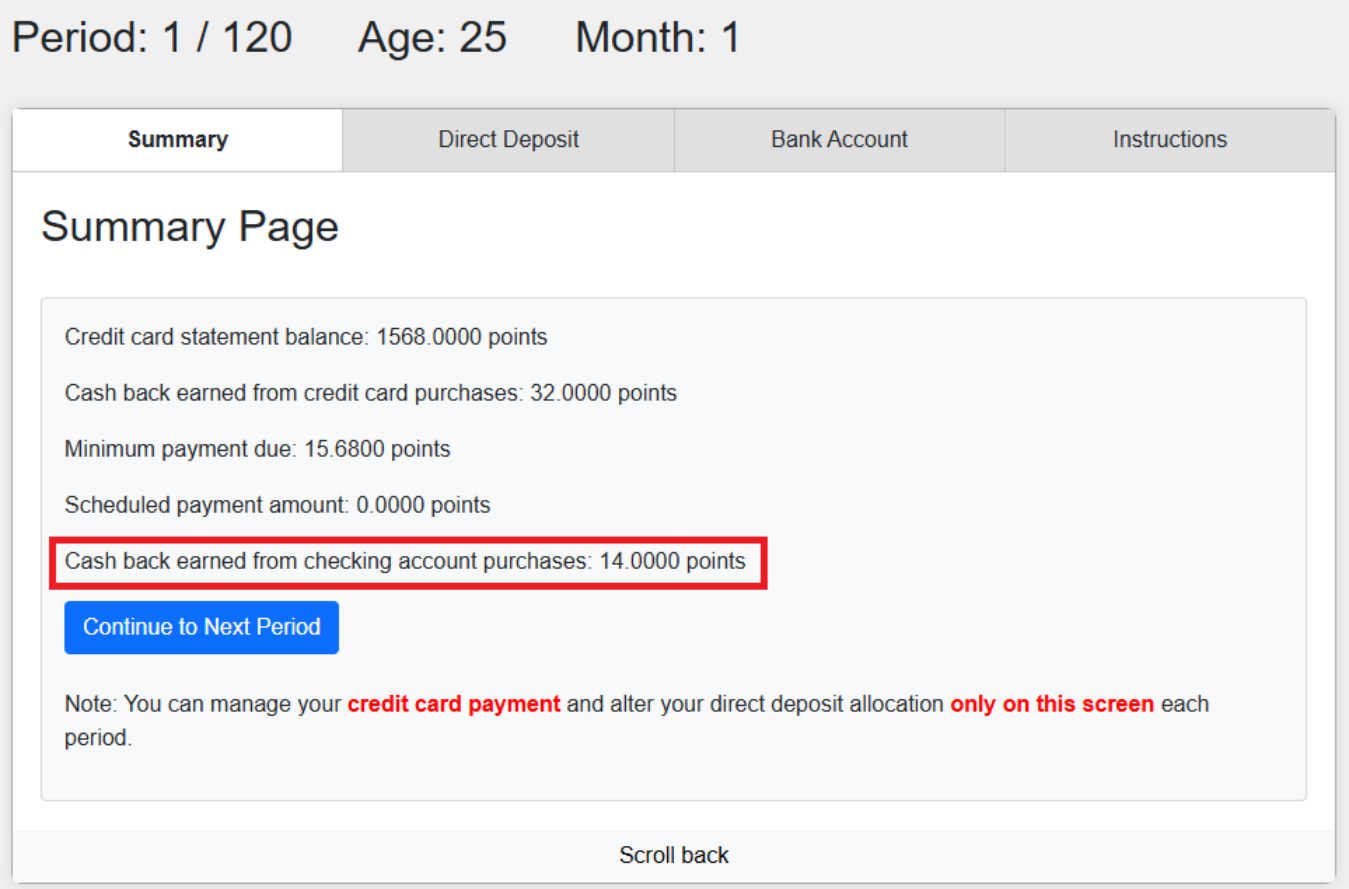


Figure B3: Second Screen

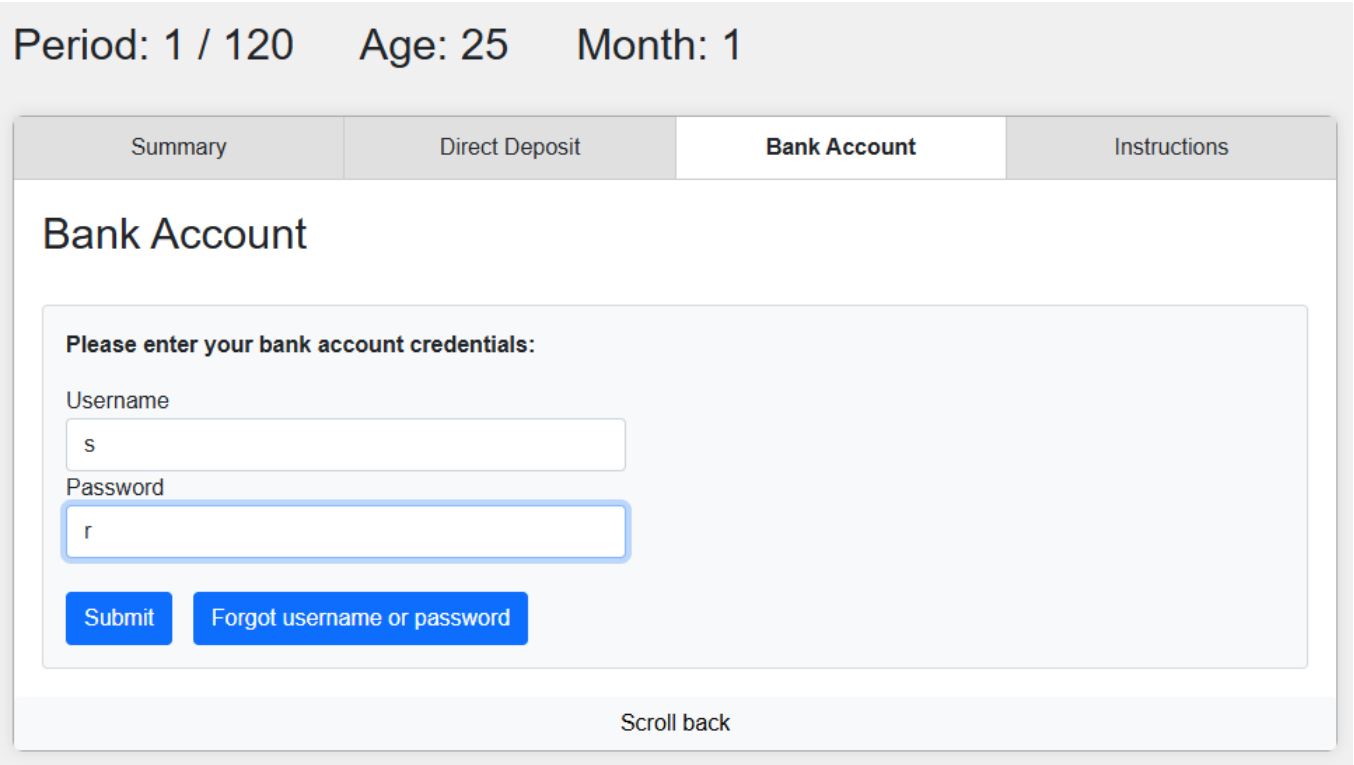


Figure B4: Bank Account Login Screen

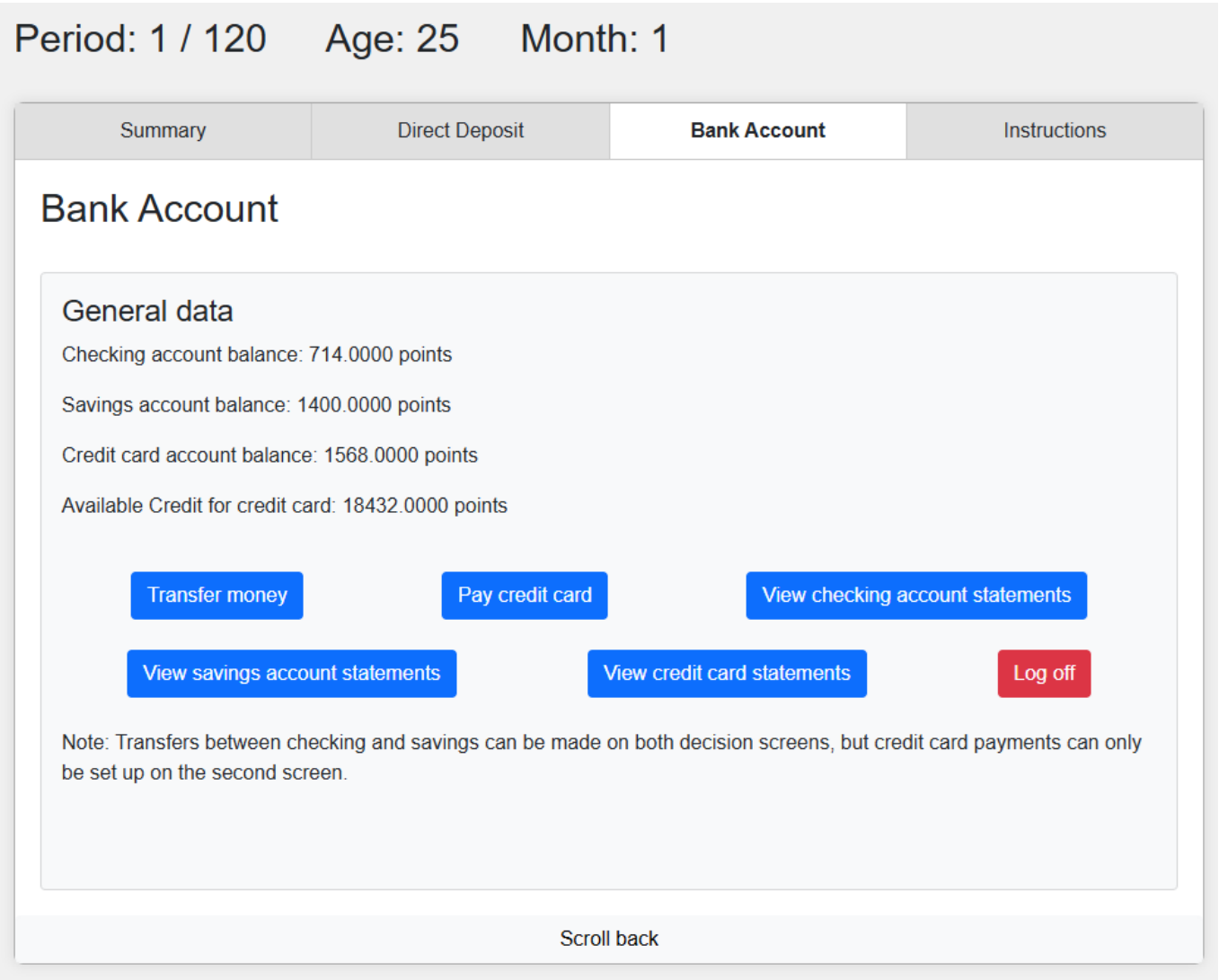


Figure B5: Bank Account Home Screen

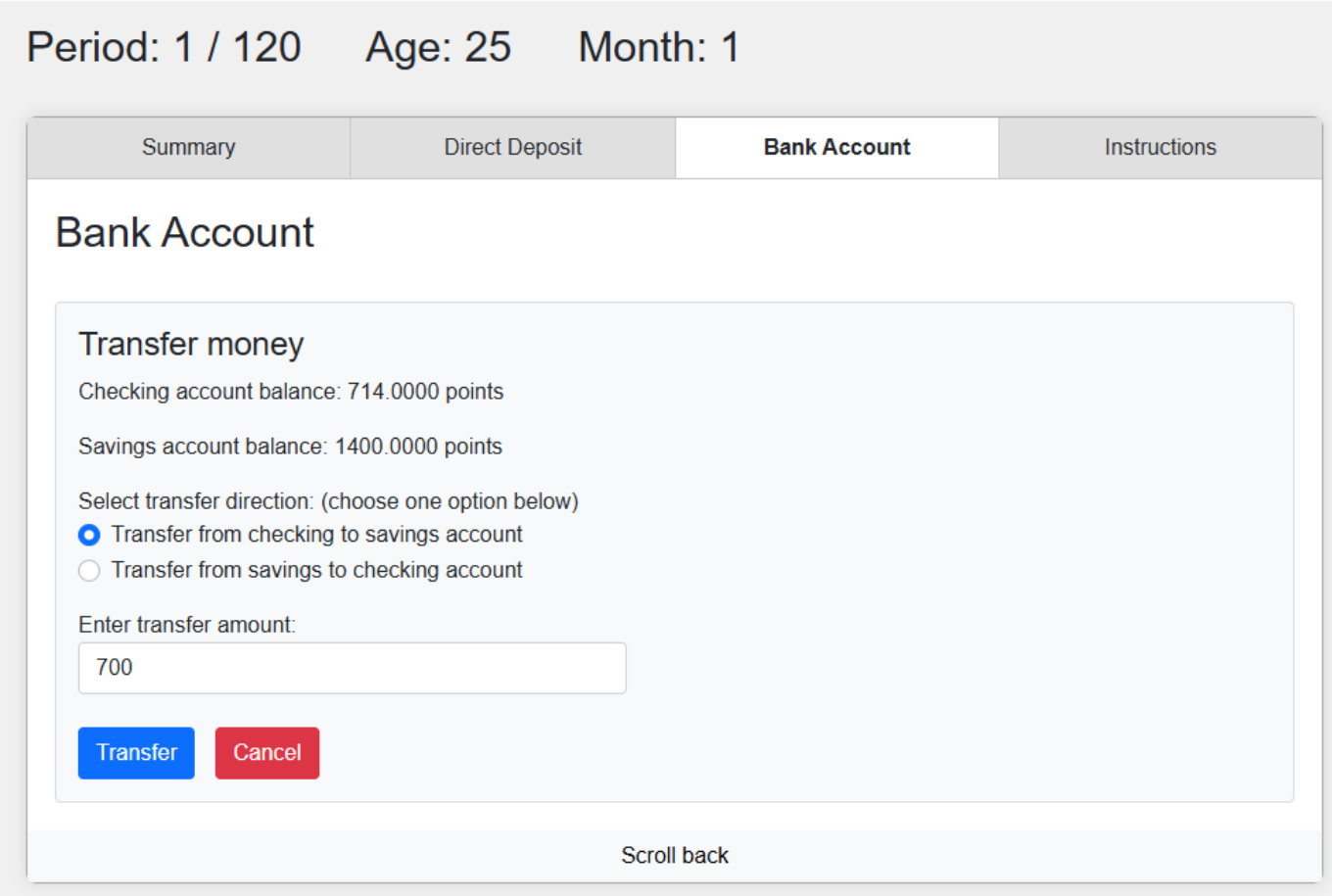


Figure B6: Fund Transfer Screen

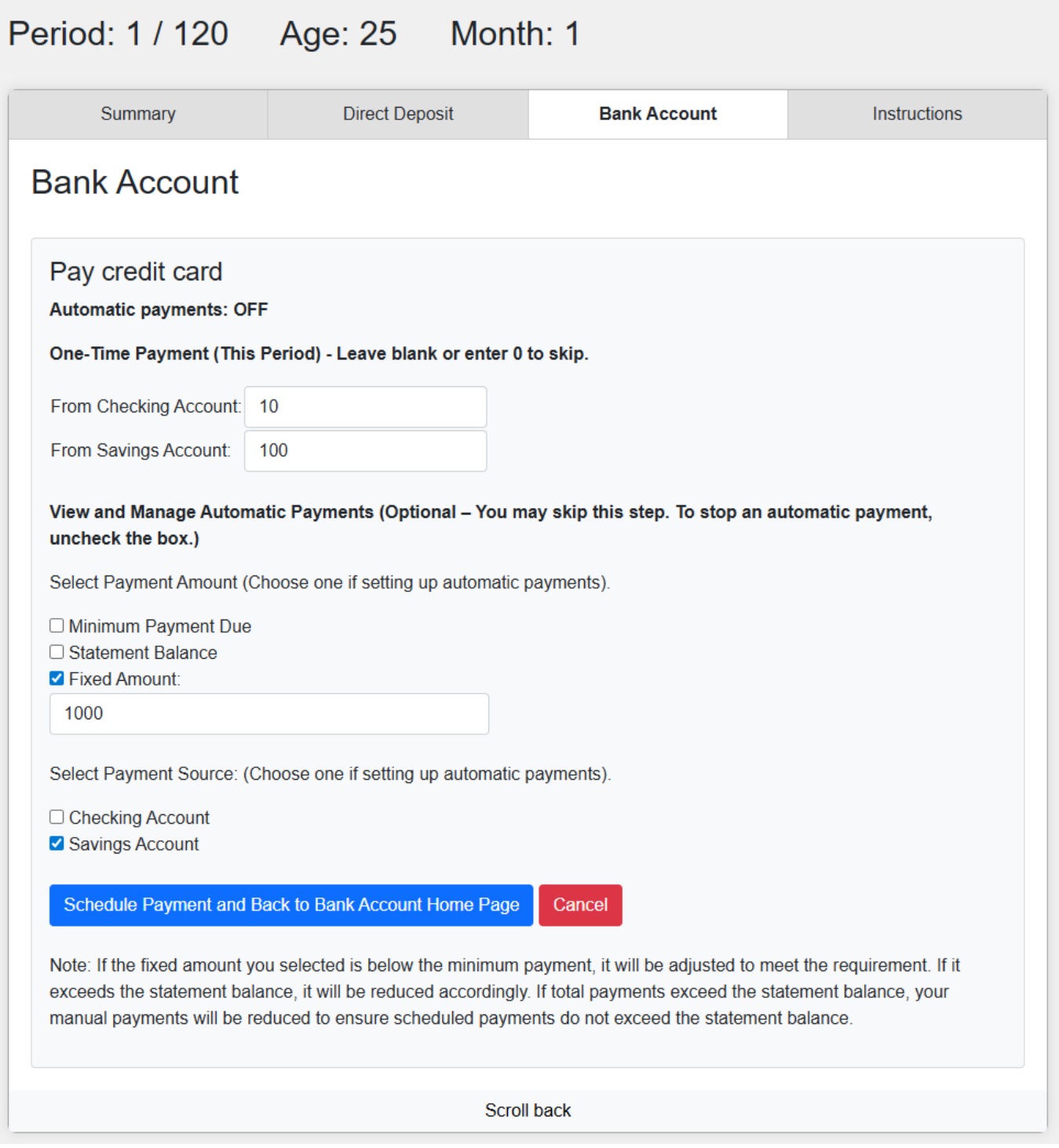


Figure B7: Credit Card Payment Screen

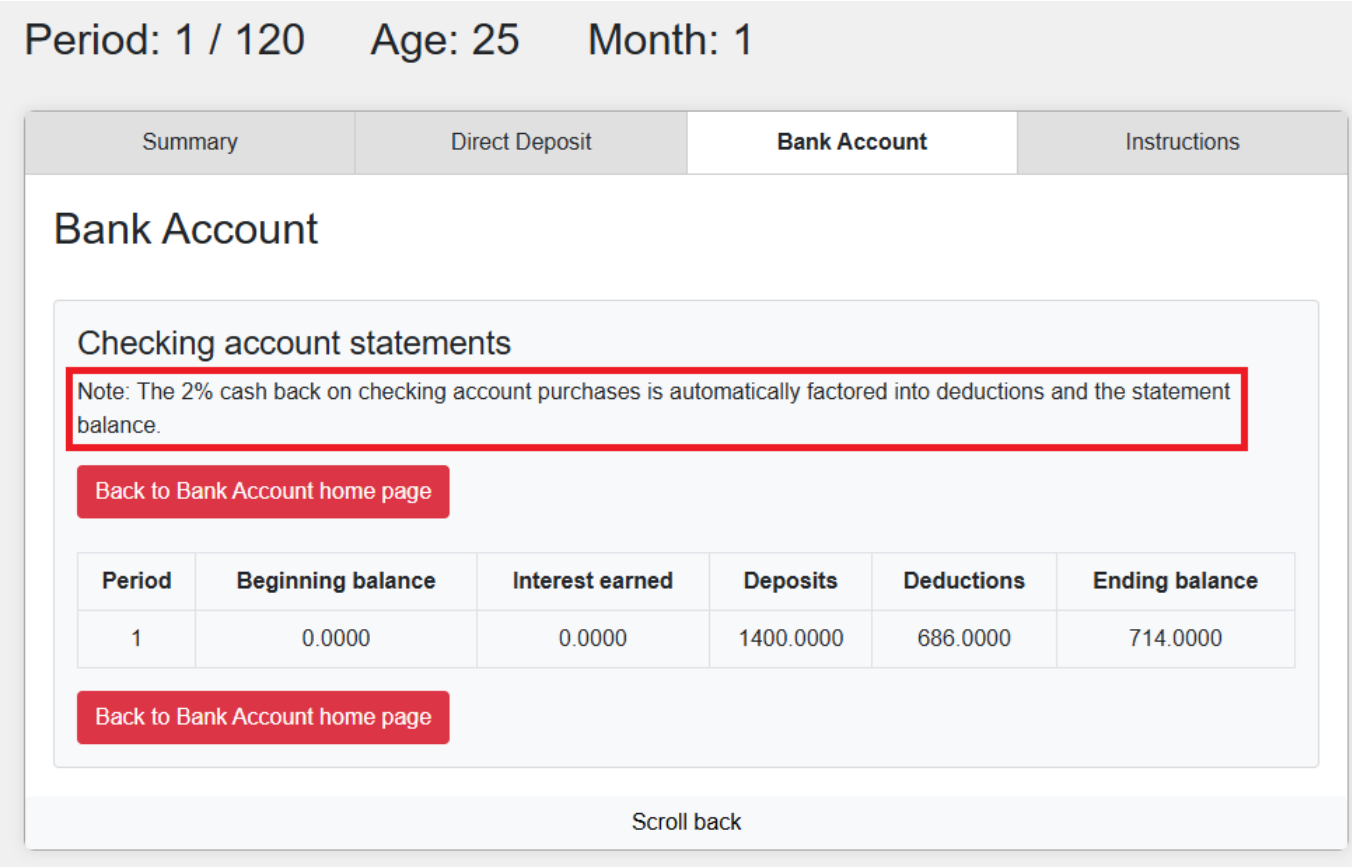


Figure B8: Checking Account Statement Screen

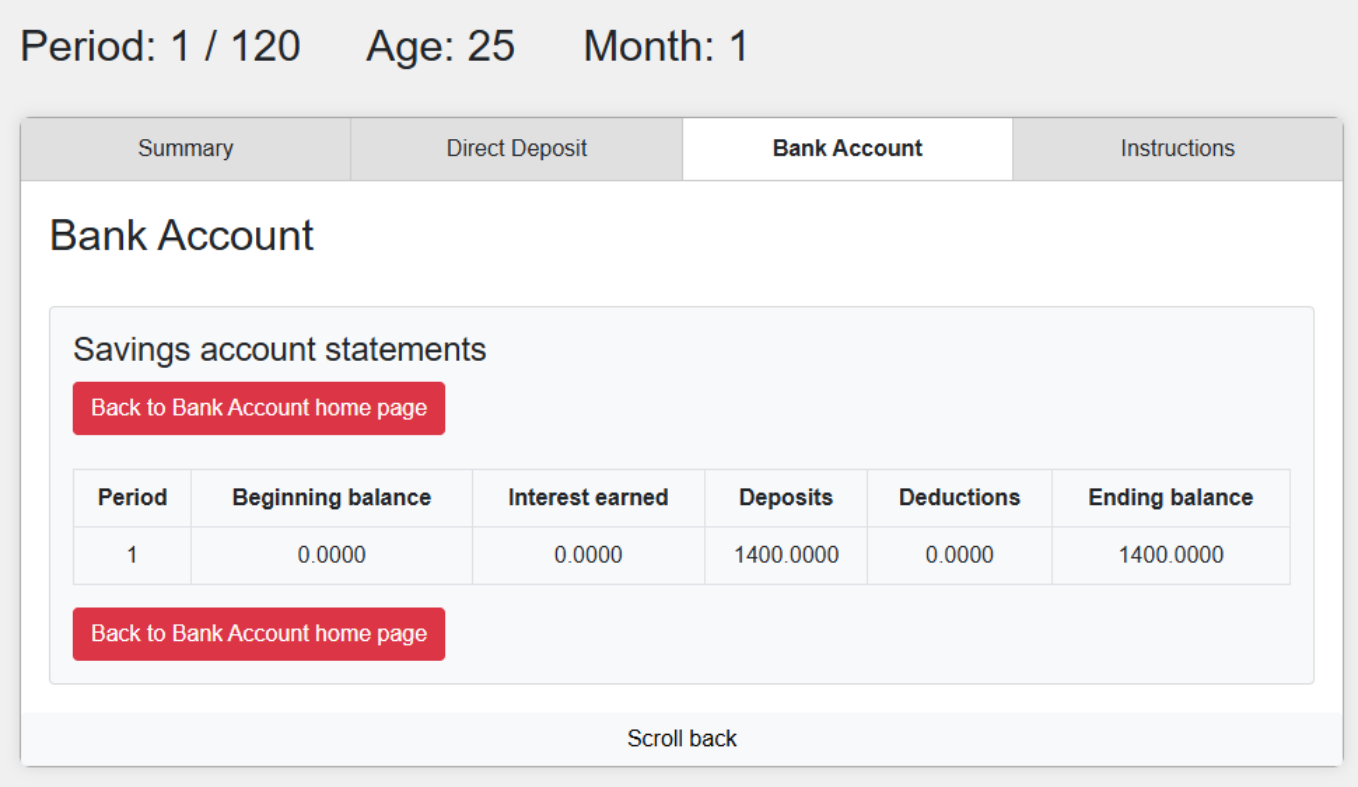


Figure B9: Savings Account Statement Screen

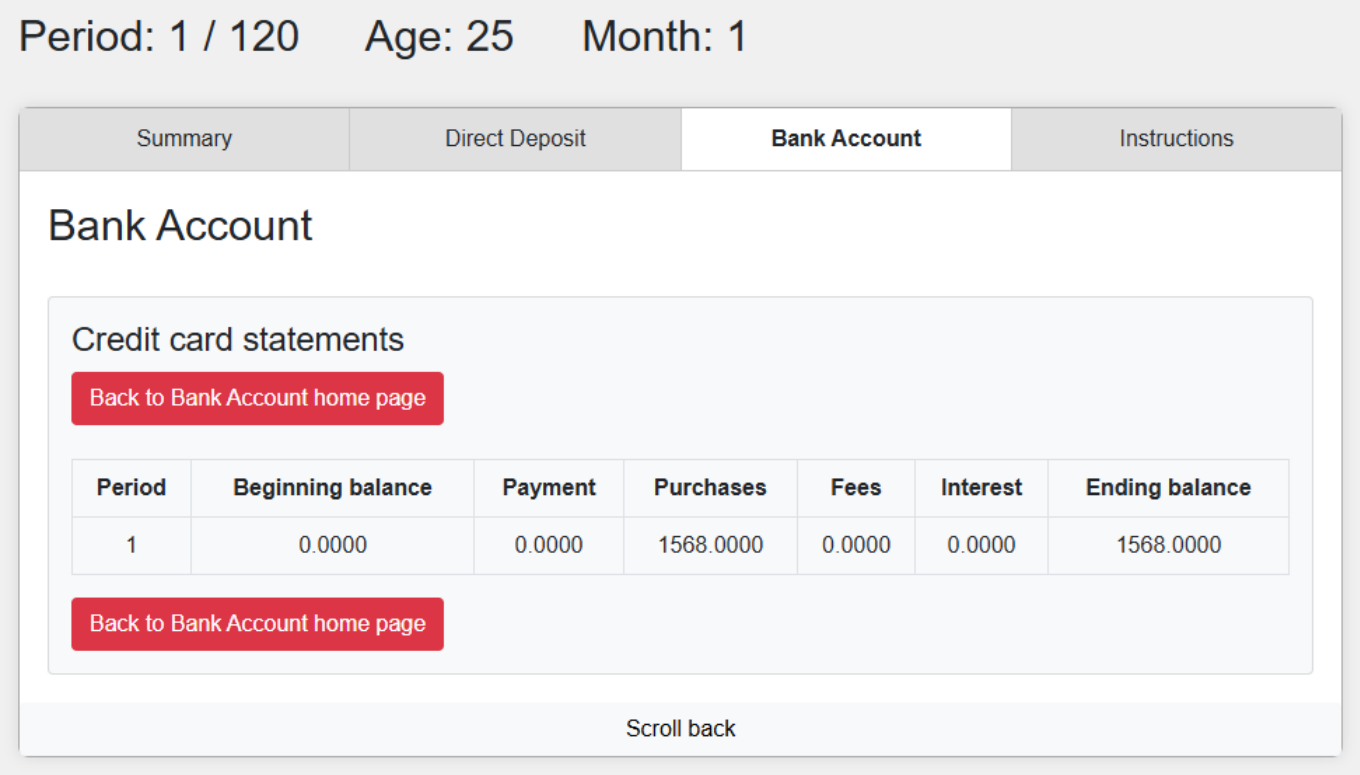


Figure B10: Credit Card Statement Screen

B.3 End of Experiment Tasks (All Treatments)

Questionnaire 1/3

Participants completed a Bomb Risk Elicitation Task (Crosetto and Filippin, 2013). In this task, 100 boxes are displayed on the screen, one of which contains a bomb placed uniformly at random. Participants choose how many boxes to collect. Each collected box yields $0.02 if it does not contain the bomb. If the bomb is among the collected boxes, the participant receives zero earnings from this task.

Questionnaire 2/3

Please answer the following questions.

1. If John can drink one barrel of water in 6 days, and Mary can drink one barrel of water in 12 days, how many days would it take them to drink one barrel of water together? [Answer: 4 days]
2. Jerry received both the 15th highest and the 15th lowest mark in the class. How many students are in the class? [Answer: 29]
3. A man buys a pig for $60, sells it for $70, buys it back for $80, and sells it finally for $90. How many dollars has he made? [Answer: $20]
4. Simon decided to invest $8,000 in the stock market one day early in 2008. Six months after he invested, on July 17, the stocks he had purchased were down 50%. Fortunately for Simon, from July 17 to October 17, the stocks he had purchased went up 75%. As of October 17, Simon has: [Answer: a]
    a lost money in the stock market
    b broken even in the stock market
    c made money in the stock market
5. Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow? [Answer: a]
    a More than $102
    b Exactly $102
    c Less than $102
    d Do not know
    e Refuse to answer.
6. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account? [Answer: c]
    a More than today
    b Exactly the same
    c Less than today
    d Do not know
    e Refuse to answer.
7. Please consider whether this statement is true or false. “Buying a single company’s stock usually provides a safer return than a stock mutual fund.” [Answer: False]

a True

b False

c Do not know

d Refuse to answer.

Questionnaire 3/3

1. What is your gender?
    - Male
    - Female
    - Other / Prefer not to say
2. What is your age?
3. What is your current employment status?
    - Employed (full-time or part-time)
    - Unemployed
    - Not in labor force (e.g., retired, students)
4. What is your personal annual income?
    - Under $40,000
    - $40,000 – $99,999
    - $100,000 or more
    - Prefer not to say
5. What is the highest level of education you have completed?
    - High school or less
    - Some college or Associate's degree
    - Bachelor's degree
    - Graduate or professional degree
6. What is your marital status?
    - Single
    - Married or in a relationship
    - Other
7. Do you have any dependents?
    - Yes
    - No
8. Do you typically pay your credit card balance in full each month?
    - Yes
    - No

- I don't have a credit card

9. What is your ZIP or postal code?
10. How did you make your decisions in the main task? Please describe your decision-making process.
11. Please enter any comments about the experiment, or suggestions for improvement (optional).
12. Please enter your Prolific ID to receive payment. This information is used to approve your task, and you do not need to enter a completion code.

C Additional Tables and Figures

Table C1: Debit Cards and Checking Accounts with Cashback Rewards

Product Name	Reward Rules
Affinity FCU Cash Back Debit Card	1% on purchases up to $1,000 per month
Affinity FCU Cash Back Plus Checking Account	10% on purchases up to $150 per month
Axos Bank CashBack Checking Debit Card	1% on signature-based debit purchases up to $2,000 per month
Discover Cashback Debit Card	1% on purchases up to $3,000 per month
Family First FCU Debit Rewards Checking	1% on purchases
First National Bank & Trust Reward Checking Account	3.5% on purchases up to $250 per month
FutureCard Visa Debit Card	5% from certain green spending categories, 6% from FutureParners, and 1% elsewhere
LendingClub LevelUp Checking	1% on purchases
OnePay Cash Debit Card	3% on purchases in one selected category up to $150 per month
Opportunity Bank Reward Checking	1% on purchases
PayPal Debit Card	5% on one selected category purchases up to $1,000 per month
TAB Spend Rewards Checking	1% on purchases
Upgrade Rewards Checking Plus	2% on purchases in eligible categories up to $25,000 per year
Venmo Debit Card	5% on selected brand bundles up to $2,000 per month

Note: Program information was collected as of March 2026.

Table C2: Summary Statistics

	All (1)	Control (2)	Treat (3)
CRT	2.33	2.50	2.16
FL	2.69	2.68	2.70
Box opened	35.50	36.80	34.20
Male	0.50	0.50	0.50
Age	30.20	29.76	30.64
Employed	0.82	0.80	0.84
Income<40k	0.34	0.42	0.26
Below college	0.38	0.40	0.36
Single	0.44	0.50	0.38
With dependent	0.40	0.40	0.40
Revolver	0.27	0.28	0.26
Total CC interest and fees	5008.01	7068.66	2947.35
Payoff	19.40	19.55	19.24
Obs	100	50	50

Note: None of the differences in the reported variables between treatment and control groups are statistically significant at the 5% level.

Table C3: Treatment Effect on Credit Card Costs and Borrower–Saver Behavior: Additional Treatment

	Deviation from Theory				Borrower–Saver Outcomes			
	Interest + Fees	Revolving Debt	Penalty Interest	Fees	Anderson Index	B–S Ind.	Suff. Assets	Interest Cost
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cons	1.78	-168.67	-1.25	5.42***	-0.19*	0.36***	0.13**	4.54
	(9.70)	(449.70)	(3.97)	(0.79)	(0.10)	(0.06)	(0.06)	(6.16)
T×EF	13.15	544.15	3.42	2.00	0.25	0.10	0.14	16.88
	(16.25)	(719.10)	(6.39)	(1.35)	(0.18)	(0.09)	(0.09)	(13.59)
T2×EF	-2.15	-11.63	-1.82	-0.16	-0.15	-0.04	-0.10	-8.47
	(14.96)	(735.25)	(5.65)	(0.44)	(0.12)	(0.08)	(0.06)	(7.17)
UF	79.18***	3038.96***	34.23***	1.79***	0.50**	0.28***	0.12	55.42**
	(27.54)	(1112.80)	(11.77)	(0.60)	(0.21)	(0.10)	(0.09)	(22.56)
T×UF	-82.16***	-3021.56***	-37.82***	-1.44**	-0.49**	-0.25***	-0.14*	-54.73**
	(27.30)	(1151.27)	(11.32)	(0.57)	(0.20)	(0.09)	(0.08)	(22.81)
T2×UF	-56.97*	-1957.02	-28.80**	-0.38	-0.46**	-0.17	-0.17**	-50.85**
	(30.66)	(1288.97)	(12.85)	(0.81)	(0.20)	(0.10)	(0.08)	(22.94)
CRT	-1.96	-200.69	0.54	0.35	-0.01	-0.02	-0.01	0.57
	(4.70)	(212.21)	(1.86)	(0.25)	(0.03)	(0.02)	(0.02)	(3.02)
FL	-25.20**	-1092.54**	-8.92*	-0.76*	-0.13*	-0.11**	-0.04	-8.41
	(11.21)	(474.78)	(4.73)	(0.41)	(0.07)	(0.04)	(0.04)	(5.57)
R^2	0.1143	0.1040	0.1209	0.0397	0.0980	0.1370	0.0622	0.0894

This table reports estimates from the following equation.

$$y_{isj} = \text{Const.} + \beta_1 T_i \times EF_s + \beta_2 T2_i \times EF_s + \beta_3 UF_s + \beta_4 T_i \times UF_s + \beta_5 T2_i \times UF_s + X_i\zeta + \gamma_j + \epsilon_{isj}.$$

where $T2_i$ is a binary indicator variable equal to 1 if participant i is assigned to the additional treatment arm that eliminates the savings account. Columns (1)–(8) report, respectively, deviations of credit card interest and fees, deviations of revolving balances, penalty interest, fees, the Anderson borrower–saver index, a borrower–saver indicator, an indicator for assets exceeding debt, and the interest cost of borrower–saver behavior. Standard errors are clustered at the participant level. $N = 18,000$ *** p<0.01, ** p<0.05, and * p<0.10.

Table C4: Treatment Effect on Several Attention Measures

	Deposit Changes (1)	Bank Logins (2)	Transfer (3)	Autopay Changes (4)	Manual Payments (5)	Total Clicks (6)	Non-default Consumption (7)
Cons	4.21***	58.04***	12.84**	3.33***	12.98**	103.21***	32.93***
	(1.28)	(10.57)	(5.10)	(0.92)	(6.02)	(20.04)	(5.64)
T×EF	-0.76	-6.44	-5.06	2.72	2.54	-9.44	16.25*
	(1.94)	(13.08)	(5.52)	(1.92)	(7.36)	(25.46)	(8.89)
UF	-0.02	-6.57	-2.21	1.41	1.70	-9.62	7.45
	(1.84)	(12.55)	(7.36)	(1.05)	(6.37)	(24.89)	(8.73)
T×UF	1.25	17.06	7.52	0.93	-1.90	26.60	2.44
	(1.82)	(12.31)	(10.67)	(1.26)	(6.28)	(24.33)	(8.66)
CRT	0.06	-5.40*	1.33	-0.96	-3.58*	-9.15	-3.98*
	(0.38)	(3.00)	(1.61)	(0.64)	(2.12)	(6.03)	(2.08)
FL	0.55	-1.32	-1.74	-0.72	2.20	-5.81	-4.18
	(0.67)	(7.10)	(4.38)	(1.11)	(3.57)	(14.82)	(5.55)
R^2	-0.0359	0.0042	-0.0308	0.0484	-0.0095	-0.0085	0.0440

Note: This table reports estimates from Equation (3) excluding age indicators. Columns (1)–(7) report, respectively, the number of changes in direct deposit share (excluding the initial choice), the number of bank account logins, the number of transfers between checking and savings accounts, the number of changes in autopay options, the number of manual payments, the total number of clicks on buttons used for direct deposit changes, bank account logins, account statements viewing, and credit card payments, and the total number of consumption choices that deviate from the default (including both checking and credit card). $N = 100$ *** p<0.01, ** p<0.05, and * p<0.10.

Table C5: Treatment Effect on Credit Card Costs and Borrower–Saver Behavior: Additional Controls

	Deviation from Theory				Borrower–Saver Outcomes			
	Interest + Fees	Revolving Debt	Penalty Interest	Fees	Anderson Index	B–S Ind.	Suff. Assets	Interest Cost
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cons	20.10	38.38	14.34	5.21**	-0.35	0.48	0.06	-30.28
	(90.75)	(3831.69)	(38.17)	(2.61)	(0.82)	(0.41)	(0.41)	(71.01)
T×EF	4.86	225.57	-0.33	1.99	0.20	0.09	0.13	8.64
	(15.87)	(708.96)	(6.19)	(1.21)	(0.17)	(0.08)	(0.09)	(13.44)
UF	79.42***	3124.31***	33.26***	1.79**	0.52**	0.28***	0.14	57.50**
	(27.42)	(1112.70)	(11.78)	(0.70)	(0.21)	(0.09)	(0.09)	(22.93)
T×UF	-81.38***	-3053.69**	-37.03***	-0.99	-0.49**	-0.24**	-0.14	-55.64**
	(28.16)	(1174.89)	(11.67)	(0.77)	(0.21)	(0.09)	(0.09)	(24.20)
CRT	-1.95	-152.23	-0.11	0.32	-0.02	-0.01	-0.01	-1.62
	(4.88)	(209.48)	(1.98)	(0.32)	(0.05)	(0.02)	(0.02)	(4.09)
FL	-36.07**	-1602.51**	-12.75**	-0.57	-0.21**	-0.15**	-0.07	-15.10*
	(14.05)	(611.29)	(6.12)	(0.65)	(0.10)	(0.06)	(0.06)	(8.26)
Box	0.55	18.63	0.24	0.05	0.00	0.00	0.00	0.44
opened	(0.43)	(16.76)	(0.17)	(0.04)	(0.00)	(0.00)	(0.00)	(0.37)
Male	-11.94	-410.25	-5.07	-1.05	-0.08	-0.07	-0.03	-4.33
	(17.71)	(722.73)	(7.25)	(1.25)	(0.15)	(0.07)	(0.07)	(15.42)
Age	-0.90	-24.12	-0.48	-0.08	-0.01	-0.01	-0.00	0.50
	(3.06)	(128.81)	(1.27)	(0.08)	(0.02)	(0.01)	(0.01)	(2.37)
Emp.	7.14	620.42	-1.51	-0.16	0.29**	0.13	0.17**	15.95
	(17.49)	(723.41)	(7.67)	(0.57)	(0.14)	(0.08)	(0.07)	(11.59)
Income	-27.78*	-1334.00**	-8.81	-0.02	-0.13	-0.07	-0.02	-18.50*
<40k	(14.02)	(617.31)	(5.78)	(0.45)	(0.13)	(0.08)	(0.07)	(11.03)
Below	-12.46	-382.37	-6.92	-0.11	-0.05	-0.02	-0.01	-8.16
college	(16.06)	(696.79)	(6.52)	(0.49)	(0.13)	(0.07)	(0.06)	(11.75)
Single	-6.53	-127.63	-5.10	0.38	-0.01	-0.01	0.01	-4.41
	(23.05)	(972.73)	(9.39)	(0.49)	(0.18)	(0.08)	(0.07)	(19.42)
With	20.66	962.51	5.62	1.37**	0.17	0.11	0.07	11.57
dep.	(25.28)	(1105.40)	(9.99)	(0.55)	(0.20)	(0.10)	(0.09)	(21.02)
Revolver	-9.41	-141.49	-6.59	-0.82	0.08	0.11	0.09	-10.97
	(16.90)	(765.69)	(6.71)	(0.50)	(0.14)	(0.08)	(0.07)	(12.52)
R^2	0.2175	0.1973	0.2236	0.0483	0.1402	0.2079	0.0822	0.1477

Note: This table reports estimates from Equation (3) with additional controls. Columns (1)–(8) report, respectively, deviations of credit card interest and fees, deviations of revolving balances, penalty interest, fees, the Anderson borrower–saver index, a borrower–saver indicator, an indicator for assets exceeding debt, and the interest cost of borrower–saver behavior. Standard errors are clustered at the participant level. $N = 12,000$ *** p<0.01, ** p<0.05, and * p<0.10.

Table C6: Mean Behavioral Outcomes by Real-World Revolver Status

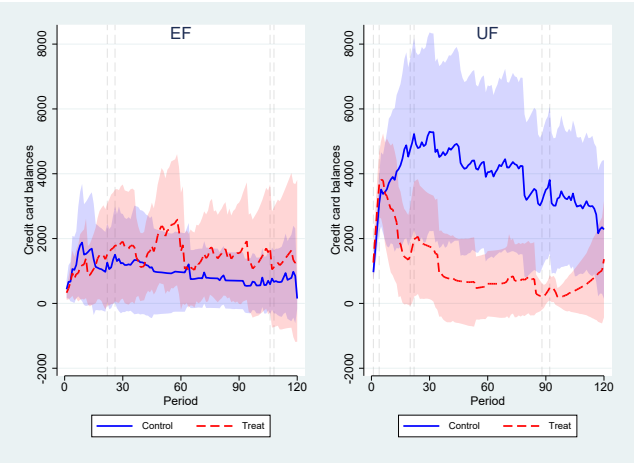
	All		Control		Treat		Treat-Control	
	NR	R	NR	R	NR	R	NR	R
Panel A: EF path								
Pay in full	0.83	0.58	0.89	0.61	0.76	0.54	-0.13	-0.07
AutoPay on	0.78	0.98	0.74	1.00	0.81	0.96	0.06	-0.04*
statement bal.	0.61	0.52	0.58	0.51	0.64	0.54	0.06	0.04
minimum	0.11	0.30	0.06	0.32	0.16	0.28	0.10	-0.03
Manual pay>0	0.12	0.06	0.10	0.05	0.14	0.07	0.04	0.02
Total pay	1165.92	1030.41	1517.72	961.10	831.72	1113.58	-686.00**	152.47
Manual pay	142.53	107.58	195.73	107.09	91.99	108.17	-103.74	1.08
Total cons.	2358.20	2326.36	2352.26	2311.48	2363.84	2344.21	11.58	32.73
CC cons.	1177.78	1003.87	1543.21	921.23	830.61	1103.05	-712.60**	181.82
CC cons.>0	0.78	0.89	0.82	0.84	0.74	0.94	-0.08	0.10
Pay-new charges	-31.65	-20.08	-32.52	-18.42	-30.83	-22.06	1.68	-3.64
Obs	4680	1320	2280	720	2400	600		
Panel A: UF path								
Pay in full	0.67	0.68	0.55	0.55	0.79	0.80	0.24**	0.25
AutoPay on	0.72	0.90	0.72	0.95	0.73	0.85	0.01	-0.10
statement bal.	0.39	0.54	0.30	0.45	0.47	0.64	0.17	0.19
minimum	0.18	0.09	0.32	0.16	0.04	0.03	-0.29**	-0.14
Manual pay>0	0.11	0.06	0.10	0.10	0.12	0.02	0.03	-0.08
Total pay	747.56	644.48	865.25	1066.32	629.87	222.64	-235.38	-843.68**
Manual pay	202.37	126.33	213.98	236.57	190.77	16.09	-23.21	-220.48
Total cons.	2349.76	2322.12	2383.99	2322.44	2315.54	2321.80	-68.45	-0.64
CC cons.	712.64	631.25	787.55	1041.36	637.73	221.13	-149.82	-820.23*
CC cons.>0	0.58	0.51	0.60	0.63	0.56	0.38	-0.03	-0.24
Pay-new charges	-35.44	-16.19	-44.83	-20.83	-26.06	-11.55	18.77**	9.28
Obs	4080	1920	2040	960	2040	960		

Note: New charges equal new credit card consumption plus the previous period's interest and fees.

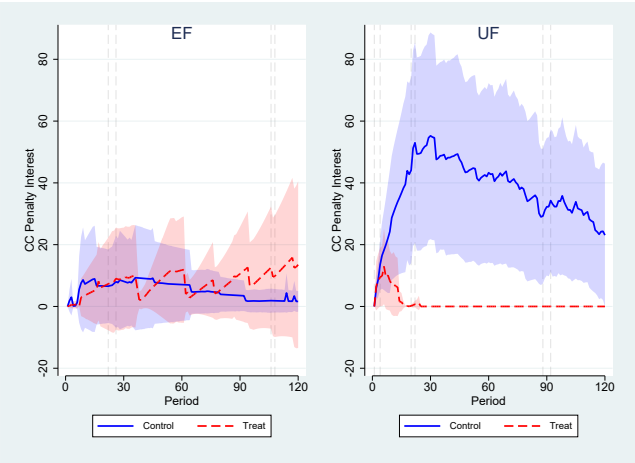
Table C7: Mean Behavioral Outcomes During the First Employment Spell (Periods 5–19), UF Path

	Real-World Non-Revolvers			Real-World Revolvers		
	C	T	Diff	C	T	Diff
Pay in full	0.42	0.46	0.04	0.36	0.63	0.27
AutoPay on	0.59	0.63	0.04	0.82	0.78	-0.03
statement bal.	0.18	0.30	0.12	0.32	0.50	0.18
minimum	0.27	0.11	-0.16	0.25	0.05	-0.20
Manual pay>0	0.19	0.31	0.13	0.25	0.12	-0.13
Total pay	779.92	866.86	86.94	1316.00	369.77	-946.24*
Manual pay	271.50	466.56	195.06	701.68	110.27	-591.41
Total cons.	2426.64	2328.22	-98.42	2394.67	2228.26	-166.41
CC cons.	917.95	663.49	-254.46	1131.17	206.67	-924.50*
CC cons. >0	0.74	0.58	-0.15	0.63	0.38	-0.26
Pay-new charges	-254.02	152.51	406.53***	140.53	123.84	-16.69
Obs	255	255		120	120	

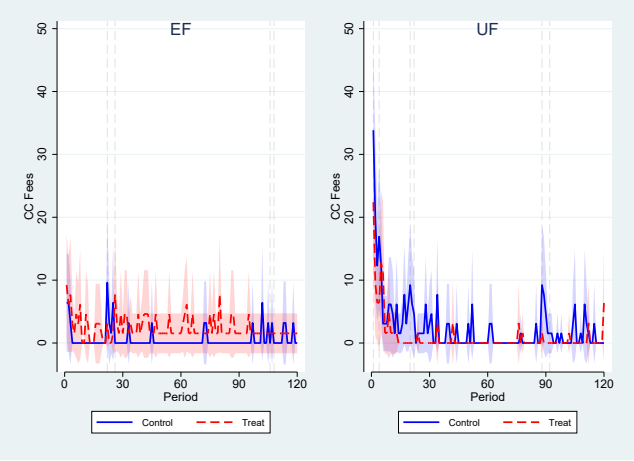
Note: New charges equal new credit card consumption plus the previous period's interest and fees.



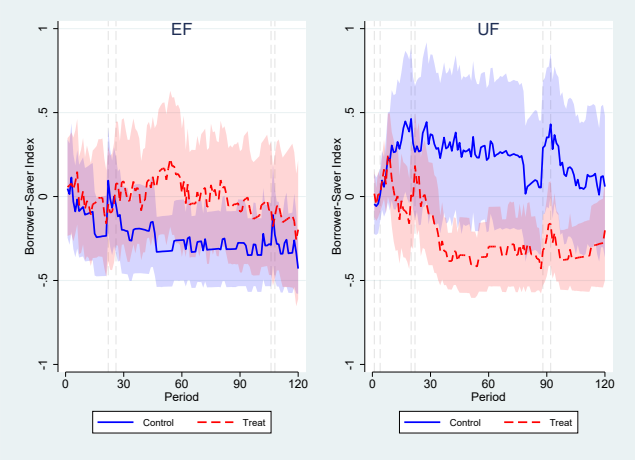
(a) Revolving Balance



(b) Penalty Interest



(c) Fees



(d) Borrower–Saver Index

Figure C1: Average Secondary Outcomes by Treatment and Income Path

Note: Shaded areas indicate the 95% confidence interval of the mean.

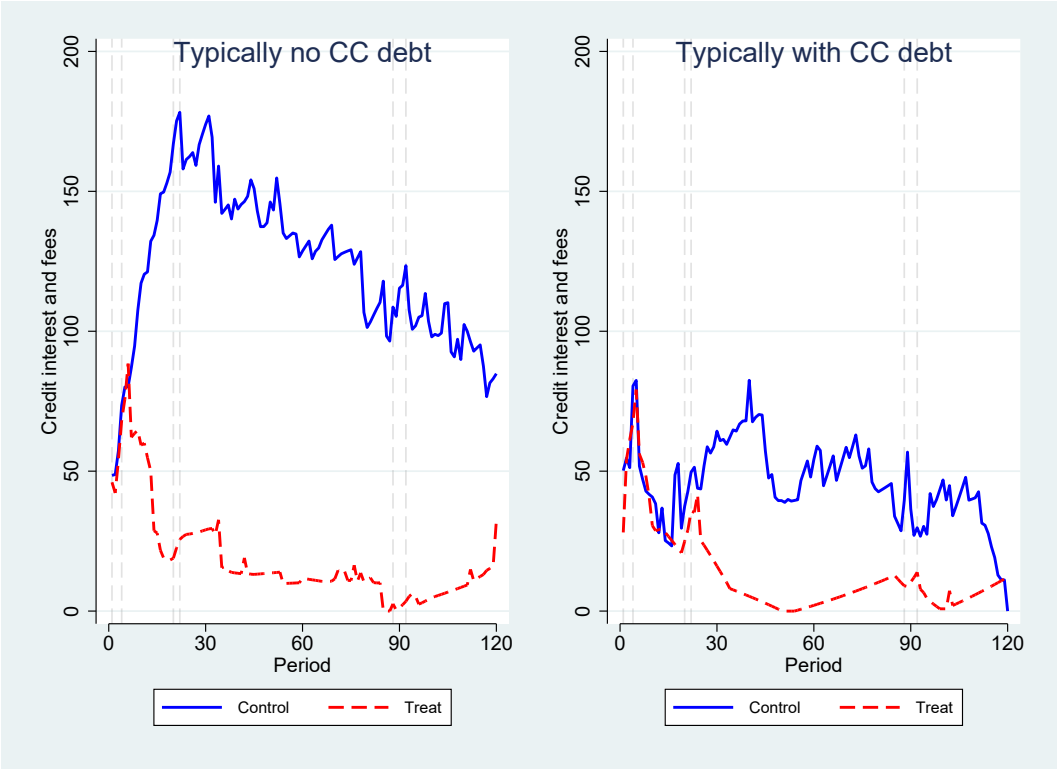


Figure C2: Credit Card Interest and Fees in the UF Path, by Real-World Revolver Status

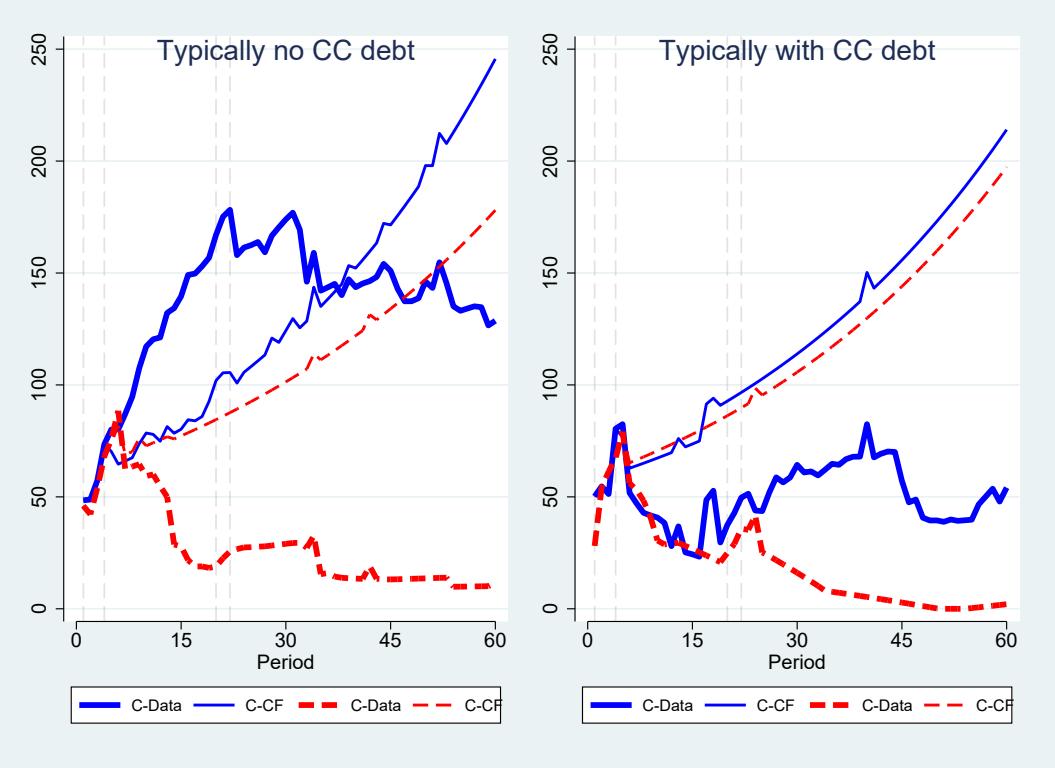


Figure C3: Counterfactual Credit Card Interest and Fees in the UF Path, by Real-World Revolver Status

Note: The thinner lines show counterfactual credit card interest and fees under the assumption that after the first unemployment spell, participants make payments equal to their credit card consumption, while continuing to incur interest on existing credit card balances and the fees observed in the experiment.