

When Consumer Financial Protection Spills Over: Student Loan Borrowing under the CARD Act

Supplemental Appendix: For Online Publication

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A Alternative Explanations to Main Event Study Results

In this section, we discuss other provisions of the CARD Act and other events that occurred during the same period as our event study. We discuss how these factors would specifically influence our results and explain why we consider it unlikely that they are the primary drivers of our findings.

Ability to pay (ATP) rules Our preferred interpretation is that the main provision of the CARD Act that could differentially affected incoming and returning students is the restriction on on-campus credit card marketing. Title 3 also required credit card applicants under age 21 to provide proof of ability to pay or to obtain a co-signer over 21. In principle, the ability of college students to document their income may differ between incoming and returning students. However, if anything, returning students are more likely to have access to on-campus employment opportunities, which could increase their access to credit cards leading to a reduction in student loan borrowing. Since we find the opposite of this, we do not think that ATP rules are the dominant force driving our treatment effects.

Reductions in home equity The financial crisis of 2009 may have reduced the ability of families to use home wealth to finance college education (Amromin et al. 2016). However, a decline in home equity is unlikely to be driving our results since that mechanism would affect incoming and continuing students with the same intensity. Our identification strategy, which controls for secular

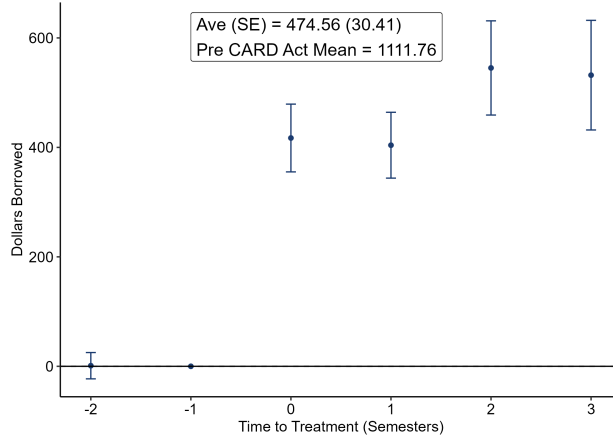


Figure A1: Treatment Effect on Student Loan Borrowing: Individual Fixed Effects

Notes: Event study plot from the Callaway and Sant’Anna (2021) staggered difference-in-difference estimator with individuals and semester fixed effects. The universal base period is $t = -1$, corresponding to the spring semester of a freshman year. The control group is given by units that are never treated. The panel is imbalanced. Standard errors are clustered at the student level.

changes in borrowing choices, relies on differences in trends between these two groups of students. This specification works to mitigate potential confounds affecting the economy as a whole.

Changes in composition of college students Despite the rich set of control variables in our main analysis, it is possible that the characteristics of students changed before and after our event study. To rule out that these changes are the drivers of our main results, we estimate an alternative specification with individual and time fixed effects and a staggered treatment assignment. This specification follows the same student over time as they transition from incoming freshman (who make borrowing decisions before spending time on campus) to returning sophomores (who decide after having been on campus for at least one year). As discussed in Section 3, credit card issuers effectively stopped advertising on college campuses in Fall of 2010. Students who first enrolled in Fall of 2010 or after are never exposed to credit card issuers on campus. We consider these students as treated when making borrowing decisions after completing at least one year on campus. Students who began college in the 2010–2011 academic year are treated beginning in Fall 2011; those who began in 2011–2012 are treated starting Fall 2012, etc. Treated students, therefore, make borrowing decisions after at least one year on campus without ever having been exposed to on-campus credit card advertising. In contrast, students who started college before Fall 2010 are considered “never treated,” having been exposed to credit card issuers on campus at some point

during their college experience.

Using this treatment definition, we implement the estimator of Callaway and Sant'Anna (2021) allowing for panel imbalance. We aggregate average treatment effects for each cohort and period into an event study plot using $t=-1$ as the universal base. Standard errors are clustered at the student level. The results are presented in Figure A1. We can see that the treatment effect is positive and significant, with an average effect of \$474.56 dollars, larger than our baseline estimates. While we are not able to decompose this effect to identify the source of the larger response, we interpret this as supporting evidence that the positive effect of our main specification is not driven by changes in the composition of enrolled students over time.

One drawback of this design is that, by construction, we can only observe treatment effects one period before treatment, comparing spring and fall semester of the freshman year. Furthermore, borrowing decisions across semesters in the same academic year are highly correlated, as they are based on the same annual FAFSA. As a result, this specification does not allow for a meaningful test of pre-treatment trends. For this reason, we treat these estimates as a robustness check and continue to rely on the repeated cross-sectional specification as our preferred approach in the main analysis.

Changes in Student Loan Limits Student loan limits have been shown to have a significant impact on student loan levels (Black et al. 2023). Table A1 reports the limits for subsidized, unsubsidized and total federal student loans for each grade and academic year between 2007 and 2014. There are no changes in the limits of subsidized loans during this time. In the fall of 2008 limits for un-subsidized loans increased by \$2,000 for all students. Notably, this occurred prior to Title 3's implementation. Given the timing, immediate and relative effects of the increase in student loan limits should occur in the pre-period. Our analysis does not reveal such relative effects. We also note that the limit increase, while nominally equivalent, was proportionally more for incoming students. Following Black et al. (2023), we would expect the limit increase to raise borrowing relatively more for incoming students. This works in the opposite direction of our main result: a relative increase in borrowing for returning students after Title 3. To the extent that delayed effects confound our empirical analysis, our estimates likely understate the impact of Title 3 on student loan borrowing.

Table A1: Federal Student Loan Limits by Year, Grade and Type: 2007-2014

School year	Grade	Max Subsidized	Max Unsubsidized	Max Total
2007	Freshman	3500	3500	3500
2008	Freshman	3500	5500	5500
2009	Freshman	3500	5500	5500
2010	Freshman	3500	5500	5500
2011	Freshman	3500	5500	5500
2012	Freshman	3500	5500	5500
2013	Freshman	3500	5500	5500
2014	Freshman	3500	5500	5500
2007	Sophomore	4500	4500	4500
2008	Sophomore	4500	6500	6500
2009	Sophomore	4500	6500	6500
2010	Sophomore	4500	6500	6500
2011	Sophomore	4500	6500	6500
2012	Sophomore	4500	6500	6500
2013	Sophomore	4500	6500	6500
2014	Sophomore	4500	6500	6500
2007	Junior/Senior	5500	5500	5500
2008	Junior/Senior	5500	7500	7500
2009	Junior/Senior	5500	7500	7500
2010	Junior/Senior	5500	7500	7500
2011	Junior/Senior	5500	7500	7500
2012	Junior/Senior	5500	7500	7500
2013	Junior/Senior	5500	7500	7500
2014	Junior/Senior	5500	7500	7500

B Alternative data filters

B.1 Definition of Post-treatment Period

Our main analysis drops observations between the Fall of 2009 and the Spring of 2011. We do so due to the timing of credit card decline among college students, and the timeline of financial aid decisions based on FAFSA submissions.

In defining our pre and post period, we take into account that FAFSA are submitted once per year and financial aid offers for both the fall and spring are determined before the academic year begins. In turn, students choose how much in loans to accept before each semester but, decisions for the fall and spring are highly correlated as they are based on the same FAFSA. To avoid mechanical persistence in loan choices, we require the last and first semesters from our pre- and post- reform periods to be from different academic years.

Title 3 went into law in May 2009, implementation began in February 2010 and the earliest evidence of the decline in credit card holders under 21 appears in the fourth quarter of 2010 (Debbaut et al. 2016). Based on this timing, we treat Spring 2009, part of the 2008-2009 academic year, as the last pre-reform period. We consider the 2009-2010 academic year to be a transition period during which both students and credit card issuers were likely adjusting their behavior in anticipation of full implementation. The 2010–2011 academic year was the first in which credit card issuers were fully absent from college campuses. Therefore, the first decision point based on a new FAFSA after students had experienced a full academic year under the marketing restrictions is Fall 2011, the beginning of the academic year immediately after full implementation.

However, anticipation effects, driven by lenders and/or students, could lead to increases or decreases in student loan borrowing between Fall 2009 and Spring 2011. For example, some credit card companies may have marketed more aggressively ahead of the restrictions, which would temporarily reduce demand for student loans among students who took up those offers. Others may have pulled back early to avoid reputational concerns, leading some students who might have otherwise relied on credit cards to substitute toward loans sooner.

Because the net effect of these opposing forces is theoretically ambiguous and cannot be empirically disentangled with available data, we treat the 2009–2010 and 2010–2011 academic years as transition periods and exclude them from the main analysis. Figure A2 shows estimates

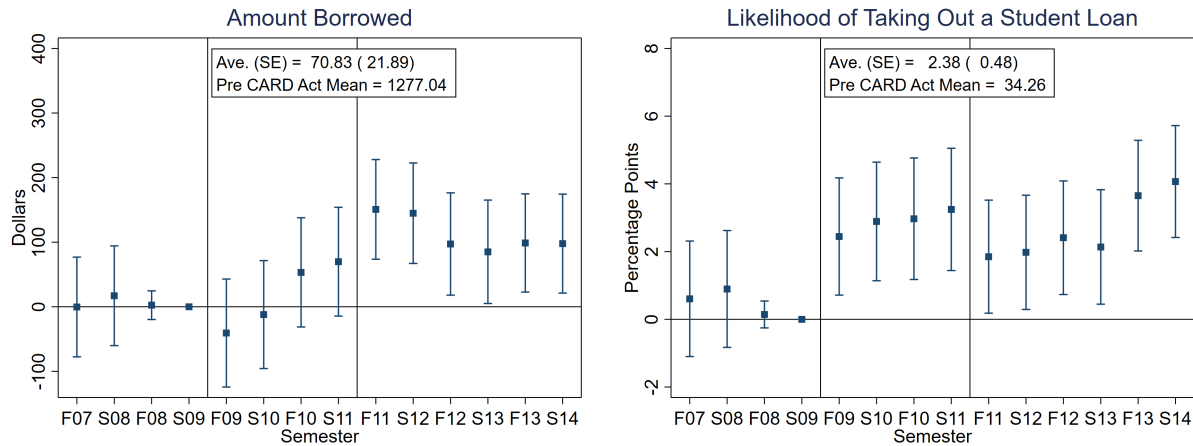


Figure A2: Treatment Effect on Student Loan Borrowing: Extended Post-Treatment Period

Notes: The figure repeats the analysis in Figure 1 except that it includes students' choices in interim semesters Fall 2009 - Spring 2011, which are omitted from the main specification.

including Fall 2009–Spring 2011. As expected, treatment effects during this period show no consistent pattern: a small, insignificant decline in average borrowing alongside an increase in the probability of taking out a positive loan, suggesting heterogeneous student responses.

B.2 Students under 21

Figure A3 shows treatment effect estimates of Title 3 excluding students 21 and older instead of excluding Senior students.

B.3 Fall semesters only

To ensure our results are not affected by this difference, we repeat Figure 1 using only fall semester data. Consistent with our baseline results, we find an average increase in amount borrowed of 114.56 and an increase in the probability of taking out a student loan of 2.33 percentage points. The results are presented in Figure A4.

Figure A2 shows treatment effect estimates of Title 3 considering only Fall Semesters.

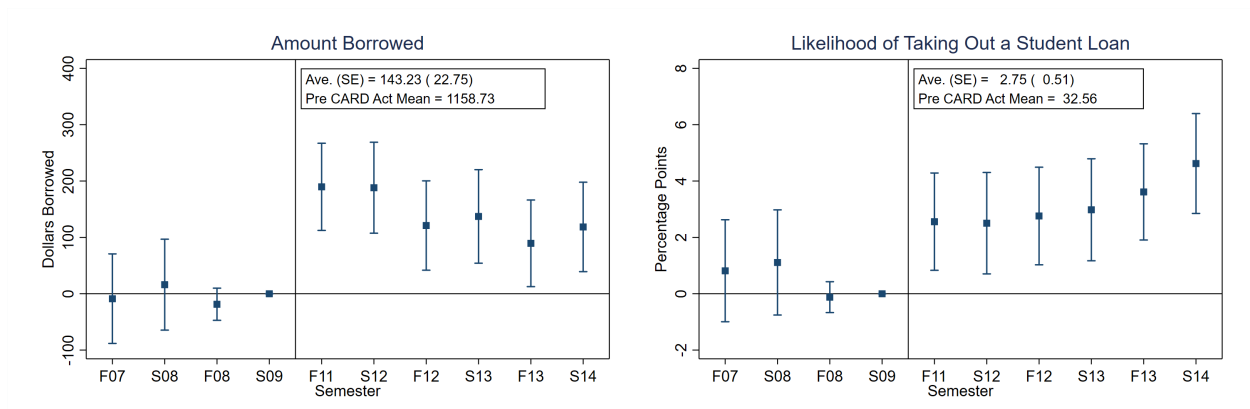


Figure A3: Treatment Effect on Student Loan Borrowing: Under 21 years old

Notes: The figure repeats the analysis in Figure 1 except that it includes excludes students 21 and older, instead of excluding seniors. The omitted semester is Spring 2009. The left panel shows the amount of student loans borrowed (b). The right panel plots the likelihood of taking out a student loan (p).

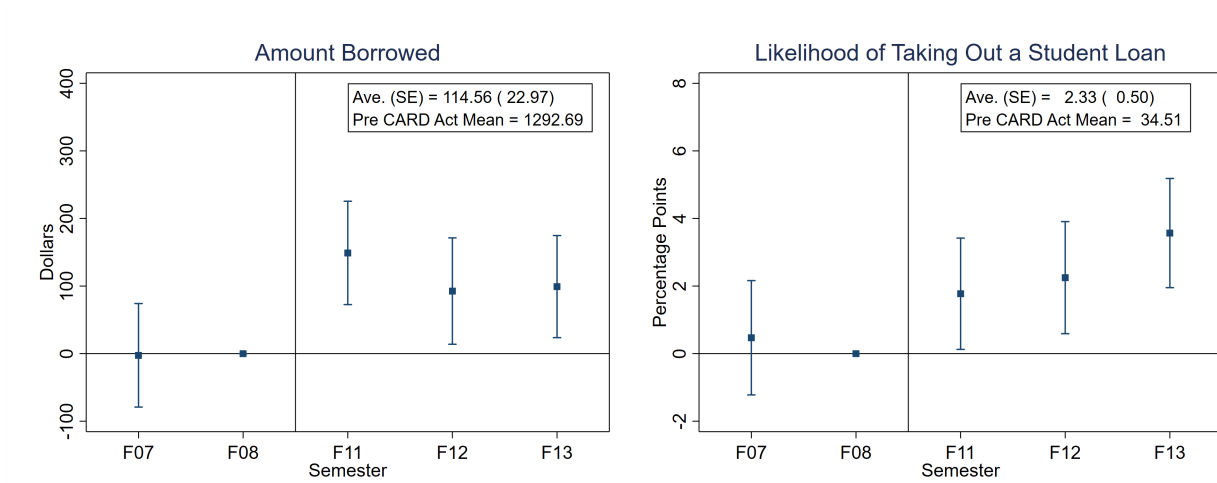


Figure A4: Treatment Effect on Student Loan Borrowing: Fall Semesters

Notes: The figure repeats the analysis in Figure 1 except that it includes students' choices only during Fall semesters. The omitted semester is Fall 2008. The left panel shows the amount of student loans borrowed (b). The right panel plots the likelihood of taking out a student loan (p).

C Academic Outcomes: Dynamic Specification and Parents' Income

In Section 6 we estimate the treatment effect of the intervention on academic outcomes using the difference-in-difference specification described in Equation 3. To assess the validity of the parallel

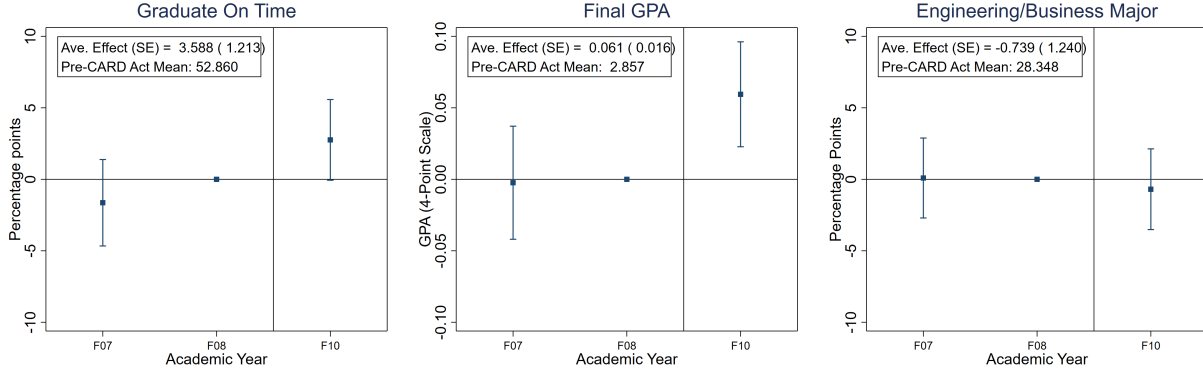


Figure A5: Treatment Effect on Academic Outcomes: Event Study Design

Note: The figure plots coefficients (β_k) from Equation 3. The dependent variables are on-time graduation (left panel), final grade point average (GPA) (middle), and whether or not the student majored in engineering or business (right). On-time graduation is defined as graduating in 4 years or less. Final GPA is based on a 4 point scale. The estimation controls for gender, in state status, and identified minority. It further includes enrollment year and ZIP income quartile fixed effects. Standard errors are clustered at the student level and 95% confidence intervals are shown.

trends assumption we also estimate a dynamic specification with semester-specific coefficients, as described in Equation A1:

$$y_i^k = \alpha_q^k + \alpha_s^k + \sum_{s \neq F09} \beta_s^k \times \mathbb{1}(Qtr \leq 3)_i + \gamma^k X_i + \epsilon_i. \quad (A1)$$

As before, we estimate treatment effects on the following outcomes:

$$k \in \{\text{GPA, On-time Graduation, Major}\}.$$

In this case, the treatment group is defined as all students in the bottom three quartiles of the parental income distribution. The results are presented in Figure A5. In all three cases we can see that there are no significant differences in trends in the pre-treatment period. We can also see a clear positive increase in the probability of graduating on time, and on grade point averages after Title 3 took place. In contrast, there is no treatment effect of the regulation on the probability of selecting a business or engineering major.

We also consider the possibility that parental income for students coming from zip codes in different quartiles may have evolved differently, due to the financial crisis of 2009, or due to other factors. To explore this, we replicate the analysis in Figure 3 using parents' aggregate gross income (AGI) as the outcome variable. The results are presented in Figure A6 and show no significant

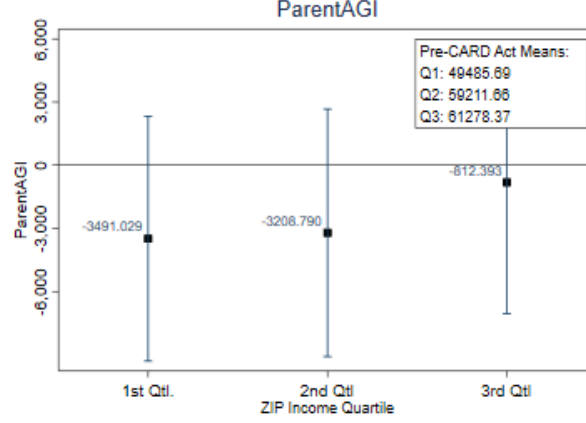


Figure A6: Changes in Parents' AGI by Quartile

Notes: The figure plots coefficients (β_k) from Equation 3. The dependent variable is the Aggregate Gross Income (AGI) of students' parents, as reported in their FAFSA application. We take the average of the AGI reported in each FAFSA. Students who did not file any FAFSA are not included in the analysis. The estimation controls for gender, in state status, and identified minority. It further includes enrollment year and ZIP income quartile fixed effects. Standard errors are clustered at the student level and 95% confidence intervals are shown.

differences in the evolution of parental income across students coming from zip codes with different income levels. Parent AGI is only available for students who filed a FAFSA and, as a result, the sample used for this analysis is endogenously selected (as FAFSA filing may itself be influenced by the treatment). We therefore treat this as only suggestive evidence that changes in parental income are unlikely to be driving our results.

D Additional Results

D.1 Heterogeneity by ZIP code level measures

In Section 4.1 we study heterogeneous effects of the intervention by parental income with a triple interaction specification. Here, we present an alternative estimation with four independent regressions, one for each quartile of ZIP code level parental income. Specifically, for each quartile we estimate:

$$y_{i,s} = \alpha_s + \alpha_c + \beta_1 \mathbb{1}(cont., post)_{i,s} + \gamma X_{i,s} + \epsilon_{i,s}. \quad (A2)$$

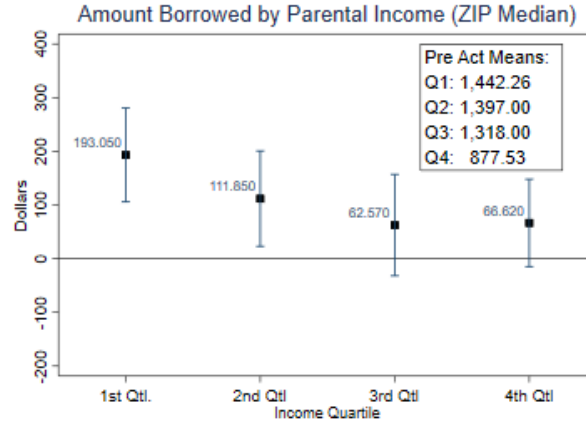


Figure A7: Heterogeneous Effects by Family Income (Separate Regressions by Quartile of ZIP Median Income).

Notes: The figure plots coefficients from Equation A2, estimated separately for observations in each quartile of ZIP code–level median family income. The estimation controls for gender, class in school, in state status, identified minority, and a binary variable indicating if a student filed a FAFSA before starting college. It further includes semester fixed effects. Standard errors are clustered at the student level and 95% confidence intervals are shown.

The results are presented in Figure A7. As before, treatment effects are concentrated on individuals coming from zip codes with lower levels of income.

We also present heterogeneous treatment effects by parental education. Specifically, for each student we pull information on the prevalence of college education at the ZIP code level using data from the ACS, and split them into quartile groups. Though correlated, parental income and education are by no means collinear. The correlation coefficient between these two variables is about 70 percent. We estimate Equation 2 calculating triple interactions with quartiles of parental education. Figure A8 presents the result. We can see that the treatment effect of Title 3 on student loan outcomes is significantly larger among students coming from neighborhoods where college education is less prevalent. For them, student loan balances increase by $\frac{281.92}{1,449.82} \approx 20$ percent.

D.2 Potential mechanisms behind treatment effects on academic performance

The results presented in Section 6 suggest that Title 3 lead to increases in academic performance among students most affected by the legislation. There are several reasons why increased reliance

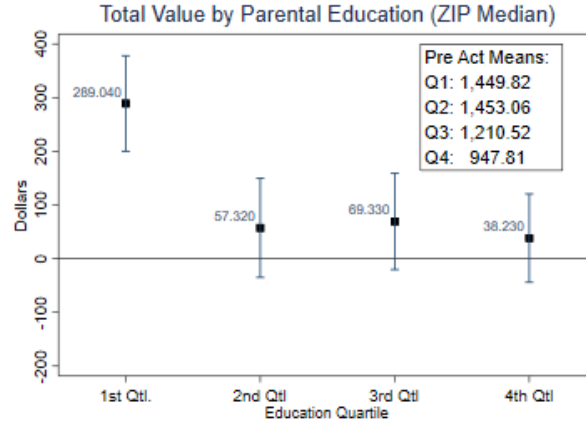


Figure A8: Heterogeneity by Parental Education

Notes: The figure plots coefficients (β_1) for the first quartile and $\beta_1 + \beta_q$ from Equation 2 for quartiles 2 to 4. Quartiles are defined based on ZIP code level parental education, measured as the fraction of individuals with a college degree in the zip code of students address at the time of application. The dependent variable is student loan balances. The estimation controls for gender, class in school, in state status, identified minority, and a binary variable indicating if a student filed a FAFSA before starting college. It further includes semester by ZIP education quartile fixed effects, as well as all lower level interactions not absorbed by the fixed effects. Standard errors are clustered at the student level and 95% confidence intervals are shown.

on student loans, when credit cards become less accessible, could influence academic performance. One possibility is a material improvement in students' need for liquidity: without the need to make ongoing credit card payments, students may feel less pressure to work on campus, freeing up time to focus on coursework. Another possibility is a reduction in the psychological burden of managing revolving debt. If credit card management was particularly stressful and distracting for students, replacing it with student loans could ease cognitive load and allow students to devote more attention to academics. While a detailed characterization of the mechanisms underlying these effects is beyond the scope of this paper, here we provide some cursory evidence on the relevance of these two channels.

Figure A9 repeats the analysis in Figure 3 using a binary variable indicating whether a student reports a non-zero AGI in any FAFSA they submitted. We use this as a proxy for having ever worked while enrolled on campus. Income information is only available for students who filed a FAFSA, and we code the variable as 1 when a student has a FAFSA record and reports a non-zero AGI. Students in the bottom quartile of the income distribution, who were the most affected by the regulation, do not show significant differences in the probability of ever working during college, relative to the top quartile of the income distribution, which was not affected by the regulation.

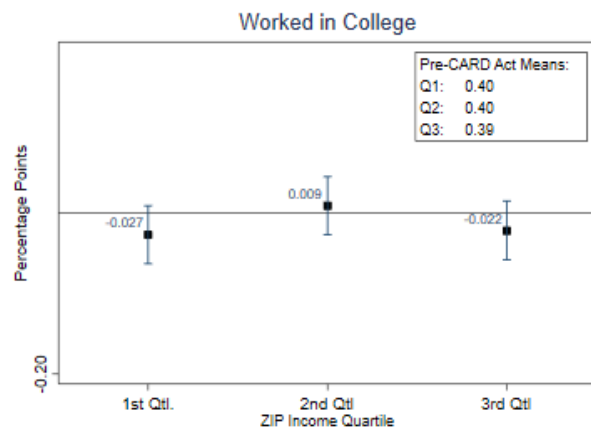


Figure A9: Changes in Propensity to Work in College by Quartile

Notes: The figure plots coefficients (β_k) from Equation 3. The dependent variable is an indicator that takes the value of one when a student reports a non-zero Aggregate Gross Income AGI of their own, in any FAFSA submitted. Students who did not file any FAFSA are coded with zero. The estimation controls for gender, in state status, and identified minority. It further includes enrollment year and ZIP income quartile fixed effects. Standard errors are clustered at the student level and 95% confidence intervals are shown.

In Figure A10, we use survey data matched to academic outcomes to examine the relationship between certain attitudes toward debt and finances, and students' GPA. Panel A shows that students who think about their finances more frequently tend to have somewhat lower GPAs. A similar pattern emerges for students reporting having more credit card debt (or student loans) than they expected, with the GPA decline being larger for credit card debt (Panels B and C, respectively). Panel D shows that students who think more frequently about their finances are more likely to perceive themselves as having excessive credit card or student loan debt, with a stronger association for student loans. This suggests that the perception of having too much debt is a potential mediator of the correlation shown in Panel A. While these descriptive statistics do not allow us to estimate the net effect of increasing reliance on student loans when credit cards become less accessible, we consider them as suggestive evidence that the regulation may have influenced students' state of mind, which in turn could have affected their academic performance.

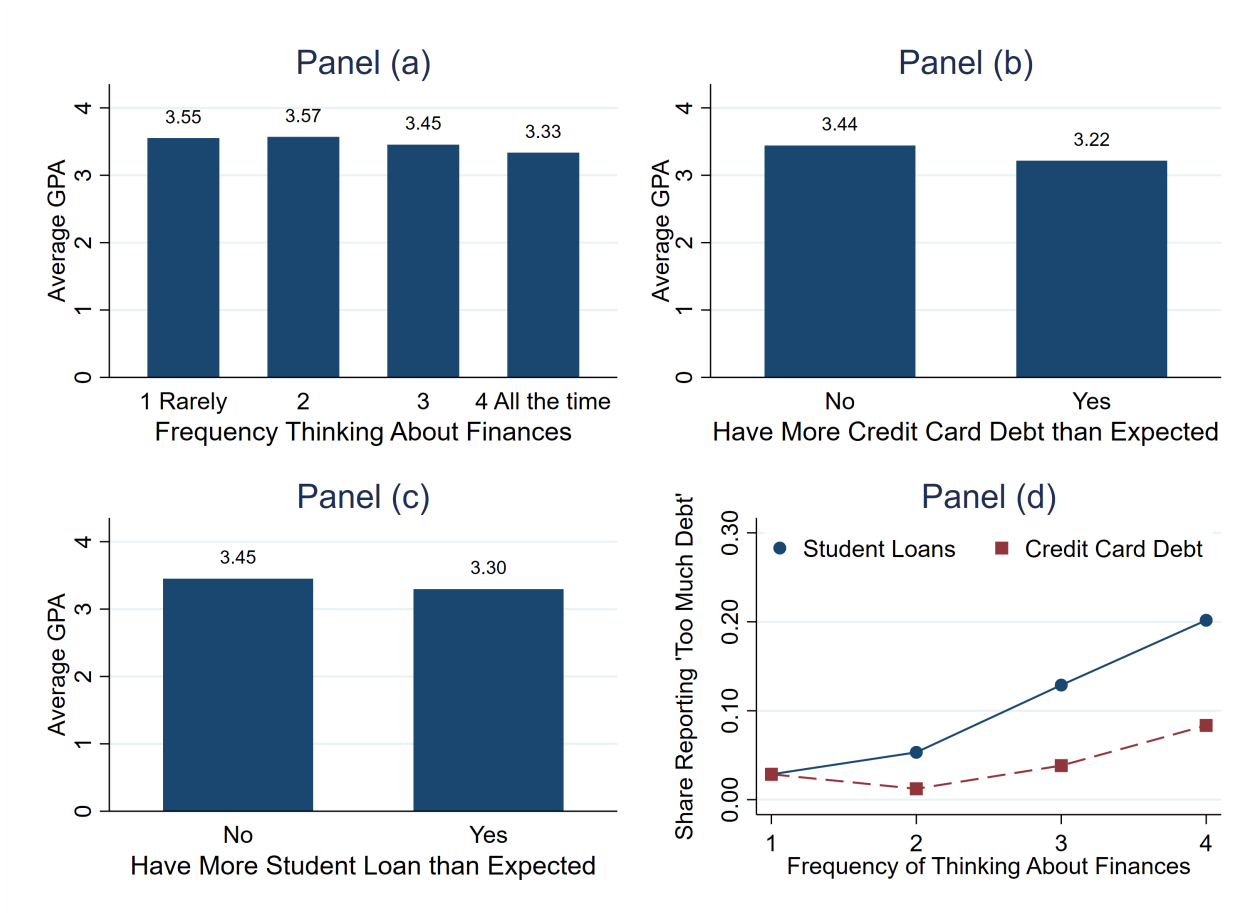


Figure A10: Relation between time spent thinking about finances, attitudes towards debt and academic performance

Notes: This figure shows information from 1,506 survey respondents matched to administrative data on cumulative GPA. Panel (a) shows the average GPA for different responses to the question “How frequently do you think about your finances?”, with 1 representing “Rarely” and 4 representing “All the time”. Panel (b)/(c) shows the average GPA of students who reported they agree or strongly agree, in a 5-point likert scale, with the statement “I have more credit card/student loan debt that I expected at this point”. Panel (d) shows the fraction of students reporting having too much debt (student loans in blue, credit card in red), for different levels of frequency thinking about their finances.

E Full Formal Model and Welfare Bounds Calculations

This section provides the full formal model and welfare analysis that is summarized in Section 5.

We first formally characterize students' borrowing decisions. This links a student's use of credit cards and the most available alternative form of credit: student loans. Our initial focus is on optimal borrowing behavior. This baseline characterization is then extended to include forms of limited rationality. Following evidence from the survey, we consider a bounded rationality rooted in low financial literacy and poor knowledge of one's own financial history. Lastly, we leverage our model to generate bounds on welfare changes, which we then quantify using results from the survey.

E.1 Students' Borrowing Problem

At the start of each year t , a student chooses how much to borrow on her credit card (b_t^c) and student loans (b_t^s) in order to cover necessary expenses during the semester. She is endowed with outside funds (w) and is burdened with existing card and student loan debt, b_0^c and b_0^s , respectively. A portion of her necessary expenditures are known at the year's start. However, some may arise unexpectedly. Denote her period utility of consumption (x) as

$$u_t(x) = \begin{cases} v_t(x - \underline{x}_t), & \text{if } x_t \geq \underline{x}_t, \\ -\infty, & \text{if } x_t < \underline{x}_t. \end{cases} \quad (\text{E1})$$

where v is a twice differentiable, increasing concave function. The term $\underline{x}_t$ represents subsistence consumption. Subsistence is stochastic and takes on values

$$\underline{x}_t = \begin{cases} h & \text{w.p. } p, \\ \ell & \text{w.p. } 1 - p, \end{cases}$$

with $h > \ell$. A student's optimal choice of how to cover her expenditures can then be written as

$$\max_{b_t^s, b_t^c} U_t(x_t) = u_t(x_t) + \beta V_t((1 + r^s)b_t^s + (1 + r^c)b_t^c), \quad (\text{E2})$$

such that

$$\begin{aligned} \underline{x}_t &\leq x_t \leq w + (b_t^c - b_0^c) + (b_t^s - b_0^s), \\ 0 &\leq b_t^c \leq \bar{b}^c, \\ 0 &\leq b_t^s \leq b_0^s + \bar{b}_t^s. \end{aligned}$$

Equation E2 defines the student's optimization problem. The student experiences disutility from carrying debt (in any form) into the future, and we represent this disutility using a decreasing and weakly (concave) value function that takes the student's debt level as its argument. This approach assumes a general fungibility of debt where students allocate optimally in expectation.¹

The interest rate charged on student loans and credit card debt is strictly positive and denoted by r^s and r^c , respectively where $0 < r^s < r^c \leq 1$. For the case of subsidized student loans that do not accrue interest during college, we still assume $r^s > 0$, reasoning that some positive costs still exist in taking out, holding, and returning additional funds over the period whether transactional and/or psychological (e.g., Cadena and Keys 2013).² Parameter $\beta \in (0, 1)$ represents the per-period discount factor.

The first constraint in Equation E2 is an accounting of consumption, liquidity inflows, and debt. To simplify notation, it incorporates subsistence ($\underline{x}_t$) as a consumption lower bound.³ The second ensures that the amount of credit card debt outstanding is non-negative and does not exceed the card's predetermined credit line. The third constraint limits student loan debt to be non-negative and within the amount available to the student.

Credit cards differ from student loans in an important way. Student loans are taken out at the start of each period, and interest accrues on the entire loan amount from the moment it is taken out. In other words, student loan borrowing choices are made prior to uncertainty being resolved, whereby some funds may remain unspent. In contrast, cards provide a line of credit. The student can decide

¹In reality, student loan and credit card debt are not fully comparable. For one credit card debt is dischargeable in bankruptcy while student loan debt is not. Similarly, debt repayment affects credit history immediately for credit cards, but typically only after graduation for student loans. We omit these factors because they matter primarily after graduation and interpret our model as capturing short-run welfare effects.

²Of the students in our survey who had available subsidized student loans in administrative records, and noted turning down additional funds on the survey, roughly one fifth (17.9%) provided "I was afraid I would spend the money unwisely" as a reason. This number is similar in magnitude to the share of respondents who claimed it would be a "real hassle" to take out more loans (19.6%). The union of these two groups is about a third of respondents (35.7%), providing some justification for our assumption.

³Because the insights of our model primarily derive from the subsistence shortfall in the high vs. low state and the curvature of the debt value function and not consumption utility, we did not consider allowing consumption above the subsistence level. Optimal consumption levels for both states would be known and ex ante and borrowing choices could accommodate them. Consumption above subsistence would decrease with debt levels as the marginal disutility of debt increases in magnitude. The welfare effects of such a model might still be accommodated by adjusting the curvature of the debt value function under our current framework.

how much to borrow on their card after learning about their expenditure needs, albeit at a much higher price.⁴ Given $r^s < r^c$, a student should finance foreseeable expenses with student loans to minimize costs. For uncertain or unforeseeable expenses, the optimal choice is less clear. A student may choose to take out student loans and pay the lower rate with certainty. Alternatively, she may prefer to gamble and possibly not pay interest. She may also choose something in between. We can interpret taking out student loans to cover uncertain expenditures similarly to buying “insurance” against the need to borrow on a card at higher interest should the need arise.

For any initial debt $b_0 = b_0^c + b_0^s$ and endowment w , there are three key ranges to consider: (1) $w - b_0 > h$, (2) $\ell < w - b_0 < h$, (3) $w - b_0 < \ell$. In case 1, the student has sufficient endowment to cover all her debt and possible expenses. It is optimal for her to end the period with no debt accrued and having consumed her endowment less any debts repaid. In case 2, she will be indebted in the high state. In case 3, she will be indebted in either state.

Since $r^s < r^c$, it is more advantageous for a student who needs to borrow to move any known expenses—whether previous debts or certain future shortfalls—to student loans. Financing uncertain shortfalls, however, is more complicated. Define such a shortfall Γ as

$$\Gamma \equiv \begin{cases} 0, & \text{if } w - b_0 > h, \\ h - (w - b_0) & \text{if } \ell < w - b_0 < h, \\ h - \ell & \text{if } w - b_0 < \ell. \end{cases} \quad (\text{E3})$$

As aforementioned, for each γ dollar of Γ a student can use student loans effectively as a form of insurance against having to borrow on her card. In other words, she can pay $\gamma \times r^s$ in both states h and ℓ in exchange for not paying $(r^c - r^s)(\Gamma - \gamma)$ when the state is h . It is useful to reformulate her problem as a choice over how much of her shortfall to insure against with student loans:

$$\max_{0 \leq \gamma \leq \Gamma} v_t(0) + pV_t((1+r^s)(b_0+h-w) + (r^c-r^s) \cdot (\Gamma-\gamma)) + (1-p)V_t((1+r^s)(b_0+\ell-w) + r^s \cdot \gamma) \quad (\text{E4})$$

The following characterize conditions under which borrowing on a credit card is optimal:

Proposition 1 *Suppose $w - b_0 < \ell$ (case 3). There exist two probability thresholds, p_1 and p_2 , where $0 < p_1 \leq p_2 \leq \frac{r^s}{r^c}$ such that*

⁴We are not necessarily implying a student only uses her credit card for borrowing. She may use it as a method of payment, though never borrow on it. We do not model the value of cards for payments. Our survey (see Section F.2) indicates that students easily substitute towards other electronic payment methods, like debit cards, whereby regulating card use likely did not gravely impact students on this margin.

1. For $p \geq p_2$, the student covers her shortfall only with student loans (she fully insures),
2. For $p_1 < p < p_2$, the student partially insures against having to borrow on her card,
3. For $p < p_1$, the student covers her entire shortfall with a credit card.

Proof. Let

$$a = \frac{r^s}{r^c - r^s} \cdot \frac{V'_t((1+r^s)(b_0 + \ell - w) + r^s \cdot \Gamma)}{V'_t((1+r^s)(b_0 + h - w))}$$

and

$$b = \frac{r^s}{r^c - r^s} \cdot \frac{V'_t((1+r^s)(b_0 + \ell - w))}{V'_t((1+r^s)(b_0 + h - w) + (r^c - r^s) \cdot \Gamma)}.$$

Since V_t is strictly decreasing and $r^c > r^s$ by assumption, $0 < a \leq b$. Consider $f(p) = \frac{p}{1-p}$. For any non-negative value c , $\exists p \in [0, 1)$ s.t., $f(p) = c$. Define p_1 and p_2 s.t. $f(p_1) = a$, $f(p_2) = b$. Clearly, $p_1 \leq p_2$.

Note that $\frac{p_2}{1-p_2} \frac{r^c - r^s}{r^s} \leq \frac{V'_t((1+r^s)(b_0 + \ell - w))}{V'_t((1+r^s)(b_0 + h - w) + (r^c - r^s)\Gamma)} \leq 1 \Rightarrow p_2 \leq \frac{r^s}{r^c}$.

Consider any $p \geq p_2$, for any $\gamma \in [0, \Gamma]$ we have

$$\frac{V'_t((1+r^s)(b_0 + \ell - w) + r^s \gamma)}{V'_t((1+r^s)(b_0 + h - w) + (r^c - r^s)(\Gamma - \gamma))} \leq \frac{V'_t((1+r^s)(b_0 + \ell - w) + r^s \Gamma)}{V'_t((1+r^s)(b_0 + h - w))} \leq \frac{r^c - r^s}{r^s} \frac{p}{1-p}.$$

with equality possible only where $\gamma = \Gamma$. Then for any $0 \leq \gamma < \Gamma$,

$$(1-p)r^s V'_t((1+r^s)(b_0 + \ell - w) + r^s \gamma) - p(r^c - r^s)V'_t((1+r^s)(b_0 + h - w) + (r^c - r^s)(\Gamma - \gamma)) < 0.$$

This indicates the expression to be maximized in (E4) is increasing on the interval $[0, \Gamma]$. Thus $\gamma = \Gamma$ is the maximum on the interval and the student fully insures.

Alternatively if $p < p_1$ then

$$\frac{V'_t((1+r^s)(b_0 + \ell - w) + r^s \gamma)}{V'_t((1+r^s)(b_0 + h - w) + (r^c - r^s)(\Gamma - \gamma))} \geq \frac{V'_t((1+r^s)(b_0 + \ell - w))}{V'_t((1+r^s)(b_0 + h - w) + (r^c - r^s)\Gamma)} \geq \frac{(r^c - r^s) \cdot p}{r^s \cdot (1-p)}.$$

with equality possible only where $\gamma = 0$. Then for any $0 < \gamma \leq \Gamma$,

$$(1-p)r^s V'_t((1+r^s)(b_0 + \ell - w) + r^s \gamma) - p(r^c - r^s)V'_t((1+r^s)(b_0 + h - w) + (r^c - r^s)(\Gamma - \gamma)) > 0.$$

This indicates the expression to be maximized in (E4) is decreasing on the interval $[0, \Gamma]$. Thus $\gamma = 0$ is the maximum on the interval and the student does not insure.

Now consider any $p \in (p_1, p_2)$. We know that any interior solution of (E4) where $0 < \gamma^* < \Gamma$, it follows that

$$\frac{p}{1-p} \cdot \frac{r^c - r^s}{r^s} = \frac{V'_t((1+r^s)(b_0 + \ell - w) + r^s \cdot \gamma^*)}{V'_t((1+r^s)(b_0 + h - w) + (r^c - r^s) \cdot (\Gamma - \gamma^*))}. \quad (\text{E5})$$

From the previous reasoning we know that where $\gamma = \Gamma$, $\frac{V'_t((1+r^s)(b_0 + \ell - w) + r^s \Gamma)}{V'_t((1+r^s)(b_0 + h - w))} > \frac{r^c - r^s}{r^s} \frac{p}{1-p}$ and where $\gamma = 0$, $\frac{V'_t((1+r^s)(b_0 + \ell - w))}{V'_t((1+r^s)(b_0 + h - w) + (r^c - r^s)\Gamma)} < \frac{r^c - r^s}{r^s} \frac{p}{1-p}$. By the intermediate value theorem, there exists a $\gamma \in (0, \Gamma)$ satisfying Equation (E5). Thus this student will insure up to $0 < \gamma < \Gamma$ and rely on credit card liquidity to cover the remainder $(\Gamma - \gamma)$ should the high state be realized. ■

Corollary 1 Suppose $\ell < w - b_0 < h$ (Case 2). Then there exist similar probability thresholds to Case 3, p'_1 and p'_2 $0 < p'_1 \leq p'_2 \leq \frac{r^s}{r^c}$.

Proof. Let

$$a = \frac{r^s}{r^c - r^s} \cdot \frac{V'_t(\max\{(1 + r^s)(b_0 + \ell - w) + r^s \cdot \Gamma, 0\})}{V'_t((1 + r^s)(b_0 + h - w))}$$

and

$$b = \frac{r^s}{r^c - r^s} \cdot \frac{V'_t(0)}{V'_t((1 + r^s)(b_0 + h - w) + (r^c - r^s) \cdot \Gamma)}.$$

Similar arguments as in the Proof of Proposition (1) show the existence and relation of p'_1 and p'_2 .

■

Corollary 2 For all $r^s > 0$, the statements $p_1 = p_2$, $p_2 = \frac{r^s}{r^c}$, and V_t is linear are equivalent.

Proof. If $p_1 = p_2$, then $\frac{V'_t((1+r^s)(b_0+\ell-w)+r^s \cdot \Gamma)}{V'_t((1+r^s)(b_0+h-w))} = \frac{V'_t((1+r^s)(b_0+\ell-w))}{V'_t((1+r^s)(b_0+h-w)+(r^c-r^s) \cdot \Gamma)}$. Since V_t is assumed to be decreasing and (weakly) concave, the can only occur if V is linear. Then $\frac{p_2}{1-p_2} = \frac{r^s}{r^c-r^s} \Rightarrow p_2 = \frac{r^s}{r^c}$. If $p_2 = \frac{r^s}{r^c}$, then $\frac{V'_t((1+r^s)(b_0+\ell-w))}{V'_t((1+r^s)(b_0+h-w)+(r^c-r^s) \cdot \Gamma)} = 1$ and V_t must be linear. Then $p_1 = \frac{r^s}{r^c} = p_2$.

The preceding arguments have already showed that $p_1 = p_2 = \frac{r^s}{r^c}$ if V_t is linear. A similar line of reasoning will hold for Case 2. ■

The likelihood of a shortfall and the relative price of student loans emerge as principal determinants of whether it is optimal for students to borrow on their card. When shortfalls are sufficiently unlikely, taking out a student loan to cover uncertain expenditures is suboptimal. Assuming students are not risk-loving, the likelihood of a shortfall that justifies borrowing on a card is never higher than the ratio of r^s and r^c .

The state, or levels of indebtedness and endowment, also influences the choice to borrow on a credit card. If absolute risk aversion is non-increasing in endowment, students with more debt are less likely to take their chances and rely on their credit card to cover a shortfall. The same applies to students with fewer financial resources as Proposition 2 and Corollary 3 show.

Proposition 2 Suppose $-\frac{V''_\infty(x)}{V'_\infty(x)}$ is non-decreasing in x . Then for any two levels of aggregate debt, $b_0 < b'_0$ the corresponding probability thresholds follow $p'_1 \leq p_1$ and $p'_2 \leq p_2$. In other words, higher levels of initial debt make students more predisposed to precautionarily borrow on student loans.

Proof. The condition $-\frac{V''_{\infty}(x)}{V'_{\infty}(x)}$ is more commonly defined as the Arrow-Pratt coefficient of risk aversion. If it were non-decreasing in x , it implies that more risky gambles (in this case credit liquidity) are less likely to be selected over safer gambles (in this case student loans) as x increases. Formally, this means that $\frac{V'_t((1+r^s)(b_0+\ell-w)+r^s \cdot \gamma^*)}{V'_t((1+r^s)(b_0+h-w)+(r^c-r^s) \cdot (\Gamma-\gamma^*))} \leq \frac{V'_t((1+r^s)(b'_0+\ell-w)+r^s \cdot \gamma^*)}{V'_t((1+r^s)(b'_0+h-w)+(r^c-r^s) \cdot (\Gamma-\gamma^*))} \forall 0 \leq \gamma \leq \Gamma$. Following the reasoning of the proof of Proposition (1), it follows that $p'_1 \leq p_1$ and $p'_2 \leq p_2$. ■

Corollary 3 Suppose $-\frac{V''_{\infty}(x)}{V'_{\infty}(x)}$ is non-decreasing in x . Consider two students i and i' with identical debt levels but with different wealth so that one is categorized as Case 2 and the other Case 3. Formally, $w < w'$ and $w < b_0 + \ell$ but $b_0 + \ell < w' < b_0 + h$. Then the corresponding probability thresholds follow $p'_1 \leq p_1$ and $p'_2 \leq p_2$.

Proof. Clearly, $\frac{V'_t((1+r^s)(b_0+\ell-w)+r^s \cdot \gamma^*)}{V'_t((1+r^s)(b_0+h-w)+(r^c-r^s) \cdot (\Gamma-\gamma^*))} \leq \frac{V'_t(\min\{(1+r^s)(b_0+\ell-w)+r^s \cdot \gamma^*, 0\})}{V'_t((1+r^s)(b'_0+h-w)+(r^c-r^s) \cdot (\Gamma-\gamma^*))} \forall 0 \leq \gamma \leq \Gamma$. The result $p'_1 \leq p_1$ and $p'_2 \leq p_2$ follows directly from this relation. ■

Following the evidence from our survey, we focus on two departures from optimal behavior: (1) poor understanding of financial concepts, e.g. low financial literacy and (2) poor knowledge of one's own financial history. A boundedly rational student with poor grasp of how interest compounds, or other financial concepts, may underestimate the cost of borrowing on their credit card. In the extreme, they optimize under the assumption that $r^s = r^c$. Under this misperception, the inequalities in Proposition 1 imply that, for any $p \in [0, 1)$, borrowing on credit cards is the better option.

A boundedly rational student who is not aware of her own past choices has incorrect beliefs about available student loans. She believes she has maxed out available her student loans when in reality she is still under the limit. When her beliefs over available liquidity are incorrect, she may simply borrow on her card because she is unaware that she can take out student loans. In the context of Proposition 1, this student will behave as if the cost of student loans were prohibitively high. In this case the student will always choose to cover a shortfall using her credit card rather than taking out more in student loans.

E.2 Restricting Cards: Choices and Welfare

The policy pushed students away from cards—some of whom may have otherwise benefited from their use. We consider how a student whose option to use a card is “taken away” fares as a result. In actuality, some students stopped using a credit card while others did not. We revisit partial compliance and incorporate it into our empirical assessment of welfare in Section 5.5.

Proposition 1 characterizes the conditions under which a student who needs liquidity optimally borrows on their credit card. Without a credit card, she would have to entirely rely on student loans to cover any shortfall. This effectively forces her to “fully insure” against the higher rate when she may optimally prefer not to do so. Here we characterize how a student’s well-being changes in the event she no longer has access to a credit card. We consider two student types: those who are fully rational, and those who lack knowledge of financial concepts or history. For either student type st , we denote welfare changes as

$$\Delta W^{st} = W_{(\text{without a credit card})}^{st} - W_{(\text{with a credit card})}^{st}$$

When students choose optimally, restricting their choices cannot improve their well-being. For students who do not require additional liquidity, e.g., case 1 above, or for whom the likelihood of h is sufficiently high, restricting card use has no effect on welfare. However, students that would have utilized a credit card, i.e., those for whom the inequality $p > p_2$ in Proposition 1 was not satisfied, now must to take out additional student loans to satisfy subsistence. This is preferred only if the high state occurs. The welfare change for these students that make decisions optimally (opt) is

$$\begin{aligned} \Delta W^{fr} = & (1 - p) \cdot [V_t((1 + r^s)\gamma(\ell) + r^s\Gamma) - V_t((1 + r^s)\gamma(\ell) + r^s\gamma^*)] + \\ & p \cdot [V_t((1 + r^s)\gamma(h)) - V_t((1 + r^s)\gamma(h) + (r^c - r^s)(\Gamma - \gamma^*))] \end{aligned} \quad (E6)$$

where $\gamma(\ell) = b_0 + \ell - w$ and $\gamma(h) = b_0 + h - w$. As shown in Equation E6, a decline in the rate difference between cards and student loans or a lower probability of h occurring would increase the welfare losses associated with the policy.

For students who are ignorant of financial concepts (br), taking away the credit card option will also lead to more student loan borrowing. Further, since the model predicts this type will borrow

on a card regardless of p , such a policy should raise their demand for student loans. Nevertheless, not all students of this type will be better off without a card.

Students for whom the inequality $p < p_1$ in Proposition 1 is *actually* satisfied will endure welfare losses similar to the optimal case. Students who are mistakenly borrowing on their credit card, or for whom the inequality is not in actuality satisfied, will benefit. The welfare change of this is

$$\Delta W^{br} = (1 - p) \cdot [V_t((1 + r^s)\gamma(\ell) + r^s\Gamma) - V_t((1 + r^s)\gamma(\ell))] + \\ p \cdot [V_t((1 + r^s)\gamma(h)) - V_t((1 + r^s)\gamma(h) + (r^c - r^s)\Gamma)]. \quad (E7)$$

As indicated in Equation E7, the policy necessarily raises welfare when $p > \frac{r^s}{r^c} \geq p_2$, and would reduce it when $p < p_1$. This means that welfare effects for this student type depend on the likelihood of a high state for that student.

Students that are unaware of their financial history and have mistaken beliefs about their available credit options behave similarly to those who are ignorant of financial concepts. Reducing their access to credit cards will lead them towards finding funds elsewhere. As they search for more funds, they may update their mistaken belief that they have no student loan availability. This could lead to more student loan borrowing. Moreover, since this type always uses a credit card to cover a shortfall, regardless of p , the welfare calculation is similar to that of students who don't know prices or internalize the cost of credit (Equation E7). The effect of reducing card access on student loan debt should be larger than under optimal behavior. Using a similar argument to that above, eliminating the credit card option can hurt students of this type for whom $p < p_1$ in Proposition 1. However, if many are mistakenly borrowing on their card, the net effect is likely positive.

E.3 Welfare Bounds and Calculation

A full estimation of our model requires substantial functional form restrictions on students' preferences for which theory provides little guidance. Instead, we derive bounds to welfare using linear forms that are informative and easily calculated using available data. Before proceeding further, it is helpful to envision a worst case scenario for the policy.

Example 1 *Suppose all students choose optimally. Further suppose parameter p is infinitesimally small, s.t., $p \approx 0$. Since the high state can still occur ($p \neq 0$), subsistence utility requires that*

students have liquidity available in case of the high state. The credit card is the ideal tool. A switch to student loans is particularly harmful.

$$\Delta W = V_t((1 + r^s)\gamma(\ell) + r^s\Gamma) - V_t((1 + r^s)\gamma(\ell)) \equiv -\Delta V_t. \quad (\text{E8})$$

For any utility specification satisfying our assumptions, we will define a value ΔV_t , that represents the absolute worst case for a policy that pushes students to use student loans for unplanned expenses. Note that this worst case welfare loss is a value defined independent of rationality type. It can be viewed as a unit of measurement. Proposition 3 shows that a utility function scaled by this value will provide a lower bound on all welfare analysis.

Proposition 3 Consider the following linearly scaled utility function L_t ,

$$L_t(d) = \frac{V_t((1 + r^s)\gamma(\ell) + r^s\Gamma) - V_t((1 + r^s)\gamma(\ell))}{r^s\Gamma} \cdot d = \frac{-\Delta V_t}{r^s\Gamma} \cdot d \quad (\text{E9})$$

For the welfare calculations ΔW^{fr} and ΔW^{br} defined in Equations (E6), (E7), the linear function L_t provides a lower bound on changes in welfare.

Proof. Consider the optimal consumer in item 1. Define $\gamma^* \in [0, \Gamma]$, as before as the level of insurance the consumer selects under no restrictions. If the probability of the high state, $p \geq p_2$, then $\gamma = \Gamma$, the student fully insures with student loans, there is no change in behavior. It follows then that $\Delta W^{fr} = 0$ under any utility specification, trivially satisfying our claim.

If $p < p_2$, then behavior changes under the policy as $\gamma^* < \Gamma$. Let us first define a particular risk premium $\epsilon \geq 0$ that represents the utility gain to the consumer from full insurance at even odds. Recall from Proposition 1 that $p_2 \leq \frac{r^s}{r^c}$. Then,

$$\begin{aligned} \epsilon \equiv & (1 - p^*) \cdot [V_t((1 + r^s)\gamma(\ell) + r^s\Gamma) - V_t((1 + r^s)\gamma(\ell) + r^s\gamma^*)] + \\ & p^* \cdot [V_t((1 + r^s)\gamma(h)) - V_t((1 + r^s)\gamma(h) + (r^c - r^s)(\Gamma - \gamma^*))] \end{aligned} \quad (\text{E10})$$

where $p^* = \frac{r^s}{r^c}$.

There exists a p' such that if we were to replace p^* with p' in Equation (E10), ϵ would equal 0. Further $p' \leq p^*$. Multiplying both sides of Equation (E10) by $\frac{p'}{p^*}$ and combining like terms yields

$$\epsilon = \left(\frac{p^* - p'}{p'} \right) [V_t((1 + r^s)\gamma(\ell)) - V_t((1 + r^s)\gamma(\ell) + r^s\gamma^*)]. \quad (\text{E11})$$

Now multiply both sides of Equation (E10) by $\frac{p}{p'}$ and apply the same technique. This allows us to come up with a new expression for ΔW^{fr} .

$$\begin{aligned} \Delta W^{fr} &= \frac{p}{p^*} \epsilon - \left(1 - \frac{p}{p^*} \right) [V_t((1 + r^s)\gamma(\ell) + r^s\gamma^*) - V_t((1 + r^s)\gamma(\ell) + r^s\Gamma)] \quad (\text{E12}) \\ &= \left(\frac{p(p^* - p')}{p^*p'} - \frac{p^* - p}{p^*} \right) [V_t((1 + r^s)\gamma(\ell) + r^s\gamma^*) - V_t((1 + r^s)\gamma(\ell) + r^s\Gamma)] \\ &\geq -\frac{p^* - p}{p^*} [L_t((1 + r^s)\gamma(\ell)) - L_t((1 + r^s)\gamma(\ell) + r^s\Gamma)] \end{aligned}$$

where the last expression is the welfare loss under the linear, risk-neutral specification L_t .

Now consider item 2, for the boundedly rational consumer. Let us define $p_3 \in [p_1, p_2]$ as the probability where the utilities from full insurance and no insurance (i.e., full liquidity) are equal. This is also the point where $\Delta W^{br} = 0$, and our claim is trivially satisfied. Using similar techniques as before, we can set up Equation (E12) as

$$\begin{aligned}\Delta W^{br} &= \left(\frac{p(p^* - p_3)}{p^* p_3} - \frac{p^* - p}{p^*} \right) [V_t((1 + r^s)\gamma(\ell)) - V_t((1 + r^s)\gamma(\ell) + r^s \Gamma)] \\ &\geq -\frac{p^* - p}{p^*} [L_t((1 + r^s)\gamma(\ell)) - L_t((1 + r^s)\gamma(\ell) + r^s \Gamma)].\end{aligned}$$

which importantly holds whether $p > p^*$ and welfare changes are positive in the linear case or $p < p^*$. ■

Now we can re-write Equations E6 and E7 using the linear form in Equation E9. Dividing by $-\Delta V_t > 0$ preserves the inequality. Respectively,

$$\frac{\Delta W_{linear}^{fr}}{-\Delta V} = \begin{cases} p \cdot \frac{r^c}{r^s} - 1 & \text{if } p < \frac{r^s}{r^c}, \\ 0 & \text{if } p \geq \frac{r^s}{r^c} \end{cases} \quad (\text{E13})$$

$$\frac{\Delta W_{linear}^{br}}{-\Delta V} = p \cdot \frac{r^c}{r^s} - 1. \quad (\text{E14})$$

Equations E13 and E14 constitute a lower bound on the (relative) welfare effects, expressed as a proportion of the worst case scenario described in Example 1. Clearly, if $p \approx 0$ Equation E13 is -1 (i.e., full harm); it is 0 (i.e., no harm) should p be sufficiently high. Equation E14 represents the welfare changes under bounded rationality where the student chooses to use the credit card unconditional of parameters. Welfare ranges from -1 (i.e., full harm) when $p \approx 0$ to values higher than 1 (i.e., net benefit) depending on the ratio of r^c to r^s . It is important to note this is a lower bound; in the event $p \approx 0.5$ and $r^c \gg r^s$ utility curvature likely increases the nominal welfare value of the true (unknown) utility function as student loans are the less risky option. Conveniently, this value is solely a function of the likelihood (p) of the high consumption state and the relative price of card debt (r^c) and student loans (r^s).

We estimate r^c and p with information from the CFPB's CARD Act report (CFPB 2013) and our survey responses, respectively, and denote the corresponding estimates as $\hat{r}^c$ and $\hat{p}$. In turn, we estimate r^s with $\hat{r}^s$, with the weighted average of 0 for students with subsidized loans available

(%SubSL), and the unsubsidized interest rate reported in the Department of Education's website for the remaining students. The change in credit card use (% Δ CC) is estimated by comparing our results to the Sallie Mae survey (SallieMae 2009).⁵ A student is characterized as needing liquidity (%NL) if they do not report they would ask their parents (or someone else) for funds in case of an emergency expenditure. We determine the proportion of boundedly rational students, %BR, from the proportion that answer a financial literacy question incorrectly or make an incorrect statement about their available student loans. With the exception of credit card interest rates, which we assume to be constant across the distribution of parental income, the key parameters of the analysis vary by income quartile and are only assumed to be constant within each quartile.

Given the above, denote an average change in welfare as

$$\Delta \bar{W}^{fr} = (\% \Delta CC) \cdot (\% NL) \cdot \left[\min\{0, \hat{p} \cdot \frac{\bar{r}^c}{\bar{r}^s} - 1\} \mid NL = 1 \right], \quad (E15)$$

$$\Delta \bar{W}^{br} = (\% \Delta CC) \cdot (\% NL) \cdot \left[\hat{p} \cdot \frac{\bar{r}^c}{\bar{r}^s} - 1 \mid NL = 1 \right], \quad (E16)$$

$$\Delta \bar{W} = (1 - \% BR) \cdot \Delta \bar{W}^{fr} + \% BR \cdot \Delta \bar{W}^{br}. \quad (E17)$$

Equation E15 refers to the average effect for students who make optimal choices, and Equation E16 refers to the average effect for students that make suboptimal ones consistent with our models of bounded rationality. Equation E17 denotes the overall average effect. As our values are tied to a specific worst case, it should be noted that this case would require (% Δ CC) = (%NL) = 100.

Table E1 reports ranges for the policy's effects on student's well-being. Column (1) shows the overall impact of the policy, while Columns (2)–(5) break down the effect by ZIP income quartile. For these latter four columns, we use separate values of $\hat{p}$, %SubSL, % Δ CC, %NL, and %BR from the quartile averages in our survey and administrative data. For both rationality types, welfare changes for students affected by the policy ($\Delta \bar{W}^{fr}$ and $\Delta \bar{W}^{br}$) are linear functions of $\hat{p}$ and $\frac{\bar{r}^c}{\bar{r}^s}$ (or 0). The two terms have been discounted by the estimated proportion of students that switched from credit cards to student loans under the policy (% Δ CC) and those who rely on these two financial products for liquidity (%NL).⁶ Aggregate welfare, $\Delta \bar{W}$, is determined as a convex combination of

⁵In our calculations by income quartile, we assume that prior to Title 3 the rate of card use was the same among all students.

⁶For tractability, we assume independence among the factors $\hat{p}$, %SubSL, % Δ CC, %NL, and %BR. In reality, they may be correlated. Although we cannot assess correlations with % Δ CC (a counterfactual estimate), we can observe

the welfare changes for optimal ($\Delta \bar{W}^{fr}$) and boundedly rational ($\Delta \bar{W}^{br}$) types using %BR.⁷

Table E1: Bounds Approach for the Net Benefits of the Regulation

	(1) All	(2)	(3)	(4)	(5)
		By Parental Income (ZIP Median)			
		0-25 pctl.	25-50 pctl.	50-75 pctl.	75-100 pctl.
% Δ CC Adoption (% Δ CC)	30.35	33.25	36.90	27.06	22.22
% Needing Liquidity (% NL)	46.61	52.50	43.17	45.80	44.61
Prob. high state ($\hat{p}$)	47.12	56.19	49.72	43.04	35.57
w. addl. subsidized loans (%SubSL)	31.36	47.50	34.39	25.22	14.67
$\hat{r}^c$	19.50 - 21.50	19.50 - 21.50	19.50 - 21.50	19.50 - 21.50	19.50 - 21.50
$\hat{r}^s$	4.67 - 6.80	3.57 - 6.80	4.46 - 6.80	5.09 - 6.80	5.80 - 6.80
$100 \times \Delta \bar{W}^{fr}$	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
$100 \times \Delta \bar{W}^{br}$	4.97 - 16.56	10.67 - 41.62	6.78 - 22.24	2.90 - 10.16	0.20 - 3.15
%BR	62.06	69.25	62.93	62.03	52.40
$100 \times \Delta \bar{W}$	3.08 - 10.28	7.39 - 28.82	4.27 - 13.99	1.80 - 6.30	0.10 - 1.65

Notes: Welfare effects are calculated using Equations E15–E17 (see Supplemental Appendix). Credit card interest rates are taken from CFPB (2013). $\hat{r}^s$ is calculated as the weighted average of 0 for students with subsidized loans available (%SubSL), and the unsubsidized interest rate reported in the Department of Education’s website for the remaining students. Estimates of changes in credit card use (% Δ CC), the proportion requiring liquidity (% NL), the probability of an emergency expenditure ($\hat{p}$), the proportion having access to additional subsidized loans (%SubSL), and the proportion of boundedly rational students (%BR), are calculated using responses and linked values in the matched-survey.

For the representative optimal-decision-making student, there is no change in welfare under the policy. The high likelihood of an unplanned shortfall exceeds the ratio of student loan and credit card interest rates, so that the optimal strategy is to take out additional student loans precautionarily. Formally, $p \geq \frac{r^s}{r^c}$ and welfare changes are 0, because the policy does not change behavior. Among students that did not choose optimally, welfare rose by at least 5 to 17 percent of the worst case magnitude. Recall from Equations E13 and E14 that the key ingredients in this calculation are the others in our survey data. Pairwise, students experiencing at least one emergency expense are about 5 percentage points more likely to need liquidity, and separately, 5 percentage points more likely to display markers of bounded rationality. Students with available subsidized loans are 8 percentage points more likely to need liquidity and 14 percentage points more likely to display such markers. We find no significant correlation between needing liquidity and bounded rationality markers. Accounting for these correlations would raise the magnitude of our welfare estimates. Given that there are other ways to calculate conditional averages beyond pairwise, and no obvious choice among all of these options, we retain the independence assumption.

⁷Note that both $\Delta \bar{W}^{fr}$ and $\Delta \bar{W}^{br}$ are scaled by the same worst-case scenario term (which is independent of rationality type; see above). Because this term is constant, scaling before averaging yields the same value as averaging before scaling.

the relative price of student loans and credit card debt and the likelihood of having an unexpected emergency expenditure. As we see from the table, this likelihood is large. About 47 percent of students in need of liquidity indicate having experienced at least one such emergency. The corresponding value of p is larger than the ratio of student loan to credit card debt.⁸ Any $p > \frac{6.8}{19.5} \approx 35$ would imply the policy improved students' welfare, on average.⁹

Table E1 also shows that gains are larger among students hailing from more modest communities (ZIP codes). This result is consistent with our difference-in-difference findings from Section 4.1, which indicate a larger substitution towards student loans among these students. We calculate an average rise in welfare of at least 7 to 29 percent of the worst case magnitude among students at the bottom quartile of ZIP income. Among those at the top quartile, the impact is smaller at 0.10 to 1.5 percent of the worst case magnitude. Three factors contribute to these differences. First, and most crucial to our calculation, the likelihood of an emergency expenditure $\hat{p}$ for those requiring liquidity is highest in the low income group. Second, a larger proportion of bottom quartile students are categorized as in need of liquidity. Third, the decline in credit card use is larger among bottom quartile students.

Taken together, our welfare analysis suggests the policy had no effect on optimizing students and a positive increase in welfare among the boundedly rational. The welfare increase was more pronounced among students originating from the lowest quartile of ZIP income.

F Full Details From Matched Survey

This section provides an unabridged analysis of the survey discussed in Section 5. These include tables regarding card adoption and use.

Overall, analysis of the matched-survey sheds light on (1) the extent of card use among college students, (2) how they choose among different sources of liquidity, and (3) the form of suboptimal financial behavior most tied to credit card borrowing. Broadly, we find that fewer students use cards

⁸We acknowledge the likelihood of an emergency may have been different for students in 2010. A higher likelihood would imply a greater benefit of the rule.

⁹Our calculations in Table E1 are based on the retrospective question “how many emergencies did you have in the last year?”. We also ask students about their prospective beliefs, “how many emergencies do you expect to have next year?”. Their responses are highly correlated, whereby our results do not materially change using either definition of p .

than prior to Title 3, especially among those from lower income areas. Students consider both cards and student loans in the long and short term. However, they very often do so suboptimally. A lack of financial literacy is the factor most closely tied to credit card indebtedness.

As we proceed, it is important to note that the survey is administered to current students. Consequently, it does not directly inform on behavior at the time of Title 3’s enactment. Its value for assessing the policy is based on the view that students, and those with cards, especially, were not better users of credit at the time of its passing. We provide evidence consistent with this premise. Moreover, we pay particular attention to the behavior of students coming from low income ZIP codes. We do so to highlight credit card use among the population for whom student loan borrowing was most responsive to the policy, which we call “marginal” students.¹⁰

F.1 Card Use Among Students Before and After the CARD Act

About 53 percent of students in our survey have a credit card. This estimate tracks well with other post CARD Act national surveys measuring card use in this population.¹¹

It also constitutes a more than 30 percentage point decline from pre CARD Act estimates, in line with the policy’s objectives.¹² We further find that students from higher income areas (top ZIP quartile) are 22–32 percent more likely to have a card than students from lower income areas (bottom quartiles). Given the nearly universal adoption of cards prior to the CARD Act, this suggest the decline was more precipitous for students from lower income areas. A reduction in credit card use among students from less affluent backgrounds is consistent with our heterogeneity

¹⁰Note that we do not use self-reported income. Rather, we use the administrative match—a novel element of our analysis.

¹¹As discussed in Section 2, a 2015 survey sponsored by Sallie Mae shows 56 percent of respondents reported having a credit card (SallieMae 2016). A 2019 national survey from Trellis Research indicates that 48 percent of college students used a credit card in the past 12 months (Klepfer et al. 2020). While the Sallie Mae question is identical to ours, the Trellis survey asks “In the past 12 months, have you used the following borrowing sources?”. This ambiguous phrasing makes it unclear whether students who do not borrow on their card but have one would respond affirmatively. Moreover, some students have a card but do not use it. When asked “suppose you could no longer use your card next year, how would this affect your financial situation?” 3.3 percent of our card-holding respondents (1.7 percent overall) said “Not at all (I don’t use a credit card).” With this in mind, we interpret the Trellis number as a lower bound for having a credit card.

¹²An earlier 2008 wave of the Sallie Mae survey estimated that about 84 percent of students had a credit card (SallieMae 2009). This decline is larger than reported in Debbaut et al. (2016) and CFPB (2013). These latter calculations are based on credit reporting data that does not distinguish between those under 21 who are enrolled in college and those who are not. While the ability to repay rules applied to all individuals under 21, Section 304 of Title 3 made no difference to those not enrolled in college—the majority of people between the age of 18 and 21. As a result, it is not surprising that the decline in card use is more pronounced among those attending college.

Table F1: Having and Using Credit Cards

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Card?</i>	<i>Why Do You Not Have a Card?</i>						
		Afraid of Debt	Other Cash	Hassle	Do Not Qualify	High Rate	Other
<i>All</i>	52.72	47.75	35.81	17.13	11.38	9.55	18.68
<i>By ZIP level Income Quartile</i>							
1 st	49.75	53.73	31.84	15.42	11.44	9.45	18.41
2 nd	46.10	52.04	36.20	16.74	12.67	9.95	14.93
3 rd	55.94	45.39	37.50	16.45	11.18	7.89	20.39
4 th	60.78	33.59	39.69	21.37	9.16	9.92	23.66
<i>By Financial Aid Status</i>							
Filed FAFSA	52.86	50.66	34.54	15.18	11.01	10.44	17.84
Offered SL	53.05	50.39	35.08	15.12	10.66	10.66	18.02
Took Out SL	51.82	53.77	33.17	13.57	12.56	11.56	16.08

Notes: This table shows survey responses describing the reasons why students do not have credit cards or, among those who have them, how they use them. Column 1 of panel (a) shows the fraction of students who responded “Yes” to the question “Do you have a credit card”. Students who responded “No” to this question were further asked: “You do not have a credit card because? (Check all that apply)”. Columns 2 to 7 of the same panel show the fraction of students who selected the corresponding answer.

analysis from Section 4.1 that shows a sharper increase in student loan use for this group and further strengthens the argument that our causal estimates in the student loan market can be attributed to Title 3. Eliminating the aggressive marketing of cards on campus likely reduced lenders’ ability to influence students predisposed to avoiding debt, whereby adoption became a more active choice.¹³ To better understand this latter mechanism, we ask students why they do not have a credit card. The most common reason students give for not having a credit card is that they are afraid to get into too much debt. About 48 percent give this reason.¹⁴ The next most common reason is “I have

¹³This pattern is consistent with Hastings et al. (2017) who show that persuasive sales forces affect price sensitivity and expands demand in financial markets.

¹⁴Our estimate is consistent with a similar question from Sallie Mae’s 2015 survey. In that survey, 47 percent of students without a card said that they do not have one because “[they] want to avoid as much debt as possible.”

other ways of getting cash.”¹⁵ This indicates a concern among students for the potential pitfalls of having a credit card and an inclination for using other means to cover their expenses, which may or may not be optimal. Unsurprisingly, the rank order of these responses flips for students from more affluent areas. Those from higher income areas without a credit card are less likely to cite a fear of excessive debt. They stress other ways of obtaining liquidity. This channel supports a positive selection by which individuals who more likely to struggled managing their credit card use are less likely to have a credit card in the period after the CARD Act. It supports the argument that college students before the CARD Act were not better credit card users than current students and that evidence of suboptimal behavior in our survey would also be informative of suboptimal credit card use before the CARD Act.

Only 11 percent report they do not have a card because they do not qualify, and 17 percent say it is a “hassle.” This response indicates a tepid perception among students that cards are difficult to get or unavailable altogether, which may not be the case for them. In line with our findings on adoption, the perception of unavailability is more pronounced among students from lower income ZIP codes. About 10 percent said they do not have a card because the interest rate is too high, indicating that price does not seem to play a dominant role in students’ adoption decisions. They also may not have direct knowledge of rates, which makes them unable to properly compare alternatives.

Students use their cards for a variety of purposes, many of which are predictable. The most commonly cited use (78%) is indirect school expenses, like books and computers. Non-essentials, like entertainment and dining out, are a close second (73%). Only about 58 percent report having a card for emergencies. Notably, 44 percent say they use their card for direct school expenses, like tuition and rent/room and board. Overall about 20 percent of card-using respondents report that they sometimes or hardly ever pay the entire statement balance on their card, a decline from pre CARD Act levels.¹⁶ Nevertheless, borrowing is more concentrated among students from less affluent backgrounds. As compared to the top quartile, Table F2 shows card-using students from the lowest quartile of ZIP income are nearly twice as likely to borrow on their card. The rates are 14.29% vs. 26.13% for the top and bottom ZIP income quartiles, respectively.

¹⁵Note that these responses are not mutually exclusive. Respondents are instructed to “check all that apply.” See Appendix H.

¹⁶See SallieMae (2009).

Table F2: How Students Use a Credit Card

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	<i>Card?</i>	<i>Revolver?</i>	<i>What Do You Use Your Card For?</i>				
			Indirect Expenses	Non- Essentials	Emergency	Direct Expenses	Other
(a) All Students with Credit Cards							
<i>All</i>	52.72	19.77	77.71	72.54	58.06	43.95	26.45
<i>By ZIP level Income Quartile</i>							
1 st	49.75	26.13	74.87	68.34	57.29	35.18	27.14
2 nd	46.10	19.58	75.66	73.02	59.79	47.09	26.98
3 rd	55.94	18.65	81.87	73.58	59.07	47.15	22.80
4 th	60.78	14.29	79.31	74.38	56.16	46.80	28.08
<i>By Financial Aid Status</i>							
Filed FAFSA	52.86	21.66	76.48	71.91	56.68	44.50	25.72
Offered SL	53.05	21.10	75.99	71.53	56.43	43.74	25.90
Took out SL	51.82	29.44	72.90	65.42	59.35	44.86	25.70
(b) Revolvers							
<i>All</i>			70.06	67.52	57.96	50.32	26.11
<i>By ZIP level Income Quartile</i>							
1 st			67.31	67.31	69.23	46.15	26.92
2 nd			72.97	78.38	62.16	51.35	35.14
3 rd			80.56	69.44	52.78	50	19.44
4 th			65.52	51.72	34.48	58.62	24.14
<i>By Financial Aid Status</i>							
Filed FAFSA			72.66	67.97	60.16	53.91	25.78
Offered SL			72.36	66.67	59.35	53.66	24.39
Took out SL			76.19	60.32	63.49	58.73	23.81

Notes: Column 1 of this table shows survey responses to the questions: “Do you have a credit card?” Among those who responded yes, Column 2 shows the fraction of students who responded “sometimes” or “hardly ever” to the following question: “Think about all your credit cards together. When you receive a bill, do you almost always, sometimes, or hardly ever pay the statement balance (the amount owed) in full?”. Students were further asked: “What do you use your credit card(s) for? (check all that apply)”. Columns 3 to 7 show the fraction of students who selected the corresponding answer. Indirect expenses include “Other school supplies (textbooks and computers)” and “Commuting”. Non-Essentials include “Entertainment and dining out” and “Clothing and personal items”. Direct Expenses include “Direct school expenses (including tuition, rent, or room and board)”. Emergencies and other expenses are directly included as separate options.

F.2 Choosing Between Cards and Student Loans

A principal objective of our survey is to inform on how students choose between cards and student loans, and the extent to which they do so optimally. Two questions address this choice. In the first, we ask card-holding students how no longer having access to their card next year would affect their

financial situation. This reflects on longer term planning. More than three quarters of students say they would “switch to using a debit card or some other form of electronic payment,” reaffirming the popularity of a credit card as a method of payment. This response also indicates that for most students there are available substitutes, whereby curbing their access would not burden them on this dimension.

Table F3: Response to Changes in Students’ Financial Environment

	(1)	(2)	(3)	(4)	(5)	(6)
Panel (a): How Would Not Using a Card Affect Your Financial Situation?						
	Switch To Debit	Cut Back On Non-Essentials	More Paid Work	Funds From Parents	Cut Back Essentials	More SL
<i>All</i>	76.45	38.41	29.72	23.17	18.26	8.94
<i>By Income Quartile</i>						
1 st	73.87	43.72	33.67	28.64	22.11	12.56
2 nd	72.49	37.57	30.69	21.16	18.52	11.11
3 rd	80.31	40.41	27.98	22.28	14.51	6.22
4 th	78.82	32.02	27.59	21.18	17.73	6.40
<i>By Financial Status</i>						
Offered SL	76.50	38.59	29.33	22.47	19.04	10.81
Revolve on Card	54.78	47.13	43.95	30.57	29.30	22.29
Panel (b): How Would You Cover A \$500 Emergency?						
	Use Card	Use Other Savings	Funds From Parents	Unable to Cover	Use SL	Other
<i>All</i>	59.07	48.74	46.22	6.05	4.91	3.53
<i>By Income Quartile</i>						
1 st	53.27	49.75	41.71	10.55	9.05	6.03
2 nd	58.73	54.50	46.56	6.35	4.23	3.70
3 rd	61.66	49.74	45.08	3.63	3.11	1.04
4 th	61.58	41.87	51.23	3.94	2.96	3.45
<i>By Financial Status</i>						
Took Out SL	52.34	43.46	42.06	12.15	14.49	3.74
Revolve on Card	59.24	38.22	45.86	15.29	9.55	5.10

Notes: This table presents students’ responses to the following two survey questions: “Imagine that you could no longer use your credit card(s) next year. How would this affect your financial situation? (check all that apply)”, and “Imagine that tomorrow you had to cover an emergency expenditure of \$500 or more. How would you do it? (check all that apply)”. In both cases, respondents are split by income quartile or financial status. Each cell shows the fraction of students that selected the corresponding answer. We consider only students who reported having a credit card on the same survey.

Nearly half indicate that this change would prompt them to increase their income (30%) or cut

their essential expenditures (18%), including those for school. About 9 percent said they would take out more in student loans. Consistent with our difference-in-difference results, students from low income communities are nearly twice as likely to consider this option. Moreover, students that regularly borrow on their card are two-and-a-half times more likely to indicate they would take out more student loans if they could no longer use their card.

The second question, concerning more immediate liquidity needs, asks: “if in the next month you had to cover an emergency expenditure of \$500 or more, how would you do it?” A majority of students holding cards said they would use them in that case. About 5 percent of respondents said they would use their student loans. Students who provided this latter answer are more likely to (1) be from the lowest ZIP-income quartile, (2) have been offered financial aid in the form of student loans, and a student who regularly revolves a balance on their card. This result suggests that those who access liquidity with their card are more likely to lean on this option, perhaps even when less costly options are available. Moreover, Table F3 shows student loans are a source of emergency funding when available.

In Table F4, we report how students weigh the choice between cards and student loans while controlling for financial aid status, previous card use, financial circumstances, and students’ demographics. Column (1) considers all students with credit cards and relates these factors to the probability a student indicates they would take out more in student loans if they could no longer use their card in the future. Students offered loans are nearly 60 percent more likely to consider them as an alternative financing option. Students using their card to cover liquidity needs (i.e., “make ends meet”), and not just for payments, are over twice as likely. The same applies for those who report they would need to increase their income or cut back on essential expenditures (not shown). While existing access to student loans is an important factor, the consideration of additional student loan debt seems strongest among those who are in greatest need of this liquidity. The remaining columns of Table F4 focus on cardholders who were offered student loans and pertain to financing emergency needs in the short term. In Columns (2) and (3) of the table, the dependent variable takes a value of one if a student declared they would use their card to cover an emergency expenditure of \$500 or more in the next month. In Columns (4) and (5), the dependent variable takes a value of one if they would use their student loans. Students who have taken out loans in the semester are significantly less likely to use their card. They are also over three times as likely to use their

Table F4: Determinants of the Student Loan / Credit Card Tradeoff

	(1)	(2)	(3)	(4)	(5)
Dependent Variable:	<i>No Card</i> More SL	<i>Cover \$500 Emergency</i>			
		Use Card	Use card	Use SL	Use SL
Offered Student Loans	0.057** (0.019)				
Took Out Student Loans		-0.097* (0.042)	-0.097* (0.042)	0.123** (0.025)	0.120** (0.024)
Revolve	0.139** (0.034)	0.032 (0.050)	0.027 (0.051)	0.032 (0.033)	0.030 (0.033)
Use to Make Ends Meet	0.119** (0.023)				
Available Family/Savings		-0.354** (0.039)	-0.354** (0.039)	-0.002 (0.024)	-0.001 (0.024)
Expected Emergency Index			0.031 (0.033)		-0.020 (0.017)
Mean Dep. Var	0.091	0.565	0.565	0.062	0.062
R-Squared	0.116	0.104	0.106	0.092	0.098
N	784	579	579	579	579

Notes: Data for these regressions are from students with a credit card in the matched-survey. Column 1 considers all cardholders. Columns 2 to 5 considers cardholders who were offered student loans only. Expected Emergency Index takes values 0, 1, and 2 when students report expecting 0, 1 or 2+ emergencies costing \$500 or more for the coming year. All specifications control for the number of \$500+ emergencies reported for the last year, class in school, minority status, how often a student reported thinking about their finances, and whether they are responsible for paying their credit card bill, as well as fixed effects for ZIP median income quartile determined from student records. Heteroskedasticity robust standard errors are in parentheses. SL = Student Loans. * $p < 0.05$, ** $p < 0.01$.

student loans. Taken together, our results suggest a great deal of substitutability between financing with student loans and credit cards in our student population.

F.3 Evidence of Suboptimal Borrowing

Here we provide evidence from our survey that card use is often inconsistent with our model's characterization of optimal borrowing behavior. These rely on the fact that nominal rates on student loans are nearly always lower than rates on credit cards.¹⁷ However, while student loan decisions are made at the start of the year, with interest paid from the outset, cards provide a flexible line of credit. As a result, it may be less costly for students to rely on a credit card for precautionary liquidity to cover uncertain expenditures when their likelihood is sufficiently low. Our model,

¹⁷There is a possibility that some students enjoy promotional rates, which can be as low as 0 percent. Though, this is rare (CFPB 2013).

summarized in Section 5.2, formalizes this intuition on optimal card use.

Four facts in the data suggests many students may not be using their credit card optimally. First, the self-reported likelihood of an emergency is neither negatively correlated with card use, nor is it positively associated with student loan borrowing. As unforeseen expenses become more likely, it becomes optimal to “insure” against higher card rates by relying on student loans. The survey directly asks students how often they experienced emergencies over the past year and their expectations for the next year. About 44 percent reported having experienced an emergency; the number increases to more than 48 percent among those with card debt. While suggestive of financial mistakes, confounding facts, such as past hardship, may be driving current debt.

Table F4 ties expectations of emergencies to planned behavior controlling for confounding factors. It shows that that student expectations of such future expenditures are not significantly associated with their choice to use a credit card or student loans. The positive coefficient for Expected Emergency Index indicates, if anything, students are *more* likely to plan to use a credit card for emergencies when emergencies are (perceived to be) more likely.¹⁸ Moreover, the coefficient does not change when accounting for past emergencies, suggesting the association is not complicated by differences in individuals who have suffered more or fewer emergencies over the past year and are perhaps running out of liquidity sources (or, alternatively, due to differences in idiosyncratic ways of characterizing “emergencies”).

Second, certain, or known, expenses are covered by a credit card, even when student loans are available. Recall, a majority of students reported using their card for indirect expenses or non-essentials. Moreover, nearly half reported using their card for direct school expenses, like tuition and room and board. Charging tuition to one’s card may just be for convenience, i.e., these balances are promptly paid off with no interest paid. In fact, the likelihood of using a card for direct school expenditures increases in ZIP income quartile. Nevertheless, over a third (35%) of students from the bottom ZIP income quartile report using their card for this purpose. This quartile of students are also most likely to borrow on their card.¹⁹ Moreover, we find similar use patterns among students

¹⁸Expected Emergency Index in Table F4 takes values 0,1, and 2 when students report expecting 0, 1 or 2+ emergencies costing \$500 or more for the coming year. The positive but insignificant coefficient is robust to various specifications, including binary variables for 0,1 and 2+ expected emergencies, and a count measure for the number of expected emergencies without top-coding.

¹⁹This proportion also tracks well with a similar question in the national survey of students’ financial wellbeing

with card debt who have not experienced an emergency. About 50% of these students report using their credit card to pay for direct educational expenses.

Third, students with unclaimed subsidized loans, which do not accrue interest during school, borrow on their credit cards. Since the responses to our survey are matched to administrative records, we can identify students who have been offered and do not claim subsidized student loans, but who nevertheless borrow on their credit card. About 37 percent of students who do not always pay their balance in full had liquidity available in the form of subsidized student loans. Since these loans do not accrue interest during school, they are a cheaper form of debt over credit cards in almost any situation. Additionally, 56 percent of students who revolve on their credit card have applied for financial aid and been offered loans which they did not fully claim. They have available and unclaimed liquidity on at least one type of student loan—including subsidized, un-subsidized, and alternative. All have unequivocally lower interest rates than credit cards.²⁰

Fourth, credit card debt should not be long lasting, more than one year, for those who have student loans available to liquidate that debt. Of the 20 percent who do not regularly pay their balance in full, over a third report they “hardly ever” pay their balance in full. This response suggests that borrowing on the credit card is not constrained to short periods for a large portion of borrowers. In other words, card debt is not paid off with student loans after students have had the opportunity to revisit their financial aid allocation. This relation is inconsistent with optimal card use, whereby carried debt is a known expense that is optimally financed with student loans.

F.4 Characterization of Bounded Rationality

To explore the drivers of suboptimal borrowing. We take inspiration from the taxonomy of Campbell (2016), who articulates five types of ‘financial ignorance.’ We focus on three types: (1) lack of

administered by Trellis Research (Klepfer et al. 2020). In that study, about 29 percent of respondents report using their credit card to pay for college. About 23 percent ($\approx 44\% \times 52\%$) report doing so in our survey. Similarly, in Sallie Mae’s 2015 survey, 21 percent of all students sampled reported using a credit card to cover tuition and fees. This proportion is lower than in Sallie Mae’s 2008 survey. However, while this type of use is more common among students from higher income areas, students who take out student loans are not less likely to cover direct school expenses with their card. This further suggests many may not be optimally handling their financial obligations.

²⁰Note that our analysis does not assume that all students should take out student loans (especially unsubsidized) due to favorable interest rates. Rather our concern is why students that *already have debt on their credit card(s)* do not transfer that debt to more favorable student loans. While previous literature suggests some students may turn down student loans due to the temptation of free cash balances (Cadena and Keys 2013), presumably a debt-balance transfer would not induce this effect.

Table F5: Financial Knowledge

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Terms / Concepts / History / Own Behavior</i>							
	<i>Contract Terms</i>		<i>Concepts</i>		<i>History</i>	<i>Own Behavior</i>	
	DK Rate	Rate < 10%	DK Limit	Both Correct	Unaware of SL	Discount # Early	Too Much Debt
<i>All</i>	42.32	21.79	13.73	43.95	8.06	1.18	9.70
<i>By ZIP level Income Quartile</i>							
1 st	34.17	27.14	10.05	40.20	7.54	1.35	14.07
2 nd	42.86	23.28	14.81	37.04	10.05	1.17	10.58
3 rd	43.01	18.65	11.92	44.56	9.33	1.02	8.81
4 th	48.77	18.72	18.72	52.71	5.91	1.14	5.91
<i>By Financial Aid Status</i>							
Filed FAFSA	39.42	23.18	12.35	41.29	10.83	1.21	11.17
Offered SL	39.62	23.16	12.69	40.99	10.98	1.23	10.98
Took Out SL	35.51	23.83	11.21	34.11	19.16	1.23	15.42

Notes: This table presents the answers to several survey questions designed to measure ignorance of contract terms, financial concepts, financial history or own behavior. DK stands for Don't Know. SL stands for Student Loans.

knowledge on the terms of debt; (2) poor understanding of financial concepts, i.e., financial literacy; (3) poor knowledge of one's own financial history.²¹

Table F5 shows a large portion of students with a credit card do not know the interest rate on it. Among cardholders, about 42 percent report not knowing the interest rate. An additional 22 percent report a rate below 10 percent. While some card contracts carry a rate below 10 percent, this is rare.²² Many students also display a low level of financial literacy, which we measure using

²¹We left out ignorance of incentives, strategy and equilibrium, which refers to taking into account how the incentives of sellers can influence the information they provide. We also modify the definition of ignorance of financial history. The original definition refers to individuals not using all available historical data to form views about likely returns of alternative investment strategies, and instead relying only on their own personal experiences. In our context, we modify the definition to reflect lack of awareness about own historical experiences, specifically, poor knowledge about previous financial decisions.

²²According to the CFPB's most recent card act report, in 2019, the average rate on general purpose cards was nearly

two of the “Big Three” questions from Lusardi and Mitchell (2008) most relevant to our setting.²³ Fewer than half card-holding students answer both questions correctly.²⁴ Unsurprisingly, students from lower income areas are substantially less likely to answer these correctly.

Consistent with (3), students also display a lack of knowledge about their available options. About 8 percent of card-holding students underestimate how much student loan liquidity is readily available to them. Among students with a credit card who took out student loans in that semester, nearly 20 percent are unaware of unclaimed loans still available to them.²⁵ To assess knowledge of preferences, we use the un-incentivized multiple price list method (Coller and Williams 1999). The price list is designed so that even one “early” response translates to an internal monthly interest rate of 10 percent.²⁶

Table F6 weighs the importance of each type of financial mistake in students’ choice to borrow on their credit card. We isolate the importance of these factors using a broad set of controls and use heteroskedasticity robust standard errors. We emphasize one particular control: a respondents’ implied subjective discount rate from choices on an unincentivized price list. The price list is designed so that even one “early” response translates to a subjective monthly interest rate of 10 percent. Similar elicited values have been positively linked with credit card debt (Meier and Sprenger 2010).

Column (1) uses the full survey sample and shows that students who answer both financial literacy questions correctly are 7 percent more likely to be cardholders. At the same time, students

19 percent, and three quarters of all accounts carried a rate greater than 15 percent. Given the way our question is phrased, it is possible that some of these reporting rates below 10 percent are in a promotional period. However, this would imply that $22\%/58\% \approx 38\%$ of our respondents were currently in a promotion, which is also inconsistent with the population rate. Moreover, those from low income areas, who are likely higher risk borrowers, are over-represented among those reporting curiously low rates.

²³The questions are: (1) how interest payments accumulate over time, (2) effects of inflation and nominal rates on purchasing power.

²⁴All survey participants are asked the Lusardi and Mitchell (2008) questions. Participants who do not have a credit card answer correctly at a lower rate, 36 vs. 44 percent.

²⁵Students may be eligible for student loans and not be aware of this fact. Our measure is not about eligibility, rather actual availability. We flag students who have applied for financial aid, were offered student loans, and left some portion of these unclaimed. In the survey, these students claimed they had no additional loans available or did not qualify for student loans altogether.

²⁶This method is subject to a number of concerns. Most importantly, students may misunderstand the question. However, we note that only 24 of 1,506 responses (1.5%) violated the implied single crossing. This method may also significantly overstate the degree of discounting. However, many studies find that this value, while not identical to exponential discounting factors elicited over longer-term horizons, is highly correlated with such values (e.g., Eckel et al. 2005). It is also shown to be correlated with credit card indebtedness (Meier and Sprenger 2010). That is, we may reasonably expect these elicited discount factors are predictive of the underlying time preferences of our respondents.

Table F6: Credit Card Debt and Financial Knowledge

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Sample:	Full	Cardholders Only				Cardholders who were offered SL Only				
Dependent Variable:	Has Card	Regularly Revolves a Balance				Regularly Revolves a Balance and Left Portion of SL Offer Unclaimed				
Concepts:	0.069**	-0.109**			-0.106**	-0.084**				-0.085**
Both Correct	(0.027)	(0.028)			(0.029)	(0.030)				(0.030)
History:							0.140*			0.137*
Unknown SL							(0.060)			(0.059)
Terms:				-0.021	-0.020				-0.046	-0.044
DK Rate				(0.029)	(0.028)				(0.030)	(0.029)
Control Variable:	-0.058*		0.044		0.031			0.030		0.017
Discount > 1	(0.026)		(0.030)		(0.030)			(0.031)		(0.031)
Mean Dep. Var	0.527	0.196	0.196	0.196	0.196	0.150	0.150	0.150	0.150	0.150
R-Squared	0.034	0.065	0.050	0.048	0.068	0.059	0.059	0.048	0.050	0.075
N	1,489	784	784	784	784	579	579	579	579	579

Notes: Data for these regressions are from students with a credit card in the matched-survey. All specifications control for the number of \$500+ emergencies reported for the last year, class in school, minority status, how often a student reported thinking about their finances, and whether they are responsible for paying their credit card bill, as well as fixed effects for ZIP median income quartile determined from student records. Heteroskedasticity robust standard errors are in parentheses. SL = Student loans. DK Rate = Don't know credit card interest rate. * $p < 0.05$, ** $p < 0.01$.

with more than one immediate answer on our exponential-discounting multiple price list, or heavy discounters, are 6 percent less likely to have a card. Columns (2)–(5) restrict the sample to students with a credit card and use a binary outcome variable that equals one when the student reports regularly revolving a balance. Columns (6)–(10) further restrict the sample to credit-card-holding students who have been offered student loans, including students who accepted the full amount offered and those who left some portion unclaimed. Here, the outcome variable equals one when two conditions are met: (i) the student regularly revolves a balance and (ii) the student left some portion of the offered student loan amount unclaimed, and zero otherwise. Across all measures, financial literacy continues to factor heavily in the decision to borrow among this population. Further, discounting and knowledge of the interest rate on the card do not meaningfully associate with this choice.²⁷ Focusing only on our aforementioned restricted sample (Columns 6-10), we

²⁷Using a similar elicitation and discounting measure, Meier and Sprenger (2010) find that individuals who heavily

can extend our analysis to include awareness of one's own financial history. We find that a lack of awareness about available student loans is also associated with card borrowing.

The association in the survey between lack of financial knowledge and credit card indebtedness is consistent with results in Carvalho et al. (2019) who find that demand for high-interest loans is correlated with limited financial sophistication. Our finding that students carry credit card balances while having unused student loans touches on the discussion of the credit card debt puzzle: individuals simultaneously hold high interest card debt and substantial liquid savings (Gross and Souleles 2002, Zinman 2007, Bertaut et al. 2009, Gathergood and Weber 2014). Just as in that literature, we highlight the importance of individuals' specific situation and the frictions inherent in certain types of debt and/or savings.

We also find that students who are classified as heavy discounters (based on their answers to our multiple price list) are less likely to have a credit card. The difference in the probability of revolving a balance, relative to students with lower discount rates, while positive, is not statistically significant. Meier and Sprenger (2010) find that present bias individuals are more likely to have credit card debt, after controlling for socio-demographic characteristics. The difference to our findings could arise from several reasons. First, our multiple price list captures time preferences from a single choice, which can be mapped to a single (exponential) discount factor, whereas Meier and Sprenger (2010) separately elicit short and long run discount factors based on choices at two different times, and classify individuals as present-biased if their short-run discount rate is higher than their long-run rate. In addition, it is possible that our control variables—and the various measures of financial knowledge we study—are correlated with our measure of discounting. Here, we further explore the difference in magnitude and significance levels of the coefficient for discounting, with and without control variables, and discuss the correlation of our measure of discounting with financial literacy, knowledge about contract terms, awareness of available student loan balances, and the full set of socioeconomic controls available in our analysis.

Table F7 shows an alternative version of Table F6 examining the relationship between discount—specifically, the present-biased—are more likely to have credit card debt. In the most comparable specification (Column 3), we obtain a larger and significantly positive coefficient when control variables are removed. Supplemental Appendix F.4 provides the full analysis, compares our results to theirs, and provides a table of the correlation of all covariates. Higher levels of discounting are also correlated with lack of financial literacy, which may explain the measure's limited explanatory power.

Table F7: Credit Card Debt and Financial Knowledge

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Sample:	Full	Cardholders Only				Cardholders who were offered SL Only				
Dependent Variable:	Has Card	Regularly Revolves a Balance				Regularly Revolves a Balance and Left Portion of SL Offer Unclaimed				
Concepts:	0.075**	-0.128**			-0.123**	-0.093**				-0.090**
Both Correct	(0.026)	(0.027)			(0.027)	(0.028)				(0.028)
History:							0.119+			0.112+
Unknown SL							(0.062)			(0.060)
Control Variable:	-0.059*		0.066*		0.046			0.045		0.027
Discount > 1	(0.026)		(0.030)		(0.030)			(0.031)		(0.030)
Terms:				-0.054+	-0.052+				-0.078**	-0.075**
DK Rate				(0.028)	(0.028)				(0.029)	(0.028)
Mean Dep. Var	0.527	0.198	0.198	0.198	0.198	0.151	0.151	0.151	0.151	0.15
R-Squared	0.010	0.025	0.006	0.004	0.033	0.016	0.009	0.004	0.011	0.038
N	1,506	794	794	794	794	583	583	583	583	583

Notes: Data for these regressions are from students with a credit card in the matched-survey. No control variables are included. Heteroskedasticity robust standard errors are in parentheses. SL = Student loans. DK Rate = Don't know credit card interest rate. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

ing and borrowing without control variables. The coefficient for discounting is generally larger in the specification without controls. In Column 3 of Table F7 the coefficient for discounting is 0.066 and statistically significant at the 5% level. In Table F6 (with controls) the corresponding coefficient is 0.043 and is statistically insignificant. When included alongside financial literacy (Column 1), the coefficient for discounting changes to an insignificant -0.059, similar to the original Table 4, suggesting that financial literacy is correlated with both discounting and borrowing. When included together with financial literacy and knowledge of credit card terms (Column 5), the coefficient for discounting becomes positive but remains statistically insignificant, again implying that these variables are correlated with each other and with credit card borrowing.

Table F8 shows pairwise correlations between our measure of discounting, various measures of financial knowledge, and the control variables used in the analysis. We find that heavy discounters tend to have lower levels of financial literacy, consistent with the significance patterns in Column 3

of Tables F6 and F7. They are more likely to be unaware of available student loan funds, but more likely to know the interest rate on their credit card. They are also more likely to have experienced emergencies in the past and are equally represented across college classes. Additionally, they are somewhat more likely to come from minority groups and to spend more time thinking about their finances. They are less likely to be responsible for their own credit card and more likely to come from areas with intermediate to low income levels.

In turn, financial literacy—shown to be an important predictor of credit card borrowing in Tables F6 and F7—is positively correlated with awareness of available student loan funds but negatively correlated with knowing the interest rate on one’s credit card. Students with higher levels of financial literacy are less likely to have experienced emergencies or to come from minority groups. They are more likely to be responsible for their own credit card and to come from high-income areas. Additionally, juniors have somewhat higher levels of financial literacy than freshmen.

Table F8: Pairwise Correlation between Selected Variables

	Student Loans	Carry CC Debt?	Financial Literacy	Unknown SL	Discount δ_1	DK Rate	Emergencies	Junior	Minority	Time Think Finances	Responsible for Card	Income Quart. 2	Income Quart. 3	Income Quart. 4
Student Loans	1													
Carry CC Debt?	.1087	1												
Financial Literacy	.1087	1	1											
Unknown SL	.1748	.0312	.0312	1										
Discount δ_1	.0345	.0323	.0326	.0784	1									
DK Rate	.1095	.0323	.0326	.0784	.0784	1								
Emergencies	.1167	.0323	.0326	.0784	.0784	.0784	1							
Junior	.0448	.0323	.0326	.0784	.0784	.0784	.0784	1						
Minority	.0845	.0323	.0326	.0784	.0784	.0784	.0784	.0784	1					
Time Think Finances	.0857	.0396	.0003	.0585	.0355	.0355	.0355	.0355	.0355	1				
Responsible for Card	.0342	.2804	.0842	.0085	.0085	.0085	.0085	.0085	.0085	.0085	1			
Income Quart. 2	.0494	-.0267	-.0157	.0286	.0227	.0367	.0409	.0746	-.0545	.0397	.0318	1		
Income Quart. 3	-.0153	.0017	.0127	.0196	.0241	.0241	.0241	.0241	.0241	.0241	.0241	.0241	1	
Income Quart. 4	-.0828	-.0293	.1029	-.0401	-.0089	.0958	-.0935	-.0103	-.0375	-.0843	-.0095	-.3315	-.2953	1

G CARD Act, Section 304

SEC. 304. PRIVACY PROTECTIONS FOR COLLEGE STUDENTS.

Section 140 of the Truth in Lending Act (15 U.S.C. 1650) is amended by adding at the end the following:

“(f) CREDIT CARD PROTECTIONS FOR COLLEGE STUDENTS.—

“(1) DISCLOSURE REQUIRED.—An institution of higher education shall publicly disclose any contract or other agreement made with a card issuer or creditor for the purpose of marketing a credit card.

“(2) INDUCEMENTS PROHIBITED.—No card issuer or creditor may offer to a student at an institution of higher education any tangible item to induce such student to apply for or participate in an open end consumer credit plan offered by such card issuer or creditor, if such offer is made—

“(A) on the campus of an institution of higher education;

“(B) near the campus of an institution of higher education, as determined by rule of the Board; or

“(C) at an event sponsored by or related to an institution of higher education.

“(3) SENSE OF THE CONGRESS.—It is the sense of the Congress that each institution of higher education should consider adopting the following policies relating to credit cards:

“(A) That any card issuer that markets a credit card on the campus of such institution notify the institution of the location at which such marketing will take place.

“(B) That the number of locations on the campus of such institution at which the marketing of credit cards takes place be limited.

“(C) That credit card and debt education and counseling sessions be offered as a regular part of any orientation program for new students of such institution.”.

H Survey Details

We distributed the survey via Qualtrics to 18,238 students. These correspond to the university population of full time sophomores and juniors, excluding international students who reported a foreign ZIP code for their permanent address. All students who completed the survey received a \$5 Amazon gift card. We first sent a pilot to a random sample to 100 students on April 26, 2021. The remaining 18,138 received the invitation to respond on May 4th. We sent reminders on a weekly basis to students who have not taken the survey by that time. The last reminder was sent on May 25th. The survey was closed on Friday June 4th. Out of 18,238 students invited to participate, 1,577 responded. Of these, 1,506 students completed the survey. Below we include the full survey, as exported from Qualtrics.

Survey

Start of Block: Block 1

Intro

This survey studies how [REDACTED] students finance their education. As a student over 18, you may participate. The focus is how you pay for college and deal with money issues. Your answers help us and your school inform policies to help Aggies succeed in their studies.

Your participation is voluntary. The survey will take about 5 minutes.

You will receive a \$5 Amazon gift card for completing the survey. It will be emailed to you within 2 weeks.

There are no sensitive questions in this survey that will cause discomfort. The research team will not collect any information that could identify you. Your identity will remain confidential to the extent allowed by law. All published results will be grouped together.

You may skip any question you do not wish to answer. You may also exit the survey at any point. The host's confidentiality policy is available [REDACTED]

You may ask questions about this study to the [REDACTED] or Professor [Alex Brown](#). You may call [REDACTED] Human Research Protection Program [REDACTED] (toll free). Please reference IRB #2018-1178D. You may print this screen to keep a copy of this consent for your records.

To participate, please select "I agree". You will begin the survey.

Please select "I Disagree" if you do not wish to participate. You may also select X in the corner of your browser.

☐ I Agree

☐ I Disagree

Skip To: End of Survey If This survey studies how [REDACTED] students finance their education. As a student over 18, you may part... = I Disagree

Page Break

Q0 How frequently do you think about your finances?

- ☐ Rarely
- ☐ Every once in a while
- ☐ Regularly
- ☐ All the time

Page Break

Q1 Do you have a credit card?

☐ Yes

☐ No

Skip To: Q3 If Do you have a credit card? = Yes

Page Break

Q2

You do not have a credit card because? (Check all that apply)

- ☐ It is a real hassle to get one
- ☐ Interest rates are too high
- ☐ I am afraid I will get into debt and financial problems
- ☐ I have other ways of getting cash
- ☐ I do not qualify for one
- ☐ Other

Skip To: Q11 If Condition: Selected Count Is Less Than or Equal to 6. Skip To: DID YOU TAKE OUT STUDENT LOANS THIS S...

Page Break

Q3 Think about the credit card you use the most. What is the interest rate on that credit card right now?

- ☐ Less than 5%
 - ☐ 5% to 10%
 - ☐ 10% to 15%
 - ☐ 15% to 20%
 - ☐ More than 20%
 - ☐ I don't know
-

Q4 Think about the credit card you use the most. What is the credit limit on that credit card right now?

- ☐ less than \$1,000
 - ☐ \$1,000 - \$2,000
 - ☐ \$2,000 - \$5,000
 - ☐ More than \$5,000
 - ☐ I don't know
-

Page Break

Q5

Think about all your credit cards together. When you receive a bill, do you almost always, sometimes, or hardly ever pay the statement balance (the amount owed) in full?

☐ Always or almost always

☐ Sometimes

☐ Hardly ever

Page Break

Q6 Think about the credit card you use the most. On your most recent bill, did you pay your statement balance in full or did you leave a balance?

- ☐ Paid in full
- ☐ Left a balance

Skip To: Q8 If Think about the credit card you use the most. On your most recent bill, did you pay your statemen... = Paid in full

Q7 After the last payment was made, what was the balance still owed on that credit card?

- ☐ Less than \$100
- ☐ Between \$100 and \$250
- ☐ Between \$250 and \$500
- ☐ Between \$500 and \$1000
- ☐ Between \$1,000 and \$2,000
- ☐ More than \$2,000
- ☐ I don't know

Page Break

Q8 Who is responsible for paying your credit card bill(s)?

- ☐ I am
- ☐ Mostly me and sometimes my parents or someone else
- ☐ Mostly my parents or someone else
- ☐ My parents or someone else

Page Break

Q9 What do you use your credit card(s) for? (check all that apply)

- ☐ Emergencies
- ☐ Direct school expenses (including tuition, rent, or room & board)
- ☐ Other school supplies (textbooks & computers)
- ☐ Entertainment and dining out
- ☐ Commuting
- ☐ Clothing and personal items
- ☐ Other

Page Break

Q10 Imagine that you could no longer use your credit card(s) next year. How would this affect your financial situation? (check all that apply)

- ☐ Not at all (I don't use a credit card)
- ☐ I would switch to using a debit card, other electronic payment method, and/or cash
- ☐ I would take out more in student loans
- ☐ I would ask my parents or someone else for additional funds
- ☐ I would get a job or increase hours at my current job to make ends meet
- ☐ I would cut back on essential expenditures (including those for school)
- ☐ I would cut back on non-essential expenditures

Page Break

Q11 Did you take out student loans this semester?

☐ Yes

☐ No

Skip To: Q15 If Did you take out student loans this semester? = Yes

Page Break

Q12 Why did you not take out student loans this semester? (check all that apply)

- ☐ The decision was primarily made by my parents or someone else
- ☐ I did not qualify for student loans
- ☐ It was too much of a hassle
- ☐ The interest rate was too high
- ☐ I was afraid I would not spend the money wisely
- ☐ I have other ways of covering my expenses
- ☐ If I face financial troubles in the future, I cannot discharge my student loans in bankruptcy
- ☐ Other

Skip To: Q16 If Condition: Selected Count Is Less Than or Equal to 8. Skip To: In the past year, how many times did

Page Break

Q15 What is the highest interest rate on any of these student loans right now?

- ☐ Less than 5%
- ☐ 5% to 10%
- ☐ 10% to 15%
- ☐ 15% to 20%
- ☐ More than 20%
- ☐ I don't know

Page Break

Q13 Did you take out the maximum amount in student loans available to you this semester?

- ☐ Yes
- ☐ No
- ☐ I don't know

Skip To: Q16 If Did you take out the maximum amount in student loans available to you this semester? = Yes

Skip To: Q16 If Did you take out the maximum amount in student loans available to you this semester? = I don't know

Page Break

Q14 Why did you not take out the maximum amount in student loans available to you this semester? (check all that apply)

- ☐ I was afraid I would not spend the money wisely
- ☐ The interest rate on additional student loans was too high
- ☐ It would have been a real hassle to take out additional loans
- ☐ I was afraid of reaching a lifetime loan limit
- ☐ If I face financial troubles in the future I cannot discharge my student loans in bankruptcy
- ☐ Other

Page Break



Q16 In the past year, how many times did you have an emergency expenditure of \$500 or more?



Q17 In the coming year, how many times do you expect you will have an emergency expenditure of \$500 or more?

Page Break

Q18 Imagine that tomorrow you had to cover an emergency expenditure of \$500 or more. How would you do it (check all that apply)?

- ☐ I would use my credit card
- ☐ I would use my student loan money
- ☐ I would ask my parents (or someone else) for help
- ☐ I would use other savings
- ☐ I would not be able to cover this amount
- ☐ Other

Page Break

Display This Question:

If Do you have a credit card? = Yes

Q19 I have more credit card debt than I expected at this point.

- ☐ Strongly disagree
- ☐ Disagree
- ☐ Neutral
- ☐ Agree
- ☐ Strongly agree

Page Break

Display This Question:

If Did you take out student loans this semester? = Yes

Q20 I have more student loan debt than I expected at this point.

- ☐ Strongly disagree
- ☐ Disagree
- ☐ Neutral
- ☐ Agree
- ☐ Strongly agree

Page Break

Q21 Imagine you had \$100 in a savings account and the interest rate was 5% per year. After 2 years, how much do you think you would have in the account if you left the money to grow?

- ☐ More than \$110
 - ☐ Exactly \$110
 - ☐ I don't know
 - ☐ I refuse to answer
-

Q22 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?

- ☐ More than today
 - ☐ Exactly the same as today
 - ☐ Less than today
 - ☐ I don't know
 - ☐ I refuse to answer
-

Page Break

Q23 Imagine you did some work for pay. When it came to be paid, you were given the following choice: you can get \$100 today, or if you waited one month, you would get more. For each of the following choices, please record which you would prefer. Please choose your preferred option in each row.

	1	2	
\$100 today	☐	☐	\$110 in one month
\$100 today	☐	☐	\$125 in one month
\$100 today	☐	☐	\$150 in one month
\$100 today	☐	☐	\$175 in one month
\$100 today	☐	☐	\$200 in one month
\$100 today	☐	☐	\$225 in one month

End of Block: Block 1

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