Can Targeted Information Affect Academic Performance and Borrowing Behavior for College Students? Evidence from Administrative Data[*]

Christiana Stoddard[†], Carly Urban[‡], Maximilian Schmeiser[§]

Abstract

More students than ever borrow to finance post-secondary education. However, students receive little information during the course of their college career that encourages them to recalibrate loan amounts and to consider academic and borrowing decisions jointly. This paper exploits a natural experiment to understand how targeted information can change student behavior. We study a large public university where students above a given debt threshold received letters with bundled information on student loan debt and effectively completing college, while students below the threshold did not. Using a difference-in-difference strategy and administrative data on individual-level academic records and borrowing, the intervention did not change borrowing in the subsequent semester but improved academic outcomes: credits completed and GPAs increased in the subsequent semester and retention rates increased.

1 Introduction

Student loans are typically the first borrowing decision made by young adults and are an increasingly large financial commitment, with aggregate student loan debt totaling $1.19 trillion as of June 2015 (**?**). Furthermore, students must choose borrowing levels as one compenent of a complex set of inter-related decisions, including how to allocate time between paid work and academic effort. As a result, borrowing behaviors may be related to the choice of a major, GPA, the number of credits completed, time to degree, and degree completion.

However, it is not clear whether current students have sufficient information as they make these decisions.[1] High school seniors have relatively restricted exposure to formal borrowing prior to deciding whether to attend and to finance college.[2] Furthermore, **?** and **?** show that the borrowing process and the details of the Federal Student Aid Application (FAFSA) are burdensome, and that providing students with application assistance increases FAFSA completion, college attendance, and aid received. After enrollment, students continue to receive limited information until close to graduation, when it tends to focus on loan repayment options rather than the optimal initial borrowing decisions.[3]

Furthermore, academic advising received by most college students is given independently of financial considerations, in spite of the fact that the financial status of students may influence their choice of a major, the time and effort they devote to studying, and their decision to remain enrolled (**?????**). For example, **?** find that career choices are related to student loan packages, but there is little evidence on how loan packages influence academic performance or future borrowing behavior. The complexity of these simultane-

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[1]A growing body of research shows that borrowers who lack financial knowledge tend to make suboptimal decisions (**????**).

[2]One possible way to promote improved decision-making on borrowing for postsecondary education is to provide instruction on student loans in high school financial education courses. While early research on high school financial education has reached differing conclusions about its effectiveness for improving financial behaviors and outcomes (**???**), recent research has shown financial education courses to be effective at improving later life financial outcomes (**?**), particularly when rigorously implemented (**?**).

[3]Federally required entry counseling for those looking to take on student loans is provided online and many students only skim through the material, leaving them with little or no additional information when making future loan decisions (**?**).

ous decisions is often overlooked in interventions aimed at improving knowledge around student loans.

This study analyzes a unique natural experiment to causally determine how the targeted provision of bundled information about student loan debt and academics can change college students' loan choices, credits, and academic performance. Students received a warning letter if their debt level–given by a specific debt and year formula based on their standing in school–suggested that they might have difficulty repaying their student debt with their prospective income. We analyze the impacts of this intervention using a comprehensive administrative dataset that contains detailed information on students' academic backgrounds, loan packages, and academic outcomes. We utilize a difference-in-difference (DD) strategy to exploit two comparisons. First, we compare students who received the letters at Montana State University to those that also had loans but were below the cutoff for receiving a letter. Second, we compare students who received the letters to those who would have received them in the years before the policy was implemented. As a placebo test, we show that at the University of Montana, a comparable peer institution within the state, students who would have received the letters had the same policy been in place on that campus experienced no change in student loan or academic outcomes.

This study complements an emerging literature on informational interventions and borrowing behaviors, with the most related studies being **?**, **?**, **?**, **?**, and **?**. Several features of our intervention and our analysis are noteworthy. First, this study is particuarly detailed in its analysis of the connection between academic and financial behaviors. The richness of our data allow us to examine how students re-calibrate their borrowing along with short-term academic outcomes like GPA and number of credits that have not been analyzed previously in other related work. The intervention we study is also unique for bundling explicitly "warning" information on student loans and "encouraging" statements about academics together in one package, instead of providing simple updates about a student's status. In related work **?** find that students who received these letters are more likely to choose higher earning majors. This allows for insight into whether providing aca-

demic and financial information jointly may have different impacts that providing siloed information. Second, this intervention is the only one we are aware of that specifically targeted high borrowing students. This is in contrast to the most closely related study: in a randomized field experiment, **?** finds that a letter containing information on student loan amounts does not change future borrowing amounts or academic choices when distributed without regard to borrowing levels.[4] Third, the population under study is four year public university students as opposed to community college students, who have been the focus of **?**, **?**, and **?**.

We find that students who receive the warning letters do not change their borrowing in the semester following the intervention relative to those who do not receive the letters. However, the intervention has the greatest impact on academic outcomes, including several that have not been studied previously. First, the letter increases current semester grade point average (GPA) and credits completed. These effects are attributed to a higher rate of completing classes (instead of withdrawing), which may have been due to the statements about the number of credits needed each semester to graduate in four years and the need to pass 67% of credits attempted to remain eligible for financial aid. Second, receiving a letter increases GPAs and credits completed in the *subsequent* semester, plausibly attributable to the portion of the letter explaining the flat spot in payment for additional credits. Perhaps most importantly, the intervention increased retention rates in the subsequent semester and the subsequent year for freshmen and sophomores. These findings are critical in a policy environment focused on improving graduation rates: they suggest that early interventions that draw borrowers' attention to their relatively high student loan debt balances and that bundle warnings with academic encouragement can improve student academic outcomes and change financial decisions.

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[4]There is also an information-based letter at Indiana University, although no rigorous evaluation of the effects of the program have been completed to the best of our knowledge. The drops in loan amounts attributed to the letter can result in other changing time trends **?** .

2   Background

2.1   Financing Postsecondary Education

Students can finance their postsecondary education through a combination of several different sources: existing savings, parental contributions, employment income, grants, scholarships, subsidized and unsubsidized public student loans, and private student loans. Our research focuses on the federal options for borrowing. The federal government offers subsidized Stafford Loans to undergraduate students based on financial need and unsubsidized Stafford Loans to undergraduate students at all income levels. The borrowing limit for Stafford loans increases with each year of college, reaching a maximum of $7,500 per year for college juniors and seniors who are still financially dependent on their parents and $12,500 per year for financially independent students for the 2014-2015 academic year.[5] As there is no underwriting done on Stafford loans, students are able to borrow for their education without consideration of their ability to repay the loan. Parents can also borrow for their children's education using the Parent PLUS loan program, where students can borrow, at most, the cost of attendance minus any other aid received. The school determines the cost of attendance. Students and their parents also have the option of borrowing from private financial institutions to finance their postsecondary education. Since 2008, the origination of private student loans to undergraduate students has declined substantially due to tighter lending standards and a drop in investor demand for the asset backed securities that funded many private student loans (**?**).

2.2   Context for the Intervention

The intervention we study took place at Montana State University, an institution that is similar in many respects to other public four-year institutions throughout the United

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[5]The cumulative maximums are $31,000 and $57,500, respectively. Students with exceptional demonstrated financial need can additionally borrow from the government through their college using the Perkins loan program. In our sample, only 7% of individuals have Parent PLUS loans and 11% have Perkins loans.

States. We also use the University of Montana as a control institution. This is appropriate because Montana does not have a single state flagship campus; Montana State University and the University of Montana are peer, public institutions that are complementary.[6]

Table A.1 provides descriptive statistics comparing the two campuses along with other public four year institutions in the US.[7] Montana State University and the University of Montana have similar student enrollment of about 15,000 and 14,000, respectively; this number is comparable to the average enrollment at public four-year universities in the United States of about 11,000 students. Admission standards are the same at both institutions: both require an ACT score of at least 22,[8] a 2.5 high school GPA, or graduation in the top half of a student's high school class. About 60 percent of undergraduate students at both universities come from Montana. In-state tuition at the University of Montana in the 2014-15 school year was $6,330, about 15 percent lower than at Montana State ($6,800); out-of-state tuition is about 5 percent higher at the University of Montana. Although tuition rates at these universities are below the national average, they are comparable as a fraction of state median household income. Graduation rates are also similar, with both colleges graduating about 45 percent of students in six years. The main difference between the two is that Montana State University is the land grant institution, with larger colleges of agriculture and engineering, while the University of Montana has a larger liberal arts program.

Borrowing behavior is also similar at the two schools and approximates the national average. At Montana State, 65 percent of students graduate with student loan debt; at the University of Montana, 62 percent graduate with student loans. The national average is similar, with 69 percent of college students graduating with student loans. In 2013, the average graduate of Montana State University had about $27,000 in debt,

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[6]For example, by design, Montana State University has the business school for the state, while the University of Montana has the law school.

[7]The largest difference between these campuses and other public institutions is the low share of minority students: 85 percent of students at Montana State and 78 percent of students at the University of Montana are white. The national average for four-year public schools is 69 percent.

[8]Median ACT scores at Montana State University and the University of Montana were both 24 in 2013 according to College Scorecard data.

which is slightly less than the average debt at the University of Montana ($30,000), and the national average ($28,400) (**?**). When comparing all Montana students to US 4-year public institutions in Table A.1, 32 percent of all Montana State students and 39 percent of University of Montana students receive Pell grants; similarly the national average is 39 percent. Table A.1 also shows that while tuition is lower at the Montana schools, average federal loan amounts slightly exceed the national average.

Students at these institutions also appear to behave in ways that suggest that information and cues about their student loan borrowing might influence their behavior. First, many students have only a rudimentary understanding of their existing loans. To supplement the administrative data, we polled fall 2015 students in Economics 101 and Economics 202, entry level courses required for many majors and overpopulated by freshmen. Based on a survey of 756 students, 40 percent took out loans. Of those, 56 percent took out both subsidized and unsubsidized loans and 25 percent took out just subsidized loans. The other 20 percent of borrowers reported either not knowing what kind of loan they took out or reported taking out only the unsubsidized loan. We also polled students on how they determined the amount to borrow. One third of borrowers said they took out the entire amount they were eligible to borrow, while 26 percent said they took out a loan amount to cover tuition. Another 8 percent reported that they "figure out how much I could afford to repay after graduation and borrowed that amount." An additional 24 report calculating the difference between projected spending and their other resources from savings, work, or parents. This suggests that the majority of students are deliberately relating borrowing amounts to factors other than just the maximum eligibility amount, and also suggests that a sizable fraction lack clear information about their current loan choices.

These survey results reiterate a Brookings Report by Akers and Chingos **?** finding that only 52 percent of students at a selective Northeastern public university could state the amount they paid for their first year of college within $5,000. Of the remaining students, 25 percent underestimated the cost, 17 percent overestimated the cost, and 7 percent said

they did not know. **?** also find that half of all first-year college students in the United States underestimate the amount of debt they hold, and less than one third of students can provide a relatively accurate estimate of their federal debt. This again highlights the lack of information students have regarding their student loans, suggesting that an information-based intervention may change behavior.

2.3   Student Debt Intervention at Montana State University

The intervention we study was initiated in fall 2012 by the Office of Financial Education, part of the Center for Student Success at Montana State University. During the fall semester, students with debt levels labeled as high were sent "Know Your Debt" letters. At the time, average debt upon graduation was about $25,000. The "Know Your Debt" letters were sent to students whose debt would have placed them at or above thresholds related to this average: freshmen with more than $6,250 in loans as of fall semester, sophomores with more than $12,500 in debt, juniors with more than $18,750 in debt, and any student with more than $25,000 in debt.[9] A sample letter is included in Figure A.1. For context, these debt amounts targeted students whose annual borrowing represented about double the amount of in-state tuition. These thresholds exceed the federal subsidized loan limits, but not the unsubsidized loan limits for dependent juniors and seniors, or the federal loan limits for all independent students. For example, freshmen can take up to $3,500 in federal subsidized Stafford loans. Independent students can borrow an additional $6,000 in unsubsidized Stafford loans, for a total of $9,500. (Parent PLUS loans were also included in the total loan amount for the letter criteria.) The class standing was determined by number of credits taken, rather than by number of semesters enrolled. Graduation requires 120 credits, implying 15 credits per semester to graduate in 8 semesters. Freshmen are defined by the university as students with less than 30 credits, sophomores have 30 to 59 credits, juniors have 60 to 89 credits, and seniors are students with more than 90 credits. As a result, letters would have been triggered by both higher

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[9]These thresholds were not indexed for inflation.

than average borrowing amounts per semester as well as by slow academic progress.[10]

Roughly 2,300 letters were sent in the first year of the intervention.[11,12] The intervention continued into the following year (2013) with the same criteria for letters and recommendations for appointments. To the best of our knowledge, there were no concurrent programs offered to these students.[13] Important to our study is that there were no other interventions that happened simultaneously at Montana State University for students either above or below the threshold differentially.

The "Know Your Debt" letters had three key components: it provided "warning" statements about debt levels, it included "encouraging" statements about academics and specific academic requirements of borrowing, and it offered financial and career counseling. The warning nature of the letter may have grabbed student attention and caused them to read the letter more carefully than the other mailings they receive. Counseling appointments were incentivized with $10 gift cards in the first year and $20 gift cards in the second year, redeemable at a local grocery store and gas station, although students who did not receive the letter were also eligible for these gift cards if they came in for counseling. Counseling services were not tracked consistently in connection with the letters, making it difficult to determine the take-up of these services. The number of appointments made represents about 10 percent of the number of unique individuals receiving a letter, but it is not clear how many visits or the timing of the appointment

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[10]A few additional letters were sent to students whose total loan amount exceeded the median annual salary by major or whose expected monthly payments were anticipated to exceed 14 percent of monthly salary. These median salary levels come from Montana State University Career Destinations Survey of recent graduates. In practice very few students met this condition who did not also meet the debt threshold conditions. We count these as untreated, as this will bias us against finding an effect.

[11]Appendix Table A.3 predicts loan letter receipt by year for Montana State over time. These results suggest that Pell recipients are the most likely to receive the letter across all years. Importantly, the determinants of letter receipt do not differ by campus. Table A.4 shows the same predictions for the University of Montana, had they implemented the program. The same variables are predictive in each setting and similar in magnitude.

[12]We do not know who precisely received the letters. However, we do know the rule by which the letters were assigned.

[13]Concern may arise that academic probation may be correlated with letter receipt. However, academic probation policies did not change over this time period, and while academic outcomes are correlated with probation, there are no systematic rules for these policies. Instead, the academic probation policies have many exceptions that are based on the individual case.

relative to the letter receipt. As a result of the bundled intervention, this study does not attempt to distinguish between the effect of receiving a targeted debt letter, the advice in that letter, and the one-on-one counseling sessions.

As in **?**, the letter provided students with a statement about their specific debt levels. This was followed with normative language discouraging this level of borrowing: "If you continue to accept student loans at this rate, you will accrue a debt level that may become difficult to repay, which may place you at risk for defaulting on your loans." The "warning" statements were combined with "encouraging" information about academics, including statements about the benefits of graduating from college.[14] The letters followed this with specific academic advice. In particular, they encouraged students to take more than 12 credits to take advantage of constant tuition rates above this threshold: "At MSU, tuition doesn't cost a penny more after you've registered for 12 credits in a semester. Please consider registering for more credits to graduate sooner and spend less on tuition!" The specific recommendation to take 15 credits instead of 12 credits provides a mental reference point, a framing that in many contexts has been shown to influence subsequent choice. This was followed with a reminder that students need to complete and pass at least 67 percent of credits attempted, another concrete reference point.

Although the University of Montana also offers financial counseling to all students, there is no parallel effort to target counseling offers and no corresponding initiative to let students know about their debt status other than through the standard federal process of applying for financial aid.[15] We therefore use the University of Montana as a control campus by identifying students whose class standing and debt levels would have generated a letter if the same policy had been in place, and replicate the DD approach at this institution. If there are no effects of this placebo letter policy at the University of Montana, this gives further confidence that the natural experimental design at Montana State is valid.

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[14]**?** find that providing this information can increase the perceived value of postsecondary education.

[15]See **?** for a discuss of the details of federal counseling.

The closest paper to this is **?**, who studies the effect of an information letter intervention on student loan and academic outcomes using a randomized control trial at the University of Missouri. Randomly selected non-graduating students that accepted aid at some point in their tenure at the University of Missouri received electronic letters that reported the student's loan amounts broken down by type, as well as an expected future monthly payment. **?** finds that the letter did not change students' borrowing amounts, probabilities of borrowing, likelihoods of dropping out, attendance costs, or likelihoods of changing programs, although it did increase the probability that students sought out financial aid offices. There are three clear distinctions between this study and that of **?**. First, the Montana State University letters provided information on both academics and student loans simultaneously. Providing loan and academic information at the same time may have made the complexity of the interrelated academic and borrowing decisions more salient, particularly given the specific reference points encouraging more than 12 credits and passing 67. Furthermore, our data allow for a more detailed investigation of the effects on a range of academic outcomes beyond retention. Second, the Montana State letters contained normative language, which may have led to different effects than simply informational statements. Third, the letters at Montana State were targeted directly to high debt borrowers, allowing university administrators to express their concern about future loan repayment for these students. Specifically targeted letters potentially make debt levels more salient to students: a student receiving a letter indicating that their debt level is considering high by their college may take that as a clear signal to make more informed borrowing decisions.

3   Data

The data for this project are administrative panel data from the Montana University System (MUS). These data include students' high school information, demographic information, the Montana postsecondary campus attended, and the degree pursued. The

MUS data are novel for the detailed individual-level college funding information provided. These data identify the source of funds (such as federal, institutional, state, or other), the type and amount of award (need-based, merit-based, athletic payments, work study, loans, etc.), and the fraction of tuition covered by the loans. Our data do not include any information on private loans; however, private student loans are only a small fraction (roughly 7%) of student debt at the undergraduate level (**?**). These data also include semester-by-semester enrollment, credits, major, GPA, courses taken, and retention.

Our data span the years 2003 through 2014, or 34 semesters of data, allowing us to follow 57,334 undergraduate students with loans for at least some portion of their time in college. The sample yields a total of 221,240 undergraduate student-semester observations with full coverage across all variables. We limit our analysis to in-state undergraduate students to abstract away from tuition and loan differences due to the choice of an out-of-state institution. Finally, we limit our analysis to all students who have some form of public student loan, as those without loans are systematically different from those with loans and would never be the target of this type of intervention.

Table 1 reports summary statistics on the loan, demographic, and academic characteristics of the students we study by campus and before and after the intervention. The campuses are similar across academic outcomes including GPA, semester credits, and retention rates. The average student across both campuses enrolls in 12 credits per semester, or approximately four classes, which is less than a recommended course load of 15 credits per semester that typically would enable graduation in four years. Average student loan amounts are appoximately $4,000 for each school in the pre-period, which covers about 94 percent of annual tuition charges. In the post-period, both average loan amounts increase to $5,700 and $5,200 for Montana State and the University of Montana, respectively. This reflects the national trend in increasing student loan amounts over time.

The two campuses have similar student characteristics. Approximately one-third of students within our sample are Pell grant recipients, meaning they come from a low-

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income household.[16] Both schools have populations that are predominantly white, and Montana State has a higher fraction of males (55%) than the University of Montana (48%). This is potentially due to the relatively larger share of STEM majors at Montana State.

We obtain data from the American Community Survey on demographic characteristics for the student's ZIP code of high school graduation. These variables include educational attainment, racial composition, median household income, and population density of the ZIP code. Finally, we control for whether or not the student came from a metropolitan area of over 25,000 residents to proxy for urbanicity.

Figure 1 documents the persistence in borrowing behavior across semesters. Specifically, students in the sample tend to take out roughly the same amount each spring semester as they did in the fall semester. Between 80 and 90 percent of students borrow within 1 percent of the previous semester's amount.

A histogram of loan debt by class for students at Montana State University after the intervention took place is presented in Figure A.5. The first thin line in the figure represents the maximum subsidized loan amount by class; the second thin line represents the combined subsidized and unsubsidized annual loan amounts by class. The thicker line signifies the threshold for receiving a letter. These limits are only relevant for dependent students: the limits for independent students will exceed the thick blue line in all cases. Beginning at the top left panel, we see that it is common for freshmen to take the full subsidized amount or the full subsidized and unsubsidized amount conditional on taking out loans. After their first year, students deviate from taking out solely the maximum subsidized limit and move to other points, although again these deviations are driven by both changes in loan amounts and students taking different numbers of semesters to reach the credits required for the next academic standing (e.g., 30 credits to be considered a sophomore, 60 credits to be considered a junior, and 90 credits for senior standing).

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[16] According to the US Department of Education's 2012-13 report, about three quarters of Pell Grant recipients have a family income of $30,000 or less (`http://www2.ed.gov/finaid/prof/resources/data/pell-2012-13/pell-eoy-2012-13.html`).

4   Methods

As described in Section 2.3, beginning in fall 2012, Montana State University extended warning letters and targeted offers of intensive financial counseling to students who were at risk of graduating with high levels of debt. Letters were sent based on debt as of the fall semester relative to a threshold that depended on the student's standing (freshmen, sophomore, etc) in school.[17]

In our data, we use the information on student loan amounts to determine freshmen, sophomores, juniors, and seniors who would have received the letters based on the debt criteria established by MSU. Table 2 reports the counts of individuals assigned to receive the letter at Montana State and those that would have received the letter using the same criteria at the University of Montana.

We examine the impact of these letters on academic outcomes by comparing students who received warning letters in fall 2012 or fall 2013 to those who did not, as well as to those who had similar levels of debt in years prior to the letter program and *would have* received letters if the program had existed. The best measure we have for parental income in our data is the student's Pell Grant status, a signal for having come from a very low-income family. We also control for ZIP code-level demographics for a student's home ZIP code to capture other dimensions of socio-economic status. These variables include percent non-white, median household income, educational attainment, urbanicity, and population density. We further control for students' race, gender, the number of credits taken up to that semester, the number of semesters the student has completed, the amount of non-loan aid a student receives (e.g., grants, scholarships), the type of semester (fall, spring, or summer), and include year fixed effects. We also control for total loans amounts, to account for the correlation with getting a letter as well as other outcomes that may be

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[17]Letters were also sent to students whose total debt exceeded the median salaries for Montana State graduates in their major field. These salaries were based on responses to MSUs Career Destinations Survey given to graduating seniors. The salary requirement is only binding for a handful of students who receive the letter. Thus, we leave it out of the estimation strategy.

correlated with loans.[18] Specifically, we estimate the Equation 1 for students with loans.

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\begin{aligned}
Y_{i,t} \;=\; & \alpha_0 + \beta_1 \text{Letter}_{i,t} + \beta_2 \text{Letter}_{i,t} \times \text{Post}_t \\
+ \;& \alpha_1 \text{White}_i + \alpha_2 \text{Male}_i + \alpha_3 \text{Pell}_{i,t} + \alpha_4 \text{Credits}_{i,t} + \alpha_5 \text{Loan Amount}_{i,t} \\
+ \;& \alpha_6 \text{Non Loan Aid}_{i,t} + \boldsymbol{\alpha_7}\text{Zip}_{\boldsymbol{i}} + \alpha_8 \text{Semesters}_{i,t} + \gamma_{\text{semester}} + \delta_{\text{year}} + \epsilon_{i,t}
\end{aligned}
\tag{1}
$$

Note that the indicator variable "Letter" is equal to 1 for a student in any year whose debt levels would have qualified them for the "Know Your Debt" letters at Montana State University in 2012 or later.[19] This varies by time because students may be letter eligible one semester and not the next. The primary parameter of interest is β_2, as it captures the difference-in-difference (DD) estimate of the effect of the counseling intervention. This estimate should be thought of as an "intent to treat" measure, as it captures the effect on all students whose borrowing reaches the key thresholds. The outcome $Y_{i,t}$ represents the outcome of a variety of decisions students can make in the subsequent semester after receiving the letter. We cluster standard errors at the individual student level. Our choice to cluster at the student level rather than the university level was guided by ?, which notes that clustering is not necessary if (1) a key regressor is as good as randomly assigned, or (2) if the model included fixed effects and the correlation of the errors is solely driven by a common shock process (pg 17). Because the level that triggered the letter was somewhat arbitrarily determined it is therefore closer to random assignment and the estimation includes year fixed effects.

In order for our DD estimation strategy to produce causal estimates of the effect of the "Know Your Debt" letters on student outcomes several assumptions must hold. The first is the parallel trends assumption that in the absence of the treatment (letters) the

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[18]In Table A.5 we include loan amount squared as well as loan amounts as a control. Our results remain consistent. If we instead control for logged loan amounts, or more flexible specifications for loan amount quantiles, our results remain robust.

[19]If we restrict our sample to include only those who borrowed over half of the thresholds for each graduating class, our results remain robust.

trends in the various outcomes across the debt groupings would have remained the same. We plot the trends across our dependent variables of interest in Figures A.2-A.4. The second is that there are no spillover effects from the treatment to the control group (e.g. students receiving the letters will not talk with others who are just below the threshold and do not receive the letter). However, if this assumption is violated it would only lead to our estimates being biased downwards since some of the control group would have then received a weak version of the treatment.[20]

We validate our DD estimation strategy by replicating the same analysis for the University of Montana, assigning letter receipt to those who would have received the intervention had it been in place at that campus. While the campuses are different in terms of the majors they more closely service, there are no reasons to expect changes in student loans, GPA, or credits attained within campus over time that would create a threat to identification, especially across the threshold. If we instead use a difference-in-difference-in-difference strategy with the cross-campus variation in addition to the differences above and below the threshold over time, our results remain consistent.

5 Results

Table 3 reports outcomes achieved in the subsequent spring semester and the current fall semester when the letter was received. The financial outcomes include the semester loan amount taken out in spring and a dummy equaling one if an individual's loan amount decreased from the fall to the spring semester. Academic outcomes include the semester credits and GPA for both the fall semester in which the letter was received and the subsequent spring semester. Academic outcomes also include the probability of retention between fall and spring semesters, as well as retention the following year (for freshmen and sophomores). These results are based on the sample of all Montana State students with

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[20]Although we use a DD framework for the analysis, the causal effect of the intervention could also be identified using a regression discontinuity design (RD). In practice, however, we do not have sufficient observations within reasonable bandwidths on either side of the threshold for each class of students to systematically validate the continuity assumptions with regards to the other control variables.

loans in any period. The second panel shows the same DD exercise with the University of Montana. If our experimental setup is valid, we expect to see no effect of the letters on outcomes at this institution, since there was no program in place.

Table 3, Column (1) shows that students subject to the intervention reduced the amount they borrowed in student loans in the semester following receipt of the letter by approximately $68 although this is not statistically different from zero at the 10 percent level. This result is roughly consistent with that of **?**, where the intervention did not change loan amounts. Further, the magnitude of the effect in Column (1) is small, representing roughly 2 percent of mean borrowing amounts. The dependent variable in Column (2) instead is a binary variable for whether or not the amount borrowed in the subsequent semester was smaller than in the semester when the letter was sent. It shows that about 5 percent of students had lower loan amounts in the subsequent (spring) semester relative to the control groups, indicating a reduction in borrowing among a relatively concentrated group.[21] The targeted letters and offer of one-on-one counseling appear to result in some students either reducing their spending or finding alternative ways to finance their subsequent semesters in school. The placebo DD results for the University of Montana also indicate an insignificant decline in average loan, with a point estimate of a similar magnitude as at Montana State. However, the effect of the letter on the binary outcome for decreasing loan amounts is a tightly estimated zero for the University of Montana.

These results suggest that there is an increase in the proportion of students recalibrating their loan amounts at Montana State, though they reduce by very small amounts. If we separate the effect based on borrower's fall loan amounts (the lowest quantile–below $2,500–, the two middle quantiles–$2,500-$5,000–and the highest quantile, above $5,000), we find that those most likely to reduce are those that borrow between $2,500 and $5,000 in the fall semester, and that the average loan amount for this group falls by about $200. These results are available in Table A.4. The later response by

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[21]We also examine a binary variable for whether or not loan amounts increase, as potentially some students could have increased loan amounts while others decreased borrowing. However, the coefficient is a tightly estimated zero, indicating no increase for other students due to the intervention.

mid-range borrowers is consistent with expectations. The highest borrowers are likely to most likely to be students who simply choose the maximum possible level of borrowing. It is likely that they are choosing the maximum for one of two reasons: (1) they are using a relatively simple rule of thumbwithdraw the maximumrather than basing their loan decision on an individual budget or other supplemental information; or (2) they are choosing the maximum because their optimal level of borrowing may be even higher but the maximum is capped. In either case, these students are unlikely to re-optimize to lower levels after receiving the supplemental information. In contrast, mid-range borrowers may have more latitude for adjusting between borrowing and work behavior. These borrowers may also borrow a moderate amount because they have a more explicit budget target (as opposed to students who simply withdraw the maximum possible level). [22]

With our rich data, we also examine the effect of the letter on a range of academic outcomes, including credits and GPA. There are a number of reasons why credits and GPA might be affected in the semester when the letter was received. The letter reminded students that they must enroll in at least 6 credit hours to be eligible for most federal and state aid (with the exception of Pell Grants), and they must be full time (12 credits or more) to receive a full Pell Grant or scholarship. Tuition and fees are constant above 12 credits, implying that the marginal financial cost for enrolling in more than 12 credits is zero. In order to complete the standard graduation credit requirements in four years, students need to enroll in 15 credits each semester. This objective implies that one potential improvement for many students would be to enroll in 15 credits instead of 12 credits, with no marginal financial cost. Students may be especially likely to enroll in more credits in the semester after they receive the letter. Furthermore, the letter reminded students that to be eligible for aid in the subsequent semester, they must complete at least 67 percent of credits attempted. For example, a student taking 9 credits could not withdraw from a 3-credit class without losing eligibility for aid the next semester. For

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[22] If we instead use a non-linear specification that interacts loan amounts with the post indicator, we see a similar pattern.

students taking more than 9 credits, withdrawing from a single 3-credit class would not affect future financial aid.

The explicit academic reminders may have induced both changes in behavior in the semester the letter was received and in the subsequent semester.[23] Because the Office of Student Success distributed the letters in November, around the time when students make decisions about withdrawing from courses and studying for finals, we examine performance and credits completed in the semester of the intervention. The deadline to withdraw from classes at Montana State University is roughly the third week of November.[24] Table 3 (Column (4)) shows that the targeted students are more likely to complete the courses they are enrolled in, finishing the semester with 0.2 additional credits, although this effect is not statistically significant. In unreported regressions, we examined the effect of the letter on the probability of completing 9, 12, 15 or more credits. We find that the magitude of the effects on credits appears at 12 credits and above (results available on request).

More significantly, the intervention increased students' semester GPAs by 0.077 points (Column (3)). There are several possible mechanisms for this: receiving the letter late in the semester may have induced greater effort. The effect may also have come from completing enrolled courszes: late withdrawal from classes has the same effect on GPA as earning an "F.". The bottom panel indicates that there was no corresponding change in credits or grades for students at the University of Montana where no intervention occurred.

Columns (5) and (6) indicate that these academic effects persist in the subsequent semester after the letter was received. Students increase their credits in the subsequent semester by 0.12, although this is not statistically significant at the 10 percent level. GPAs in spring semester are 0.07 points higher for targeted students. While these effects are

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[23]Unfortunately, our data do not report the number of credits attempted by each student. Thus, we cannot directly test whether or not the student passed 67 percent of his or her classes. However, an increase in credits across the distribution will increase the probability that students remain eligible for aid by completing over two thirds of their courses.

[24]At the University of Montana, students can withdraw without the signature of the dean up until the 45th day of class (roughly the first week of November), but can withdraw with a signature up until finals week.

modest (both represent about 2 percent of mean values), they do suggest some positive effects for students that were exposed to the intervention. Importantly, we find no effect of the letter on academic outcomes for students at the University of Montana–the point estimates are again essentially zeros in magnitude.

The findings thus far indicate that the intervention affects current and subsequent semester behaviors in ways that suggest that students are correcting behavior after receiving additional information. However, it may be that the letters have negative effects on eventual outcomes if they cause students to become discouraged and drop out of the university. If subsequent semester outcomes are driven by the fact that some students select out of college completion, the results may overstate the positive effects on academic achievement. This does not appear to be the case. Table 3 Columns (7)-(8) examine the effect of the intervention on student retention for freshmen and sophomores only, as including juniors and seniors confounds graduation with retention. This table reports retention two different ways. Column (7) reports whether the student was still enrolled and taking courses in the subsequent semester, and Column (8) reports whether the student was still enrolled and taking courses in the subsequent fall semester (one year later). The one year retention results only include those exposed to the intervention in 2012, since we do not have data for the 2014-2015 academic year at this point.

The results indicate that the intervention increased retention in the subsequent semester by 1.7 percentage points and in the following year by 5.3 percentage points. This is roughly 2 and 7 percent of mean retention rates (86.5 percent and 78.5 percent) for one semester and one year, respectively. We attribute the greater effect on one year retention rates in part due to the timing of the letter. Students who receive letters in November may already have made plans for the following semester, particularly those who planned to drop out. Over the following year, students have more time to adjust their decisions. As retaining students is often a university goal, particularly at public universities, this targeted intervention could be an important way to retain at-risk students (i.e., those with higher loan amounts). This is in contrast to literature finding that academic proba-

btion discourages students from returning to school (**?**).[25] Students at the University of Montana who would have received letters again saw no change in retention probabilities, with coefficient estimates of zero.

Since these results suggest that those subject to the intervention are most likely to be retained, causing more treated students to show up in the sample the subsequent semester and year, concern may arise that sample selection affects the estimates on GPA and credit hours taken. We argue that the students retained due to the policy are marginal students who might have considered dropping out. The retention of marginal students would downwardly bias our estimates for GPA and credits in the spring semester, suggesting that the true magnitude of the effect of this intervention could be greater than what we report.

It could be that our results are driven by a cumulative effect after individuals receive the letter in the fall of 2012 and again in the fall of 2013. We verify that the cumulative effect is not generating our effect. Table 5 replicates Table 3 but instead documents the effect of the letter in 2012 alone. This gives us the effect of receiving only one letter on loan and academic outcomes. These results are consistent, and in fact indicate that the effects of the first letter are both larger in magnitude and statistically significant in the case of current semester GPA and credits completed. Importantly, our placebo test at the University of Montana continues to validate our experimental design: there is no effect of predicted letter receipt on academic or loan outcomes on the campus where no policy was in place. While we would like to separately identify the cumulative effect of receiving a letter in each year, these data do not have enough observations of students who only recieved the letter once to precisely differentiate the effect of recieving one letter instead of two.

Table A.6 trims the sample to reduce the number of pre-intervention years in an effort to ensure that pre-period trends are not driving the results. While our standard errors

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[25]There is no systematic academic probabtion policy at Montana State University or the University of Montana.

increase, our results remain comparable for borrowing, current and subsequent semester GPAs, and retention. We continue to find that our placebo test at the University of Montana holds. If we falsely assign the letter to 2010 and 2011 instead of 2012 and 2013, we find no effect of the intervention on loan or academic outcomes.

5.1 Heterogeneity

We next look at potentially heterogeneous effects of the intervention in Table 6. Panel A begins by replicating all outcomes from Table 3 for four different sub-samples: freshmen, Pell recipients, females, and non-white students. Coefficients reported in bold are statistically different from the average effects in Table 3 at the 90 percent level.

For this analysis, we examined true first semester freshmen, rather than defining freshmen as students with less than 30 credits. First semester freshmen are an important sub-population to examine. As shown in Figure 1 previously, borrowing decisions are highly habitual, so early changes are likely to have persistent cumulative effects. Furthermore, dropout rates are highest after a student's first year. The results indicate that first semester freshmen in the fall did not change their loan amounts in the subsequent semester, though receiving a letter caused 3.5 percent of freshmen to reduce their loan amounts from the fall to spring semesters.

However, the academic responses by freshmen were larger than for the entire average population. In the fall semester when the letter was received, freshmen exposed to the intervention finish, on average, with a 0.11 point higher GPA (Column (3)) and 0.4 more credits (Column (4)); the former is statistically greater than the average effect. Freshmen further responded to the intervention by increasing their average credits by 0.33 (Column (6)) in the subsequent semester and improved their GPAs by 0.12 points (Column (5)) in the subsequent spring semester, where both are statistically greater than the average effect. This could be a direct response to the cautions in the letter about maintaining Satisfactory Academic Progress. Freshmen are 0.5 percentage points more likely to be

retained in the next year. As freshmen were not able to receive the letter twice by definition, this sample also validates that we are not driven by the cumulative effect of receiving two letters.

The next set of estimates are for Pell grant recipients, who come from low-income households. These students track the average effect from Table 3 closely. Pell recipients see a larger increase in current semester credits: 0.33. This is over 50 percent greater than the average effect. One year retention rates also improve more for this group than the average effect, though these are not statistically different from each other.

Female students have essentially the same responses as in Table 3: the coefficients for females are never statistically different from the overall overage. We find that the intervention produced no changes for non-white students in next-semester GPA, next-semester credits completed, current-semester GPA, current-semester credits, or retention. However, 8 percent of these students did reduce their loan amounts. Note that in our data, only 13 percent of the student body is non-white, and these students are dispropor-tionately American Indian. Caution should be taken in extending these results to other groups. The small sample results in findings that have large standard errors.

5.2   Discussion

There are a few components to the experimental design that are worth mentioning. First, while we know the specific rules used to determine who would receive the letters, we do not know who exactly received the letters. In addition, the number of students who should have received letters, according to our counts, is slightly smaller than the number of students to whom the Center for Student Success actually sent letters.[26] This slight discrepancy would lead to a downward bias in our results relative to the actual effect size, as we classify students as not receiving the intervention when they did.

Second, there may be spillover effects from the letter recipients to the non-recipients.

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[26]This difference could be due to refunds of student loans or a difference in the loan amounts at the given date in the data versus the loan amount on the given date in the Centers records.

For example, at-risk students who received a letter may see the counseling option and tell their roommates about their financial struggles or their experience at a counseling session. Even if the at-risk student does not go to counseling, his roommate can still see a one-on-one financial counselor at no charge. If the roommate attends the counseling session, or makes more thoughtful borrowing and academic decisions in the future, this will downwardly bias our estimates of the true effects of the intervention.

Third, this is a sample of students in Montana, and the results should be extended to other states, private schools, and two-year schools with caution.

6 Conclusion

In June of 2015, the 90 or more day delinquency rate on student loans reached 11.5% (?). This high rate of delinquency on a large amount of consumer debt has prompted widespread concerns about student loan debt. Much of the existing research and policy effort has focused on addressing student loan debt once the borrower has entered repayment. In contrast, we find that providing college students with information when they still have the flexibility to alter their borrowing and career trajectory can improve their outcomes while still in school. Furthermore, we focus on effects at public four year institutions. Much of the recent discussion about default has centered on the rising cost of college at high-end private universities, as well as the high default rates for low-quality for-profit and community college students (?). However, public four-year institutions educate 72% of all postsecondary students (?) and three year cohort default rates at public institutions are 12 percent.[27] This paper provides insight into this understudied yet large portion of student loan borrowers.

Our study suggests that a relatively low-cost intervention as simple as sending targeted at-risk students a warning letter about their student loan debt and offering academic advice and financial counseling can positively influence students' academic outcomes,

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[27]Data accessed at http://www2.ed.gov/offices/OSFAP/defaultmanagement/cdr.html.

while leaving debt levels unchanged for borrowers with above average student debt. The intervention increased GPAs and credits in the current and the subsequent semester, while also increasing the probability students were retained the following year relative to their peers. These estimates rely on comparisons with similar students in pre-intervention periods and other borrowers with loans below the thresholds, with a peer institution corroborating that no similar effects were found in the state for universities without this policy.

The magnitudes we find in this paper complement those of some information-based interventions, particularly the modest effects on borrowing. However, the relatively larger effects on mid-range borrowers and the effects on current and future semester academics highlight the importance the specific architecture of informational interventions. It is worth reiterating that the estimated effects are for a combined package: a letter that is targeted and that contains loan information coupled with a warning, academic encouragement and reminders, and offers for one-on-one counseling. This study alone cannot identify if there is a single mechanism that drives the results. However, the combined package is a novel approach that is also low cost, in part because only a subset of students receive the letters. Because of the low costs of this intervention, gains from identifying the precise mechanism in this context are relatively minimal. Further, a range of permutations of letters and informational efforts are beginning at a number of other universities, making it especially important to have results that can be compared to more intensive and costly approaches.[28,29] These results suggest that bundling academic and financial information, targeting letters specifically to high borrowers, and using normative language may lead to more substantial effects. Furthermore, the low cost of this intervention is dwarfed by the high returns potentially achieved, particularly because of the positive effects on retention. However, long-run outcomes are needed to see if these effects persist further into college.

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[28]For example, Indiana and Nebraska now require all colleges that accept federal financial aid to send a letter regarding debt amounts and repayment. (`http://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2016/05/19/what-happens-when-you-warn-students-about-their-loan-debt`)

[29]See ? for some early evidence in Indiana.

7 Tables

Table 1: Letter Descriptive Statistics

	Montana State		University Montana	
	Pre	Post	Pre	Post
Academic Characteristics				
Semester GPA	2.79	2.85	2.77	2.81
	(1.02)	(1.03)	(1.04)	(1.06)
Semester Credits	12.16	12.33	12.10	12.05
	(4.51)	(4.68)	(4.62)	(4.79)
Retained Following Semester	0.87	0.86	0.87	0.87
	(0.34)	(0.34)	(0.34)	(0.34)
Retained Following Year	0.77	0.80	0.77	0.80
	(0.42)	(0.40)	(0.42)	(0.39)
Loan Characteristics				
Loan Amount for Borrowers	4.071	5.692	3.885	5.195
	(2.546)	(4.087)	(2.437)	(3.142)
Non-loan aid for borrowers	1.410	2.062	1.446	2.105
	(1.626)	(2.319)	(1.495)	(1.948)
Student Characteristics				
White	0.89	0.87	0.85	0.85
Male	0.55	0.55	0.48	0.47
Pell	0.28	0.30	0.32	0.36
Observations	92,764	23,494	87,839	18,250

Notes: Data for all periods where Pre signifies before the intervention (2002-2011) and Post contains all years after the intervention (2012-2013). Means reported with standard deviations in parentheses. Loan amounts in thousands.

Figure 1: Students Borrow the Same Amount Every Semester
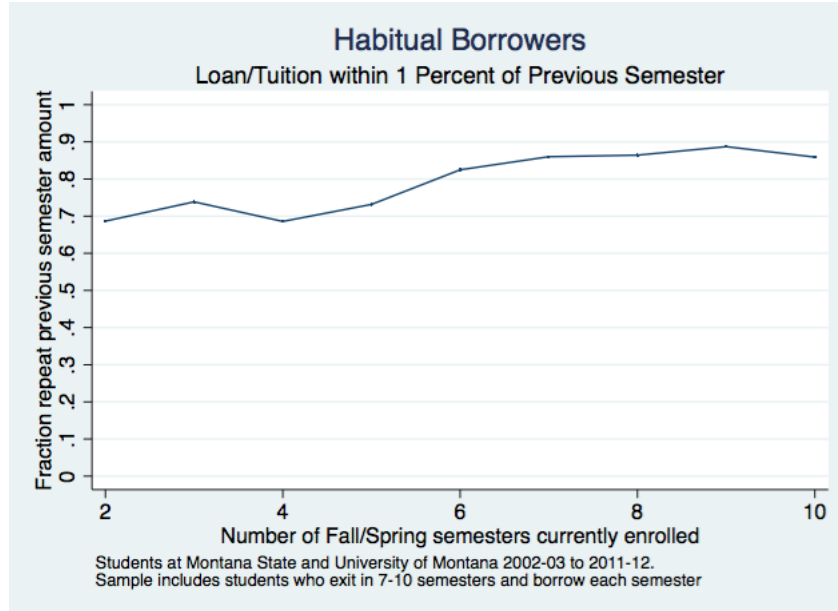
Notes: This graph plots the percent of students that come within 1% of their fall semester loan amount to tuition ratio in the subsequent spring semester by the number of semesters in which the student is enrolled.

Table 2: Letter Descriptive Statistics

| | Intended Letter | | No Letter | |
	Montana State	University Montana	Montana State	University Montana
Number Freshmen	1,474	807	5,585	4,089
Number Sophomores	1,607	1,394	3,915	3,551
Number Juniors	941	1,028	1,963	2,177
Number Seniors	450	511	1,205	1,403
Cumulative Loan amount Fall	17.71	17.85	7.19	7.16
Semester Loan amount Fall	3.55	3.37	1.91	1.93

Notes: Data for Fall 2012 and Fall 2013 only. Cumulative loan amounts in thousands.

Table 3: Effect of Letters on Loan and Academic Outcomes

	(1) Loan Amount	(2) Loan Amount Fell	(3) Fall GPA	(4) Fall Credits	(5) Spring GPA	(6) Spring Credits	(7) Retained 1 Semester	(8) Retained 1 Year
DD: Within Montana State								
Letter × Post	-0.068	0.049***	0.077**	0.198+	0.072**	0.123	0.017+	0.053**
	(0.044)	(0.010)	(0.025)	(0.112)	(0.022)	(0.090)	(0.010)	(0.018)
Observations	44,380	44,380	44,379	44,379	50,881	50,881	25,743	21,382
DD: Within University of Montana								
Montana State × Post	-0.071+	0.013	0.006	0.094	0.001	-0.026	-0.003	0.003
	(0.041)	(0.010)	(0.026)	(0.119)	(0.024)	(0.101)	(0.011)	(0.019)
Observations	46,597	46,597	46,280	46,280	53,025	53,025	25,430	21,518

Notes: Standard errors are clustered at the individual student level and are reported in parentheses. $^+$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Loan Amount is measured in thousands. Loan Amount Fell is a dummy variable equal to one if the semester loan in the spring semester was lower than the Fall semester loan amount. Specifications condition on having loans in Fall semester. Columns (7)–(8) further restrict the sample to freshmen and sophomores. Column (8) only includes data from the first year of the letter. All models control for ZIP codelevel characteristics from the American Community Survey, including percent no high school education, percent high school education, percent some college, percent non-white, population density, and median household income. We also control for whether or not the individual is from a metropolitan statistical area (MSA) with over 25,000 residents as a proxy for urbanicity. All models include year fixed effects, semester fixed effects (fall or spring), the number of credits the individual has completed at the institution, a dummy equal to one if the student was above the debt threshold for the letter, the number of semesters the individual has completed, the amount of non-loan aid the individual received, a dummy equal to one if the individual received a Pell grant, a male dummy, and a dummy equal to one if the individual is White.

Table 4: Effect of Letters on Loan Amounts Across Fall Loan Amount Categories

	(1)	(2)	(3)
	Dependent Variable= Spring Loan Amount		
	Under $2,500	$2,500 to $5,000	Over $5,000
Letter × Post	-0.269	-0.252***	0.074
	(0.183)	(0.064)	(0.074)
Observations	10,375	22,875	14,681

Notes: Standard errors are clustered at the individual student level and are reported in parentheses. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Loan Amount is measured in thousands. Specifications condition on having given loan amounts in Fall semester. All models control for ZIP codelevel characteristics from the American Community Survey, including percent no high school education, percent high school education, percent some college, percent non-white, population density, and median household income. We also control for whether or not the individual is from a metropolitan statistical area (MSA) with over 25,000 residents as a proxy for urbanicity. All models include year fixed effects, semester fixed effects (fall or spring), the number of credits the individual has completed at the institution, a dummy equal to one if the student was above the debt threshold for the letter, the number of semesters the individual has completed, the amount of non-loan aid the individual received, a dummy equal to one if the individual received a Pell grant, a male dummy, and a dummy equal to one if the individual is White.

Table 5: Effect of First Year Letters Only (2012) on Loan and Academic Outcomes

	(1) Loan Amount	(2) Loan Amount Fell	(3) Fall GPA	(4) Fall Credits	(5) Spring GPA	(6) Spring Credits	(7) Retained 1 Semester	(8) Retained 1 Year
DD: Within Montana State								
Letter × Post	0.043	0.080***	0.146***	0.453**	0.104***	0.276*	0.029*	0.053**
	(0.059)	(0.013)	(0.033)	(0.148)	(0.029)	(0.119)	(0.013)	(0.018)
Observations	40,097	40,097	40,096	40,096	45,938	45,938	23,093	21,382
DD: Within University of Montana								
Montana State × Post	-0.064	-0.009	-0.000	0.140	-0.004	0.067	-0.002	0.005
	(0.053)	(0.011)	(0.031)	(0.148)	(0.029)	(0.124)	(0.014)	(0.018)
Observations	43,905	43,905	43,535	43,535	50,256	50,256	24,367	22,237

Notes: Standard errors are clustered at the individual student level and are reported in parentheses. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Loan Amount is measured in thousands. Loan Amount Fell is a dummy variable equal to one if the semester loan in the spring semester was lower than the Fall semester loan amount. Specifications condition on having loans in Fall semester, with 2012-2013 academic year data only. Columns (7)-(8) further restrict the sample to freshmen and sophomores. All models control for ZIP code-level characteristics from the American Community Survey, including percent no high school education, percent high school education, percent some college, percent non-white, population density, and median household income. We also control for whether or not the individual is from a metropolitan statistical area (MSA) with over 25,000 residents as a proxy for urbanicity. All models include year fixed effects, semester fixed effects (fall or spring), the number of credits the individual has completed at the institution, a dummy equal to one if the student was above the debt threshold for the letter, the number of semesters the individual has completed, the amount of non-loan aid the individual received, a dummy equal to one if the individual received a Pell grant, a male dummy, and a dummy equal to one if the individual is White.

Table 6: Heterogeneous Effects

	(1) Loan Amount	(2) Loan Amount Fell	(3) Fall GPA	(4) Fall Credits	(5) Spring GPA	(6) Spring Credits	(7) Retained 1 Semester	(8) Retained 1 Year
Freshmen								
Letter × Post	**0.017**	0.035$^+$	**0.107***	0.395$^+$	**0.119****	**0.327***	**0.017**	0.054*
	(0.091)	(0.018)	(0.048)	(0.208)	(0.041)	(0.149)	(0.014)	(0.026)
Observations	15,684	15,684	15,683	15,683	18,154	18,154	15,462	12,420
Pell Recipients								
Letter × Post	-0.003	0.061***	0.083*	**0.325***	0.085**	0.232$^+$	0.014	0.062*
	(0.060)	(0.014)	(0.037)	(0.162)	(0.032)	(0.130)	(0.015)	(0.028)
Observations	22,117	22,117	22,116	22,116	25,809	25,809	12,238	10,081
Female								
Letter × Post	-0.077	0.043**	0.106**	0.271$^+$	0.076*	0.039	0.018	0.057*
	(0.061)	(0.014)	(0.036)	(0.154)	(0.031)	(0.124)	(0.014)	(0.026)
Observations	22,239	22,239	22,238	22,238	25,553	25,553	12,681	10,524
Non-White								
Letter × Post	0.005	0.080**	0.044	0.198	0.039	**0.257**	0.040	0.070
	(0.144)	(0.030)	(0.075)	(0.330)	(0.068)	(0.275)	(0.030)	(0.056)
Observations	4,845	4,845	4,845	4,845	5,652	5,652	2,815	2,214

Notes: Standard errors clustered at the individual student level in parentheses. $^+$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Bold signifies that the effects are statistically different from the average effects from Table 3 at the 90% level. Samples condition on having loans in Fall semester. Retention restricts the sample to freshmen and sophomores. One-year retention includes data from the first year of the letter. Models control for ZIP codelevel characteristics, year and semester fixed effects, urbanicity of hometown, credits completed, Letter, semesters completed, non-loan aid, Pell, a male, and white.

Appendix A: Descriptive Statistics and Figures

Figure A.1: Sample "Know Your Debt Letter"

«First_Name» «Last_Name»
«Address_Line1»
«City», «State» «Zip»

Dear «First_Name»,

At Montana State University, we are serious about your education. We know higher education requires a real investment in time, energy, and financial resources, and we think you made a good choice by investing in yourself. However, we want to be sure the financial choices you make now do not negatively impact your future.

To that end, we want you to *know your debt* and be informed of important programs and options at MSU as well as Federal Student Loan terms and conditions:

- As of September 18, 2014, you have accepted $ in student loan debt at Montana State University.*
- Current federal loans for undergraduate students have interest rates as high as 6.8%.
- In order to remain in good financial aid standing, you must pass 67% of your classes each semester to meet the Satisfactory Academic Progress requirements to continue receiving student loan financing.
- When you are in the repayment period of your loans, there are multiple repayment plans available for you. For example, The Public Service Loan Forgiveness plan allows borrowers who work full-time at a qualifying public service organization to have the balance of their loans forgiven if they have made 120 on-time, full, scheduled monthly payments.
- For more information about your current loan amount, please visit www.NSLDS.ed.gov.
- At MSU, tuition doesn't cost a penny more after you've registered for 12 credits in a semester. Please consider registering for more credits to graduate sooner and spend less on tuition! Check out montana.edu/freshman15 for more information.

Again, we want you to know we think you made an excellent decision to invest in your future. Generally, college graduates earn more, have a lower unemployment rate, and live longer than those who do not have a college degree. We want to be sure you find the right balance so that student loan debt isn't going to negatively affect your financial future.

Schedule an appointment with a Financial Coach to learn more about repayment options, budgeting, and tips for managing your debt. To set up an appointment with a Financial Coach, call the Office of Financial Education at 406.994.4388 or email MakeChange@montana.edu. If you continue to accept student loans at this rate you will accrue a debt level that may become difficult to repay, which may place you at risk for defaulting on your loans.

We are so certain an appointment with a Financial Coach will be beneficial we are willing to pay you to attend. When you meet with one of the Financial Coaches in the office by DATE, you will receive a $20 gift card to help supplement grocery or gas expenditures.

We also recommend you meet with a Career Coach. Outside of earning a degree, we believe one of the most important steps you can take to secure a solid financial future is to develop an internship and career plan. Your Financial Coach will refer you to a Career Coach during your first meeting to assist with this effort.

Sincerely,

*Please note, Nursing Loans, private education loans, and debt accrued at another institution are not included in this debt total. Loan balance does not reflect any payments or repayments made on the loans. To view your complete federal student loan borrowing history at all schools attended, please visit the National Student Loan Data System (NSLDS.ed.gov).

Figure A.2: Loan Amounts over time and across Campuses
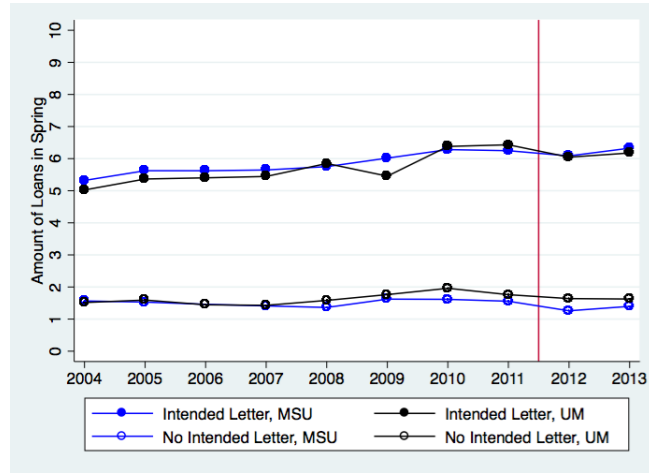
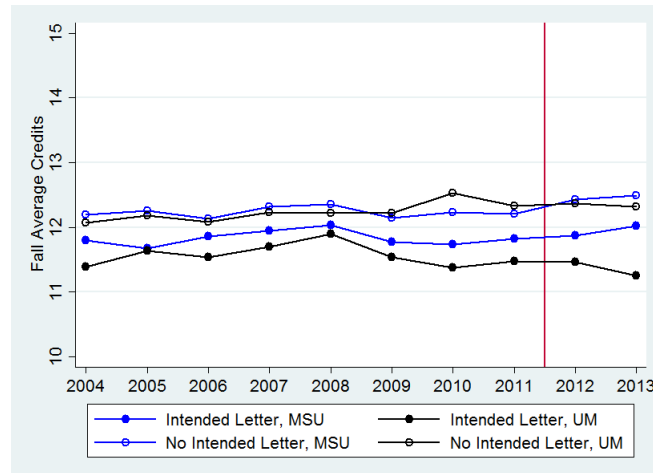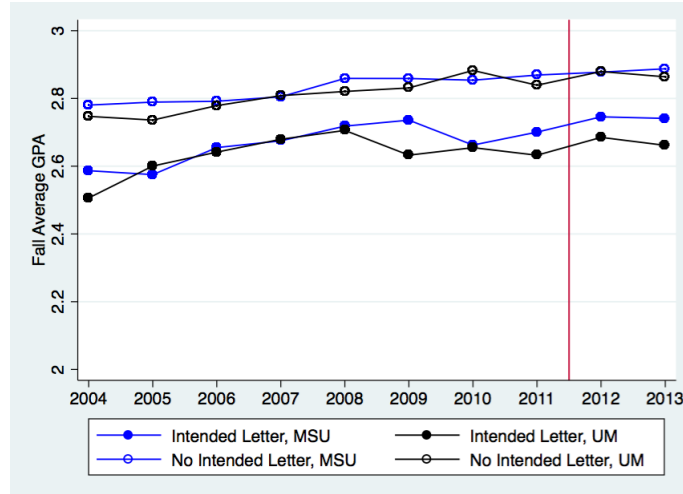Notes: This graph plots the average loan amount by school and letter eligibility over academic years for the spring semester only.

Figure A.3: Credits over time and across Campuses

Notes: This graph plots the average credits by school and letter eligibility over time for the fall semester only.

Figure A.4: GPA over time and across Campuses

Notes: This graph plots the average GPA by school and letter eligibility over time for the fall semester only.

Table A.1: Representativeness of Sample

	Montana State	University Montana	US 4-year Public
Undergraduate Enrollment	14,098	14,753	11,028
In-state Tuition and Fees	6,752	6,275	7,756
% White	85	78	69
% Male	54	46	44
% Pell	32	39	39
% Ugrads with Fed Loans	49	56	51
Avg Fed loan	7,113	7,467	6,873
3 Year Default Rate	6%	10%	9%
% In-state	55	74	83
Avg Annual Cost	16,236	12,776	18,735
6 Year Graduation Rate	49%	47%	47%
Salary After Attending	39,700	34,100	

Notes: 4-year public institution data from the 2013 IPEDS. This information differs from Table 1 in that it includes in and out of state students.
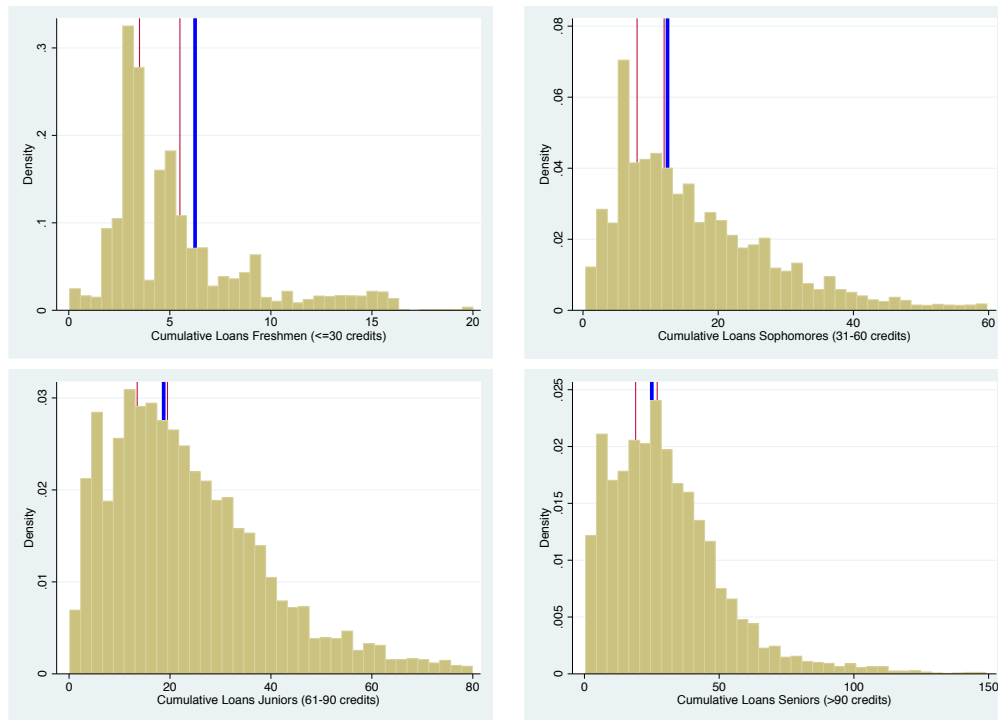
Figure A.5: Histogram of Loan Amounts Across Class Standing

Notes: The figures above shows trends in cumulative loan amounts across classes for Montana State University from Academic years 2012-2013 and 2013-2014 (the two years after the intervention). The thin, red lines, signify the Stafford subsidized amount and Stafford combined subsidized amount that can be borrowed each year, and the thicker, blue line signifies the threshold for the intervention. Histograms are censored such that juniors and seniors with over $100,000 in loans are labeled as $100,000 and sophomores with over $80,000 in debt are coded as $80,000 for the purpose of the figures. Standing is determined by the number of credits completed (Freshmen≤ 30, Sophomores ≤ 60, Juniors ≤ 90, and Seniors ≤ 120).

Table A.2: Stafford Limits & Tuition Over Time

| | Tuition | | Freshmen | | Sophomores | | Juniors + | |
Academic Year	Montana State	University Montana	Stafford Subsidized	Stafford Combined	Stafford Subsidized	Stafford Combined	Stafford Subsidized	Stafford Combined
2003	3,807	4,102	2,625	2,625	3,500	3,500	5,500	5,500
2004	4,145	4,260	2,625	2,625	3,500	3,500	5,500	5,500
2005	4,577	4,546	2,625	2,625	3,500	3,500	5,500	5,500
2006	5,221	4,894	2,625	2,625	3,500	3,500	5,500	5,500
2007	5,673	5,174	3,500	3,500	4,500	4,500	5,500	5,500
2008	5,749	5,338	3,500	5,500	4,500	6,500	5,500	7,500
2009	5,798	5,377	3,500	5,500	4,500	6,500	5,500	7,500
2010	5,988	5,533	3,500	5,500	4,500	6,500	5,500	7,500
2011	6,168	5,722	3,500	5,500	4,500	6,500	5,500	7,500
2012	6,428	5,985	3,500	5,500	4,500	6,500	5,500	7,500
2013	6,705	6,045	3,500	5,500	4,500	6,500	5,500	7,500
2014	6,752	6,099	3,500	5,500	4,500	6,500	5,500	7,500

Table A.3: Predicting Letter Receipt at Montana State from 2010-2013

	(1) 2010	(2) 2011	(3) 2012	(4) 2013
White	0.008	0.016	-0.004	0.004
	(0.011)	(0.010)	(0.011)	(0.009)
Male	-0.001	-0.006	-0.016*	-0.001
	(0.007)	(0.007)	(0.007)	(0.006)
Pell Dummy	0.041***	0.062***	0.124***	0.076***
	(0.009)	(0.009)	(0.009)	(0.009)
Cumulative Credits	-0.001***	-0.001***	-0.001***	-0.000+
	(0.000)	(0.000)	(0.000)	(0.000)
Institution GPA	-0.024***	-0.021***	-0.007	-0.012**
	(0.005)	(0.005)	(0.005)	(0.004)
Cumulative Semesters	0.032***	0.032***	0.029***	0.031***
	(0.002)	(0.002)	(0.002)	(0.002)
Amount of Loans in Fall Semester	0.086***	0.087***	0.092***	0.083***
	(0.001)	(0.001)	(0.001)	(0.001)
Amount Non-Loan	-0.001	-0.004**	-0.007***	-0.003*
	(0.001)	(0.001)	(0.001)	(0.001)
Observations	9,366	9,576	9,850	10,328
Adjusted R^2	0.427	0.444	0.482	0.474

Notes: Standard errors reported in parentheses. $^+$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Specifications condition on having loans in currents semester. All models control for ZIP code-level population density, education, race, and income, as well as urbanicity. Models only include Montana State University, and Columns (1)-(2) predict hypothetical letter receipt given the same rules as were in place in 2012 and 2013. Regressions only include the fall semester.

Table A.4: Predicting Hypothetical Letter Receipt at the University of Montana from 2010-2013

	(1) 2010	(2) 2011	(3) 2012	(4) 2013
White	0.003	0.011	0.005	0.011
	(0.009)	(0.011)	(0.011)	(0.012)
Male	-0.003	-0.003	-0.009	-0.005
	(0.007)	(0.007)	(0.007)	(0.008)
Pell Dummy	0.044***	0.093***	0.104***	0.108***
	(0.008)	(0.009)	(0.009)	(0.009)
Cumulative Credits	-0.000^+	-0.000*	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Institution GPA	-0.035***	-0.033***	-0.033***	-0.030***
	(0.005)	(0.005)	(0.005)	(0.005)
Cumulative Semesters	0.029***	0.031***	0.031***	0.028***
	(0.002)	(0.002)	(0.002)	(0.002)
Amount of Loans in Fall Semester	0.077***	0.082***	0.082***	0.081***
	(0.001)	(0.001)	(0.001)	(0.001)
Amount Non-Loan	-0.001	-0.006***	-0.004***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
Observations	9,765	9,228	8,990	8,348
Adjusted R^2	0.388	0.437	0.428	0.436

Notes: Standard errors reported in parentheses. $^+$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Specifications condition on having loans in currents semester. All models control for ZIP code-level population density, education, race, and income, as well as urbanicity. Models only include the University of Montana, and Columns (1)-(2) predict hypothetical letter receipt given the same rules as were in place in 2012 and 2013 at Montana State University. Regressions only include the fall semester.

Table A.5: Effect of Letters on Loan and Academic Outcomes with Non-Linear Loan Controls

	(1) Loan Amount	(2) Loan Amount Fell	(3) Fall GPA	(4) Fall Credits	(5) Spring GPA	(6) Spring Credits	(7) Retained 1 Semester	(8) Retained 1 Year
DD: Within Montana State								
Letter × Post	-0.097*	0.046***	0.078**	0.151	0.079***	0.098	0.021*	0.055**
	(0.044)	(0.010)	(0.025)	(0.112)	(0.022)	(0.091)	(0.010)	(0.018)
Observations	44,380	44,380	44,379	44,379	50,881	50,881	25,743	21,382
DD: Within University of Montana								
Montana State × Post	-0.115**	0.010	0.013	0.015	0.012	-0.065	0.002	0.010
	(0.041)	(0.010)	(0.026)	(0.119)	(0.024)	(0.101)	(0.011)	(0.019)
Observations	46,597	46,597	46,280	46,280	53,025	53,025	25,430	21,518

Notes: Standard errors are clustered at the individual student level and are reported in parentheses. $^+ p < 0.10$, $^* p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$. Loan Amount is measured in thousands. Loan Amount Fell is a dummy variable equal to one if the semester loan in the spring semester was lower than the Fall semester loan amount. Specifications condition on having loans in Fall semester. Columns (7)-(8) further restrict the sample to freshmen and sophomores. Column (8) only includes data from the first year of the letter. All models control for ZIP codelevel characteristics from the American Community Survey, including percent no high school education, percent high school education, percent some college, percent non-white, population density, and median household income. We also control for whether or not the individual is from a metropolitan statistical area (MSA) with over 25,000 residents as a proxy for urbanicity. All models include year fixed effects, semester fixed effects (fall or spring), the number of credits the individual has completed at the institution, a dummy equal to one if the student was above the debt threshold for the letter, the number of semesters the individual has completed, the amount of non-loan aid the individual received, a dummy equal to one if the individual received a Pell grant, a male dummy, and a dummy equal to one if the individual is White.

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Table A.6: Effect of Letters on Loan and Academic Outcomes with Fewer Pre-Letter Years

	(1) Loan Amount	(2) Loan Amount Fell	(3) Fall GPA	(4) Fall Credits	(5) Spring GPA	(6) Spring Credits	(7) Retained 1 Semester	(8) Retained 1 Year
DD: Within Montana State 2009-2014								
Letter × Post	-0.068	0.019$^+$	0.069*	0.053	0.045$^+$	-0.088	0.014	0.051**
	(0.051)	(0.011)	(0.028)	(0.126)	(0.024)	(0.102)	(0.011)	(0.020)
Observations	21,096	21,096	21,095	21,095	24,063	24,063	12,932	9,499
DD: Within Montana State 2007-2014								
Letter × Post	-0.063	0.026*	0.062*	0.062	0.047*	-0.049	0.014	0.047*
	(0.047)	(0.010)	(0.026)	(0.117)	(0.023)	(0.094)	(0.010)	(0.019)
Observations	28,324	28,324	28,323	28,323	32,394	32,394	16,952	13,239
DD: Within University of Montana 2009-2014								
Letter × Post	-0.075	-0.017	0.017	0.097	-0.002	-0.125	0.002	-0.007
	(0.048)	(0.010)	(0.028)	(0.133)	(0.026)	(0.111)	(0.012)	(0.020)
Observations	22,188	22,188	22,050	22,050	25,098	25,098	11,554	8,778
DD: Within University of Montana 2007-2014								
Letter × Post	-0.078$^+$	-0.011	0.001	0.073	-0.007	-0.112	-0.002	-0.006
	(0.043)	(0.010)	(0.026)	(0.125)	(0.025)	(0.105)	(0.011)	(0.019)
Observations	29,997	29,997	29,779	29,779	33,933	33,933	15,775	12,669

Notes: Standard errors are clustered at the individual student level and are reported in parentheses. $^+$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Loan Amount is measured in thousands. Loan Amount Fell is a dummy variable equal to one if the semester loan in the spring semester was lower than the Fall semester loan amount. Specifications condition on having loans in Fall semester. Columns (7)-(8) further restrict the sample to freshmen and sophomores. Column (8) only includes data from the first year of the letter. All models control for ZIP codelevel characteristics from the American Community Survey, including percent no high school education, percent high school education, percent some college, percent non-white, population density, and median household income. We also control for whether or not the individual is from a metropolitan statistical area (MSA) with over 25,000 residents as a proxy for urbanicity. All models include year fixed effects, semester fixed effects (fall or spring), the number of credits the individual has completed at the institution, a dummy equal to one if the student was above the debt threshold for the letter, the number of semesters the individual has completed, the amount of non-loan aid the individual received, a dummy equal to one if the individual received a Pell grant, a male dummy, and a dummy equal to one if the individual is White.

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