

How Low-Income Expectations Affect Student Loan Repayment Plan Choice: Survey Evidence from College Seniors¹

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Abstract

Income-driven repayment plans lower required payments for student loan borrowers when their income decreases, helping to reduce student loan defaults. Despite universal availability, only a minority of student loan borrowers in the U.S. are in an income-driven repayment plan. In this study, I test whether a student's choice of repayment plan is related to their expectations of earning a low income. Using an information experiment in a web survey, I create two groups of MSU seniors with an exogenous difference in low-income expectations. I find that respondents who saw the major specific income information believed they, on average, had a higher probability of earning a low income. However, those respondents are not any more likely to choose the income-driven repayment plan. I conclude that students' repayment plan preferences are not strongly related to their expectations of earning a low income. This may be due to students caring about things other than minimizing monthly payments when choosing a repayment plan.

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1. Introduction

Most college students in the United States (U.S.) get loans from the federal government to fund their college education (Woo, Bentz, Lew, Velez, and Smith, 2017). The U.S. federal government offers student loan borrowers a choice between two kinds of repayment plans. One type of repayment plan sets payments so that the loan is paid off within a certain period.² The other type of repayment plan set payments as a function of a borrower's income.³ The latter kind of plan is referred to as an income-driven repayment plan or IDR plan. IDR plans are preferred over time-based plans by scholars of student loans for their ability to reduce the loan payments of student loan borrowers when their incomes are low (Chapman and Dearden, 2017). Borrowers on IDR plans are also statistically significantly less likely to default on their student loans⁴ (U.S. Government Accountability Office, 2015; Muller and Yannelis, 2019; Herbst, 2020). Preventing student loan default is important because defaulting on U.S. government student loans can lead to a variety of negative consequences for the borrower. These consequences include: a reporting of the default to credit bureaus leading to reduced access to private sources of credit, collection fees, wage garnishment, the garnishment of the borrower's tax refund, and the inability to get more U.S. government student loans until the default is resolved. Many borrowers, even in good macroeconomic conditions, are in default on their student loans. As of Q2 2021, 17 percent of student loan borrowers were in default (Ma and Pender, 2021). Scott-Clayton

² The default plan choice for students who get loans from the U.S. federal government sets payments so that the loans are paid off in full if the minimum payment is made every month for 10 years.

³ After a certain number of years of making payments on one of these plans, all remaining loan balances are forgiven and required payments decrease to \$0. The income-driven plan that is available to all new borrowers of U.S. government student loans, the Revised Pay as You Earn Plan, offers loan forgiveness after 20 years for undergraduate borrowers and after 25 years for graduate borrowers. See <https://studentaid.gov/manage-loans/repayment/plans/income-driven> for more information.

⁴ The U.S. Department of Education defines student loan default as not making required payments for at least 270 days.

(2019) found that the proportion of students who graduated in 1996 who had ever defaulted on their loans continued to increase over the 20 years they had data for. Using that data to forecast defaults in the future, Scott-Clayton projects that 40% of borrowers who graduated college in 2004 would default on their student loans at some point by 2023. Despite these facts, only 32% of borrowers in FY 2021 were in IDR plans (Ma and Pender, 2021). Given the high default rate on student loans, and the fact that IDR plans statistically significantly reduce student loan default, it seems as if borrowers' lives could be significantly improved if more of them are on IDR plans.

One reason why there may be both relatively low enrollment in IDR plans, and a high default rate on student loans, is that students have overly optimistic expectations about their future earnings.⁵ In terms of reducing required payments, the biggest benefit of being on an IDR plan occurs when a borrower's income is low. If borrowers believe they have an unreasonably low probability of earning a low income, then they may also believe that it is unlikely they will experience reduced payments should they choose an IDR plan instead of a time-based repayment plan. Should a student loan borrower earn a low income after they graduate while being on a time-based repayment plan, their required payments may be such a large proportion of their income that they are unable or unwilling to make the required payments. If a borrower does not make the required payments, they

⁵ Colon (2021) finds that, on average, a sample of undergraduates at The Ohio State University underestimate the mean salary for employed workers in Ohio age 30 to 50 with specific groups of majors. In Cox, Kreisman, and Dynarski (2020) college students who participated in a laboratory experiment expect the typical earnings of the typical graduate to be \$34,500 while the average earnings of 24-year-old graduates in 2015 was about \$22,000. In a survey of NYU students Wiswall and Zafar (2015a) find that when they asked what NYU undergraduates thought 30 years old college graduates with broad categories of majors in the US earned, the average response is statistically significantly above the authors calculations of the actual population earnings. The authors also find substantial heterogeneity in errors, with many students underestimating population earnings. Betts (1996) finds that in a sample of undergraduates at UC San Diego, the mean beliefs about the average salary of BA holders in 1990 is close to correct although the mean salary of BA's with psychology degrees is statistically significantly below mean beliefs about the salary of psychology graduates.

will go into default on their loans. If this is the case, then presenting students with relevant information about post-college incomes should cause them to: increase the probability that they believe they will earn a low income, be more likely to choose an IDR plan over a time-based repayment plan and reduce the probability that they default on their loans.

The purpose of this research is to learn about the effect that student's expectations of earning a low income have on their student loan repayment plan choice.⁶ To study this, I field an online survey to college seniors at Michigan State University (MSU). Survey respondents are asked about the probability they expect to earn an income in 5 different income ranges. They are also asked about which repayment plan they preferred under a scenario where they have \$30,000 in student loan debt. Survey respondents are given the option of choosing either an IDR plan, where annual payments are 10% of income above \$20,000, or a time-based, non-IDR plan. If a borrower on the non-IDR makes the minimum payment every month for 10 years, loan would be completely paid off. The survey includes an information experiment where respondents were randomly shown either information about the average income of U.S. college graduates (All Graduates Income Treatment), or information about the median earnings of MSU graduates with majors like their own major (Major Specific Income Treatment). The goal of providing this information is to create an exogenous difference in low-income expectations between respondents who saw the two types of income information. Questions about income expectations and repayment plan choice are asked both before and after the income information is shown.

Controlling for pre-treatment differences in low-income expectations, I find that survey respondents who see the Major Specific Income Treatment have a

⁶ Abraham, Filiz-Ozbay, Ozbay, and Turner (2020) and Brownstein (2020) find that the probability a student believes they will earn a low-income 6 months after leaving school is statistically significantly correlated with student loan repayment plan choice.

subjective probability of earning a low income that is a statistically significant 7 percentage points higher than the survey respondents who see the All Graduates Income Treatment. However, controlling for pre-treatment differences in repayment plan choice, I find that survey respondents who see the Major Specific Income Treatment are 2 percentage points less likely to choose the IDR plan than survey respondents who saw the All Graduates Income Treatment. This difference is not statistically significant. Based on this, and similar results for various subsamples, I conclude that repayment plan choice is not very responsive to changes in low-income expectations. This may be because students care about things other than minimizing required monthly payments when picking a repayment plan.

This paper proceeds as follows. Section 2 provides some background on student loans and income-driven repayment in the U.S. Section 3 reviews related literatures. Section 4 describes the survey and the sample used in this paper. Section 5 discusses the empirical framework used for the main analysis of the data. Section 6 describes the results using the empirical framework in Section 5. Section 6 includes heterogeneity analysis where the sample is split into two subsamples. Section 7 describes additional analyses of the data that do not use the empirical framework in Section 5. Section 8 discusses the results, including speculating on why there is no statistically significant difference in repayment plan choice between treatments. Section 9 concludes this paper.

2. Background on Student Loans and Income-Driven Repayment in the United States

About 92% of all student loan debt in the U.S. is owed to the U.S. Federal Government (Peter G. Peterson Foundation, 2021).⁷ Students who attend college

⁷ Every year most new student loan debt is also owed to the U.S. Federal Government. For example, in the 2020 – 2021 academic year, 87% of new student loan debt was owed to the U.S. Federal Government (Ma and Pender 2021). The other 13% was owed to private companies.

apply for federal loans by filling out the Free Application for Federal Student Aid. Loans are offered to students as part of their overall financial aid package for a university. Students can borrow up to the lesser of either the cost of attendance, or a limit that is based on year in school and dependency status (Kirkham, 2020). For federal student loans, there are limits both on the amount of borrowing per year and the lifetime amount of borrowing.⁸ In the academic year 2020-2021, 25 percent of undergraduate students borrowed loans directly from the federal government (Ma and Pender, 2021). Ma and Pender also found that 55 percent of students who graduated from public and non-profit 4-year universities in the 2019 – 2020 academic year had student loan debt. They calculate that the average amount of debt among people who graduated with debt that year was \$28,400.

One of the major benefits of IDR plans is that they prevent borrowers from defaulting on their student loans. Borrowers⁹ will be current on their loans if they make at least the minimum monthly loan payment. The minimum monthly loan payment is generally¹⁰ determined by the repayment plan the borrower is on. Once a student misses a payment on a student loans, they are considered delinquent on that loan. Borrowers who are delinquent on their loans for a period of 90 days have their delinquency reported to the 3 major Credit Reporting Agencies (CRA's).¹¹ If a borrower pays less than the minimum payment for 270 days, then their loan is in default. Default has several negative consequences for the borrower. When a loan is defaulted on, the entire amount of the loan is due immediately. The default is reported to the 3 major CRA's. A borrower who defaulted is charged for collection

⁸ If students would like to borrow more than the limits for those loans, their parents may borrow Parent's PLUS loans from the federal government up to the cost of attendance.

⁹ In this paper borrowers is used as a shorthand for U.S. citizens who have gotten student loans from the U.S. federal government.

¹⁰ Borrowers can temporarily lower their minimum monthly payment to \$0 using deferment or forbearance. Deferment and forbearance can be given for a variety of approved circumstances such as getting treated for cancer or serving in the Peace Corps.

¹¹ Credit Reporting Agencies (CRA's) are businesses that collect information about people's use of credit, and sell that information to third parties (Irby 2020).

costs. If a borrower has defaulted and they have federal student loan debt outstanding, they are prohibited from receiving additional federal student aid. Finally, default allows the U.S. Department of Education to garnish the borrower's wages, tax refunds and federal benefits to pay for their loan. To prevent these harms to borrowers, it is a worthwhile goal to prevent student loan defaults.

In the survey, respondents are given the choice between an IDR plan and a non-IDR plan. These plans are based on two of the repayment plans borrowers have when they enter repayment. There are currently seven different repayment plans for student loans. Four of those repayment plans set minimum payments as a function of the borrower's income. The Standard Repayment Plan sets minimum monthly payments so that the loan would be paid off if the minimum payment is made every month for 10 years in a row. If a borrower does not select a repayment plan before they begin paying back their loans, they are automatically put on the Standard Repayment Plan. The non-IDR plan in the survey is based on the Standard Repayment Plan. All IDR plans set payments as a percentage of "discretionary income" defined as income above 150% of the federal poverty line.¹² The IDR plan available to the most US student loan borrowers is the Revised Pay as You Earn Plan (REPAY). REPAY sets minimum payments equal to 10% of discretionary income with loan forgiveness¹³ after 20 years of payments for an undergraduate borrower or 25 years of payments for individuals who borrowed for graduate or professional school. The IDR plan in the survey is based on REPAY.

¹² For all states except Hawaii and Alaska, 150% of the federal poverty line for a household with a single individual in 2020 was \$19,140 and for a household with 2 individuals was \$25,860. See Office of the Assistant Secretary for Planning and Evaluation (2019).

¹³ According to Student Borrower Protection Center (2021), despite the first IDR plan becoming available in the U.S. in 1995, only 32 U.S. student loan borrowers have ever received loan forgiveness because they had been in an IDR plan for a long period of time. Despite this, it is probably the case that loan forgiveness is a salient feature of IDR plans. In Brownstein (2020), I find that decreasing the number of the years until loan forgives for an IDR plan from 20 years to 15 increases the probability surveyed MSU students prefer an IDR plan to a non-IDR plan by about 20 percentage points.

IDR plans lower the required payment of student loan borrowers when their income is low. This is the feature of IDR plans lower a student's probability of default. Even if this feature does not prevent defaults, it prevents students from losing a high proportion of their income on student loan payments when they most need the money. These benefits of IDR plans should make IDR plans more attractive to borrowers who believe they are more likely to earn a low-income. However, IDR plans are not always better than non-IDR plans. If an IDR plan successfully lower a borrower's payments, they cause the borrower to accrue more interest on their loan¹⁴ and take longer to pay off their loan. If borrowers care more about that than the benefits of lower payments, then they make continue to prefer a non-IDR even if they believe are more likely to earn a low-income.

Borrowers have the opportunity to learn about student loan repayment, including payment amounts and what repayment plans are available, by doing student loan exit counseling. Most exit counseling is done through a website created by the U.S. Department of Education.¹⁵ The information I provide students in the survey is like the information borrowers get on the U.S. Department of Education's exit counseling website. The U.S. Department of Education requires colleges to have borrowers complete student loan exit counseling when they leave school.¹⁶ If colleges do not offer exit counseling, they may lose access to federal financial aid (Klepfer, Fernandez, Fletcher, and Webster, 2015). Exit counseling provides information on loan balances, repayment obligations, and which repayment plans

¹⁴ A borrower may make lower total interest payments when making lower monthly payments if the borrower makes payments long enough for a significant proportion of their loan balance to be forgiven, not be case if the borrower qualifies for loan forgiveness.

¹⁵ <https://studentaid.gov/app/counselingInstructions.action?counselingType=exit>. Schools can do other things to fulfill the requirement to provide exit counseling. However, anyone can use the U.S. Department of Education's website and most schools (including MSU) refer their students to the website for exit counseling.

¹⁶ It may be the case that a large proportion of borrowers do not complete exit counseling. In a survey of 13,000 high debt borrowers 40% of respondents reported they did not receive any form of student loan counseling (Whitsett and O'Sullivan 2012).

are available to the borrower. During exit counseling borrowers can enter their estimated future income, future expenses, and federal loans into the website. The website then provides students with an estimated initial monthly payment, an estimated total amount paid, and a “repayment period” of either the number of years in repayment or the number of years until loan forgiveness. As part of this process, borrowers are asked to select a repayment plan from a menu of available repayment plans. The selected plan is sent to the borrower’s loan servicer to determine if they are eligible for the plan. If borrowers do not go through exit counseling, or they do not choose a specific repayment plan at the end of exit counseling, they are put on The Standard Repayment Plan. Students can change their repayment plan at any time by contacting their student loan servicer (Lane, 2020).¹⁷

3. Literature Review

There are many studies which look at the effect of providing students with information about what they can expect to earn after college on decisions related to college. Wiswall and Zafar (2015a) look at how U.S. students change their income expectations after being informed about the earnings of different groups of individuals in the U.S. Treatments included the average income of all college graduates and the average income of college graduates conditional on gender and major. In a companion paper, Wiswall and Zafar (2015b) use the same data to study how changes to major-specific earnings expectations caused by seeing major specific earnings information changed students’ expectations of what they would major in. Baker, Bettinger, Jacob, and Marinescu (2018) study the impact of income information on major choice for community college students. Hastings, Neilson, and Zimmerman (2018) find that Chilean student loan applicants who receive information about college- and major- specific incomes of past Chilean college graduates are less likely to attend, and believe they would earn less if they enrolled

¹⁷ A loan servicer is a private company that the U.S. federal government contracts with to collect federal student loan payments.

in, programs whose graduates earned low incomes. Bleemer and Zafar (2018) find that providing information to U.S. household heads about the expected returns to college increased the probability that respondents said they wanted to attend college. Hurwitz and Smith (2018) looked at the effect of the release of a large amount of information about the income of college graduates in the College Scorecard. They find that colleges with higher reported median incomes had more students send their SAT scores to them after the College Scorecard information is released. Conlon (2021) finds that when taking an online survey students were more likely to major in one of the subset of majors they were provided with income information. The above research shows that college students change their expectations and behaviors in response to seeing information on post-college incomes.

Other research uses experiments to study what affects student loan repayment plan choice in the U.S. Abraham, Filiz-Ozbay, Ozbay, and Turner (2020) study how the description of IDR plans affected repayment plan choice. They find that students were statistically significantly more likely to choose the IDR plan when the description of the plan emphasized its benefits. Cox, Kreisman, and Dynarski (2020) have college students participate in an incentivized laboratory experiment which involve students choosing between time-based and IDR repayment plans. They find that: being shown information about the incomes of recent college graduates caused students to decrease the how much they expected their income to be, that being shown that information did not change student's choice of repayment plans, and that students were statistically significantly more likely to select the repayment plan framed as the default plan. In Brownstein (2020) I field a small online survey to students at MSU where they choose either an IDR or non-IDR student loan repayment plan. Although many of my results are not statistically significant, I find that students were more likely to choose the IDR plan when: the

amount of income not considered when calculating payments is lower, the percent of non-exempt income determining payment is lower, and the number of years until loan forgiveness is lower. Muller and Yannelis (2019b) study a field experiment where borrowers are randomly sent or not sent pre-populated applications to enroll in an IDR plan. They find that individuals who receive the applications have much higher enrollment in IDR plans, lower loan payments, and a lower probability of failing to make a required loan payment.

The method for eliciting distributional income expectations used in this study comes from Delavande and Rohwedder (2008). They find that, compared to eliciting expectations by asking for points on the cumulative distribution function, eliciting expectations by asking respondents to place balls in bins representing ranges of the probability distribution leads to a statistically significantly higher percentage of respondents with valid probability distributions. Delavande, Giné, and McDenzie (2011) find that using this method to elicit income expectations in developing countries provides reasonable responses that are predictive of future economic behavior. Orr (2020) uses this method to elicit the subjective expectations of college students, including questions about expected GPA conditional on a certain amount of studying, and questions about income conditional on graduating with a certain GPA.

4. Description of Survey

This paper analyzes data from a web survey of MSU college seniors.¹⁸ MSU's Office of the Registrar sent out emails that I wrote on October 19th, October 22nd, and October 25th, 2021. The emails described the survey and had a URL which could be used to take the survey. The emails also informed students that if they completed the survey, they could be sent \$10 using either Venmo or Paypal. The median time it took students in the sample to complete the survey is 9 minutes and

¹⁸ MSU's Office of Financial Aid defines a senior as an undergraduate student who has completed at least 88 credits.

56 seconds. The 3 emails were sent to the same 7,000 students. The survey was closed on October 27th, 2021. Screenshots of the emails are available upon request. Before any data was analyzed, incomplete survey responses and any response after the first response by the same person were removed.¹⁹ After that 1,581 responses were left. The survey has a response rate of 22.6%.

Survey respondents are asked about their income expectations in the form of a statistically valid probability distribution. The method of eliciting this distribution comes from Delavande and Rohwedder (2008). Survey respondents allocate 10 balls to the following income ranges: \$0 - \$30,000, \$30,000 - 60,000, \$60,000 - \$90,000, \$90,000 - \$120,000, and greater than \$120,000. Each ball they allocate to an income range represents a 10-percentage point probability that they expect to earn an annual income in that range. Survey respondents are asked about what income they expect to receive 5 years after graduating with an undergraduate degree from MSU.²⁰ Survey respondents are asked not to count any time in graduate or professional school as part of those 5 years.²¹

After the income expectation questions, survey respondents are asked to choose between two different repayment plans. They are asked to assume they have graduated from MSU with \$30,000 in student loan debt, and the debt has an interest rate of 5%. Repayment Plan 1 is an IDR plan like the widely available Revised Pay as You Earn Plan. Repayment Plan 2 is a time-based repayment plan like the Standard Repayment Plan. Information about the repayment plans is shown in 3

¹⁹ In cases where 2 or more responses had the same Venmo account name or email for Paypal, all responses except for the response with the earliest recorded date were deleted. 4 completed responses had neither a Venmo account nor an email for Paypal and therefore could not be checked against other responses.

²⁰ Arcidiacono, Hotz, Maurel, and Monamo (2020) survey students at Duke University about their major and occupation specific earnings expectations in 2009. In 2015 they collect data on the survey respondent's actual earnings. They find that a student's earnings expectations are informative about future earnings and that students sorted into occupations based on expected earnings.

²¹ This was for 2 reasons. First, individuals in graduate or professional school have an unusually low income given their level of education. Second, borrowers who are in graduate or professional school can get a deferment and temporarily lower their required loan payment to \$0.

tables. The first table describes the two repayment plans. The other tables have estimates of minimum month payments, estimated length of time making payments, and total amount paid over the course of the loan. These estimates are given for the two repayment plans for starting post-college incomes of between \$10,000 and \$90,000 in \$10,000 increments.²²

After being asked about their income expectations and choice of repayment plan for the first time, survey respondents are randomly shown one of the two information treatments described below.

One information treatment contains information on the average yearly incomes of individuals in the U.S. with a college degree.²³ I refer to this treatment as the All Graduates Income Treatment. This statistic is calculated using the American Community Survey (ACS) 2014 – 2018 IPUMS file (Ruggles, Flood, Goeken, Grover, Meyer, Pacas, and Sobek, 2020). This information is intended to be a placebo treatment in that it would not change a survey respondent's income expectations. I expected that students would think that information about the incomes of college graduates of all ages is too general to affect their earnings expectations. The purpose of including a treatment like this is to deal with issues related to the Hawthorne effect and to have a control group without letting survey respondents know that they are in the control group.

The other treatment shows survey respondents the median yearly earnings of MSU graduates with majors similar to the respondent's primary major. I call this treatment the Major Specific Income Treatment. The median earnings data is from the U.S. Department of Education's College Scorecard.²⁴ The College Scorecard

²² See Appendix A for screenshots from survey. Total amount paid and length of time making payments are calculated assuming simple daily interest and income increasing at 5% on January 1st of each year. Additional details about those calculations are available upon request.

²³ I calculated the average income to be \$53,268.

²⁴ The data was taken from the following URL in October of 2020:

<https://collegescorecard.ed.gov/school/fields/?171100-Michigan-State-University>. The data matched the median salary 1 year after graduation (EARN_MDN_HI_1YR) for 2015-2016 and

has data on median earnings for students of either a single major or a group of related majors. The median earnings statistic that a student who received the Major Specific Income Treatment sees is based on the survey respondent's reported primary major. The statistics shown are for median earnings during the first year after students have graduated from MSU. Only students who got federal financial aid are included in the sample to calculate the medians.

My hypothesis is that the major specific earnings data would increase the probability students expected to earn a low income, and that this would cause them to be more likely to choose the IDR plan. Cox, Kreisman, and Dynarski (2020) study student loan repayment plan choice by randomly providing or not providing students with information related to their future income. In that study, about half of college students who participated in a laboratory experiment are provided information on the distribution of earnings of 24-year-old bachelor's degree holders. Those who see the information expect themselves and their peers to earn statistically significantly less than experiment participants who are not provided with that information. Based on this, I expect that providing students with information about the earnings of recent BA holders would shift their expected income distribution to center around lower incomes. This in turn would increase students' subjective probability that they would earn a low income. In my survey, given the hypothetical borrowing amount, available plans, and interest rate, borrowers whose annual income is less than \$58,184 would have lower required monthly payments on the IDR plan described in the survey than if they were on the non-IDR plan described in the survey.

After being shown one of the treatments, respondents are then asked the same questions related to income expectations and repayment plan choice a second time. Then survey respondents are asked four questions to test their understanding of the

2016-2017 classes that can be downloaded from the College Scorecard's data website (<https://collegescorecard.ed.gov/data/>).

two repayment plans. See Appendix A for screenshots of these questions. The survey ends with a series of questions related to the survey respondent's demographics and their college financial aid. This section includes questions about the survey respondent's gender, race, and age. The survey respondents are also asked how much student loan debt they have.²⁵

5. Empirical Framework

The goal of this research project is to use a randomized information treatment to create exogenous variation in low-income expectations between two groups of students. I then want to see if the group which believes they have a higher probability of earning a low income are more likely to choose the IDR plan.

To study how low-income expectations and repayment plan choice are affected by the treatments, I use the following estimating equations:

$$(1) Outcome_i = \beta_0 + \beta_1 sawMajorSpecificIncome_i + \beta X_i + \epsilon_i$$

$$(2) Outcome_i = \beta_0 + \beta_1 sawMajorSpecificIncome_i + \beta_2 AfterTreatment_i + \beta_3 sawMajorSpecificIncome_i * AfterTreatment_i + \epsilon_i$$

i indexes the survey respondent. $Outcome_i$ is two different variables. One variable is the subjective probability a student believes they would earn a low-income. For my main analysis, I define earning a low income as earning \$0 to \$30,000 a year. A second main variable is an indicator variable that equals 1 if the respondent chooses the IDR plan and equals 0 if the respondent chooses the non-IDR plan. X_i is a vector of covariates. The covariates in the analysis are the same covariates I use in the balance tests. X_i includes indicator variables for having a

²⁵ Past research which compares how much student loan debt students say they have in surveys to university administrative records of student loan debt has found that many students do not correctly report how much student loan debt they have (Akers and Chingos, 2014; Andruska, Hogarth, Fletcher, Robes, and Wohlgemuth, 2014). I use data on student loan debt only to categorize survey respondents who do and do not have student loans. Unfortunately, even this categorization likely has measurement error. Andruska, Hogarth, Fletcher, Robes, and Wohlgemuth. (2014) find that 62 of 165 students in their study who reported in a survey they had no student loan debt had student loan debt in administrative records.

single major, being female, being white, having a Pell Grant, being a first-generation college student, and having student loans. \mathbf{X}_i also includes continuous variables for a student's age and the student's subjective probability that they will attend graduate or professional school in the next 20 years.

Equation 1 uses data from the income expectations and repayment plan choice questions that are asked after the survey respondents see one of the treatments. The coefficient of interest in equation 1 is β_1 . β_1 is the average outcome for survey respondents who see the Major Specific Income Treatment minus the average outcome for survey respondents who see the All Graduates Income Treatment.

Equation 2 uses data from the income expectations and repayment plan choice questions that are asked both before and after the survey respondent has seen information about the income of college graduates. In these equations $AfterTreatment_i$ is an indicator variable for the outcome being recorded after the survey respondent has seen the income information. The coefficient of interest in equation 2 is β_3 . Equation 2 improves on equation 1 by controlling for pre-treatment differences in the outcome variable.

The following equation is used to see if the difference in the effect of the treatments on outcomes are statistically significantly different for different subgroups.

$$(3) Outcome_i = \beta_0 + \beta_1 sawMajorSpecificIncome_i + \beta_2 SubgroupMember_i + \beta_3 AfterTreatment_i + \beta_4 sawMajorSpecificIncome_i * SubgroupMember_i + \beta_5 sawMajorSpecificIncome_i * AfterTreatment_i + \beta_6 SubgroupMember_i * AfterTreatment_i + \beta_7 sawMajorSpecificIncome_i * SubgroupMember_i * AfterTreatment_i + \epsilon_i$$

$SubgroupMember_i$ is an indicator variable for being a member of a subgroup such having student loans or having a low-income major. Equation 3 has

3 sources of variation: the variation in outcome by treatment, the variation in outcome by subgroup, and the variation in the outcome before the treatment and after the treatment. The coefficient of interest in Equation 3 is β_7 . β_7 can be thought of as how much the effect of the Major Specific Income Treatment is different for survey respondents who are and are not members of the subgroup, controlling for pre-treatment differences in the outcome by subgroup and treatment.

6. Results

6.1. Analysis Sample

Before any data is analyzed, incomplete survey responses and any response after the first response by the same person are removed.²⁶ After that, 1,581 responses are left. The survey has a response rate of 22.6%. 38 international students are removed from the sample because only U.S. citizens are eligible for student loans from the U.S. government. 147 additional students are dropped because of missing income information.²⁷ This left a sample of 1,396 completed survey responses for the analysis sample.

6.2. Summary Statistics

Appendix B contains summary statistics for the analysis sample. The sample contains individuals with 95 different primary majors. The 5 majors with the highest number of individuals in the sample are: Human Biology (107 respondents), Psychology (68 respondents), Finance (66 respondents), Neuroscience (62 respondents), and Kinesiology (59 respondents). 87% of respondents reported

²⁶ In cases where 2 or more responses had the same Venmo account name or email for Paypal, all responses except for the response with the earliest recorded date were deleted. 4 completed responses had neither a Venmo account nor an email for Paypal and therefore could not be checked against other responses.

²⁷ These individuals are removed from the analysis because if they are selected to receive the Major Specific Income Treatment, they see a median income of Data Not Available. For many of these majors there would be a major or group of majors in the College Scorecard dataset that was like a particular MSU major, but in the College Scorecard dataset the median earnings for MSU graduates for the major or group of majors was listed as unavailable. A list of which majors were or were not in the analysis sample is available upon request.

having only 1 major when they took the survey. Each MSU major is matched to a description of a major or group of majors in the College Scorecard to determine what income would be shown if the respondent received the Major Specific Income Treatment. Survey respondents were matched to 61 College Scorecard major descriptions, with some College Scorecard major descriptions being matched to more than one MSU major. The top 5 College Scorecard major descriptions in the data are: Physiology, Pathology, and Related Science (137 respondents), Psychology (68 respondents), Finance and Financial Services Management (66 respondents), Public Relations, Advertising, and Applied Communications (65 respondents), and Business Administration, Management, and Operations (63 respondents). 59% of the sample is female. 81% of sample is white. The average age of a survey respondent in the analysis sample is 21. 59% of survey respondents in the analysis sample have student loans. 31% of survey respondents in the analysis sample have ever had a Pell Grant. 19% of survey respondents in the analysis sample are first-generation college students. Individuals in the sample believed they had an average subjective probability of 65% of attending graduate or professional school in the next 20 years.²⁸

6.3.Balance Tests

In Appendix C, I test for balance in covariates between survey respondents who saw the All Graduates Income Treatment and survey respondents who saw the Major Specific Income Treatment. I regress a binary variable for seeing the Major Specific Income Treatment on 8 binary variables related to a survey respondent's demographics and college financial aid. The only coefficient for a covariate that is statistically significant at the 5% level is the coefficient for having a single major.

²⁸ 27% of individuals were either in or seeking continuing education 6 months after graduating from MSU. See <https://careernetwork.msu.edu/outcomes/> Accessed November 11th, 2021. Using data from the 2007 – 2008 Baccalaureate and Beyond Longitudinal Study, Baum and Steele (2017) estimate that 39% of individuals who graduated with a bachelor's degree in 2007 – 2008 enrolled a graduate degree program within 4 years of graduating from college.

An F-test of joint significance for that regression has a p-value of 0.2376. Therefore, I believe the covariates are balanced across the treatments. Because of that, I interpret coefficient estimates on the coefficients of interest as casual effects of seeing the Major Specific Income Treatment on the outcome compared to seeing the All Graduates Income Treatment.

6.4.Distribution of Income Expectations by Treatment Before and After Treatment

Figure 1: Income Expectations by Treatment Before and After Treatment

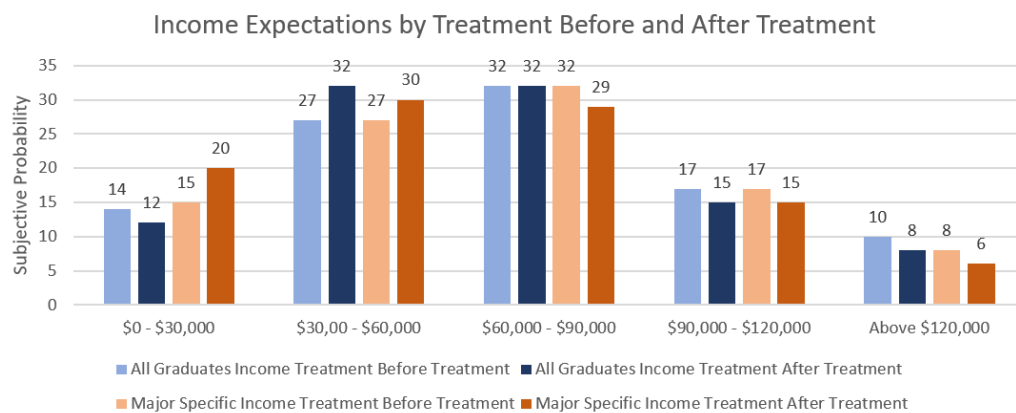


Figure 1 shows the average distribution of income expectations before and after seeing the income information for survey respondents who saw the All Graduates Income Treatment and the Major Specific Income Treatment. Firstly, this figure shows that the average distribution of income expectations is very similar for survey respondents who see the All Graduates Income Treatment and the Major Specific Income Treatment before they see the income information. For the two treatments, the middle three income ranges have the exact same average subjective probability and the other two income ranges are different by no more than 2 percentage points.

Second, this chart shows that both treatments cause income expectations to change. Survey respondents who see the All Graduates Income Treatment believe

they have a higher average probability of receiving an income between \$30,000 and \$60,000, and a lower or no different probability of earning an income in other income ranges after they see the income information. The income information causes survey respondents to believe they have an increased probability of receiving an income close to the typical income number they see. In the case of the All Graduates Income Treatment this income is \$53,268. This is different than my expectation that the information in the All Graduates Income Treatment would be too general for it to affect a survey respondent's income expectations. Survey respondents who see the Major Specific Income Treatment increase the probability they believe they would earn between \$0 and \$30,000 and between \$30,000 and \$60,000. Those survey respondents also have a decreased average probability they believe they would earn an income in the other three income ranges. Given that 83% of survey respondents who see the Major Specific Income Treatment see a typical income less than \$60,000, this is consistent with survey respondents responding to income information by increasing the probability they believe they will earn an income close to the income that they see.

Having All Graduates Income Treatment change survey respondents' income expectations does not invalidate my research design. So long as the two treatments create exogenous variation in low-income expectations, I can relate differences in low-income expectations, uncorrelated with anything else, to differences in repayment plan choice. However, having the All Graduates Income Treatment change income expectations means that I do not have evidence for how students would change their income expectations and repayment plan choice if they were simply asked questions about income expectations and repayment plan choice twice.

6.5. Effect of Treatment on Low Income Expectations

Table 1: Effect of Treatment on Low Income Expectations

| Variable | Covariates | Coefficient | Standard Error | P-Value |
|--|------------|-------------|----------------|---------|
| Major Specific Treatment | No | 7.9997 | 1.2381 | 0.000 |
| Major Specific Treatment | Yes | 8.0647 | 1.2152 | 0.000 |
| Major Specific Treatment * After Treatment | No | 7.0947 | 1.6578 | 0.000 |

For rows 1 and 2 the sample is N = 1,396. For row 3 each survey respondent has two observations: one observation before the treatment and one after the treatment. Therefore, for row 3, $N = 1,396 * 2 = 2,792$. This table shows the results of the subjective probability (scaled to be between 0 and 100) a survey respondent believed they would earn between \$0 and \$30,000 5 years after graduating from MSU regressed on binary variables for the survey respondent seeing the major specific income treatment (Major Specific Treatment) (rows 1 and 2) or a binary variable for seeing the Major Specific Income Treatment, a binary variable for the question about income expectations coming after the treatment (After Treatment) and an interaction between those variables. All regressions use the robust option in Stata. In row 2, covariates included in the regression are binary variables for the survey respondent: being female, being white, having only 1 major, having a Pell Grant, being a first-generation college student and having student loans. There are also 2 other covariates: the survey respondent's age and the probability the survey respondent believed they would attend graduate or professional school within 20 years of answering the survey.

Table 1 shows the results of regressions of low-income expectations after treatment on receiving the Major Specific Income Treatment. Survey respondents who got the Major Specific Income Treatment believe they had on average an 8 percentage points higher probability of earning a low income after seeing the treatment then survey respondents who saw the All Graduates Income Treatment. This is the results with and without covariates. Controlling for pre-treatment differences in low-income expectations reduces the treatment effect to 7 percentage points. In all cases the effect is statistically significant.

6.6. Effect of Treatment on Repayment Plan Choice

Figure 2: Plan Choice by Treatment Before and After Treatment

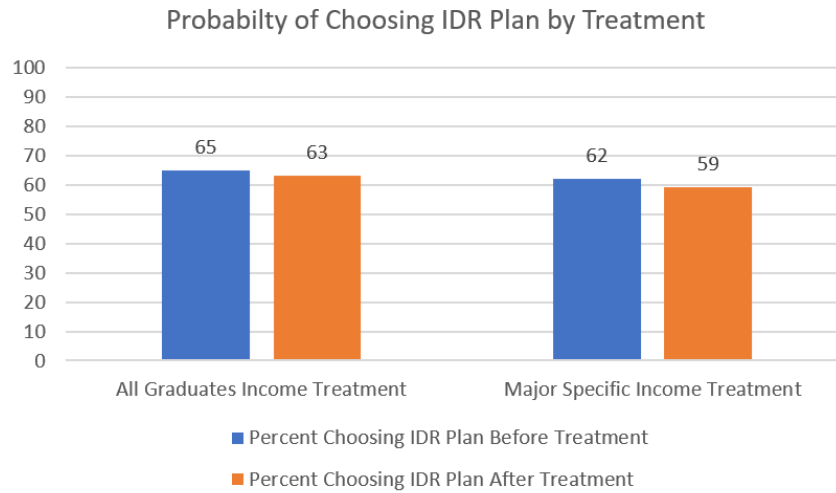


Table 2: Effect of Treatment on Repayment Plan Choice

| Variable | Covariates | Coefficient | Standard Error | P-Value |
|--|------------|-------------|----------------|---------|
| Major Specific Treatment | No | -0.0432 | 0.0261 | 0.098 |
| Major Specific Treatment | Yes | -0.0455 | 0.0262 | 0.083 |
| Major Specific Treatment * After Treatment | No | -0.0187 | 0.0367 | 0.611 |

For rows 1 and 2 the sample is $N = 1,396$. For row 3 each survey respondent has two observations: one observation before the treatment and one after the treatment. Therefore, for row 3, $N = 1,396 * 2 = 2,792$. This table shows the results of the subjective probability (scaled to be between 0 and 100) a survey respondent believed they would earn between \$0 and \$30,000 5 years after graduating from MSU regressed on binary variables for the survey respondent seeing the major specific income treatment (Major Specific Treatment) (rows 1 and 2) or a binary variable for seeing the Major Specific Income Treatment, a binary variable for the question about income expectations coming after the treatment (After Treatment) and an interaction between those variables. All regressions use the robust option in Stata. In row 2, covariates included in the regression are binary variables for the survey respondent: being female, being white, having only 1 major, having a Pell Grant, being a first-generation college student and having student loans. There are also 2 other covariates: the survey respondent's age and the probability the survey respondent believed they would attend graduate or professional school within 20 years of answering the survey.

Figure 2 shows the percent of the analysis sample who saw each treatment who chose the IDR plan before and after seeing the treatment. I hypothesized that because the Major Specific Income Treatment would increase the subjective probability that survey respondents believed they would earn a low-income, the Major Specific Income Treatment would cause survey respondents to be more likely to choose the IDR plan. Contrary to my hypothesis, all 3 regressions in Table 2 estimate that the treatment effect of Major Specific Income Treatment is to decrease the percent of survey respondents who choose the IDR plan. The effect is about -4 percentage points without covariates, -5 percentage points with covariates, and -2 percentage points controlling for pre-treatment differences in plan choice. No coefficient is statistically significant. When controlling for pre-treatment differences in covariates the 95% confidence interval of the treatment effect is -9 percentage points to 5 percentage points. This is despite that, consistent with my hypothesis, survey respondents who saw the Major Specific Income Treatment had a higher average subjective probability of earning a low income than respondents who saw the All Graduates Income Treatment.

6.6 Robustness Checks

In Section 6.3 I find a statistically significant difference in the proportion of survey respondents who have only one major for the two treatments. This difference may help explain differences in outcome by treatment. In results available upon request, I recreate the figures in tables in Section 6.4 and 6.5. The results are like the results in those sections with a statistically significant difference in low-income expectations by treatment, but not a statistically significant difference in plan choice by treatment. The magnitude of all coefficients of interest are within 1 percentage point in these tables compared to coefficients of interest for the full sample.

To see if the low-income expectations results are robust to a change in the highest income that is considered low, I replicated the analysis on low-income

expectations changing the definition of low-income from earning between \$0 and \$30,000 to earning between \$0 and \$60,000. The results of this analysis are in Appendix D. Survey respondents who received the Major Specific Income Treatment have a subjective probability of earning between \$0 and \$60,000 after the survey respondents see the income information that is 5 to 6 percentage points higher than survey respondents who saw the All Graduates Income Treatment. This after treatment difference is statistically significant at the 5% level with or without covariates. Taking into account pre-treatment differences in income expectations reduces this difference to about 4 percentage points. In the regression using both before and after treatment income expectations, this lower coefficient value and a much larger standard error makes this difference not statistically significant at the 10% level.

6.7.Heterogeneity by Having Student Loans

Only 41% of survey respondents in the analysis sample report they have student loans.²⁹ Because only students with student loans have to choose a student loan repayment plan, I want to see if the results are similar for respondents with and without student loans. Appendix E shows the results of this analysis.

To see how survey respondents with student loans are different from survey respondents without student loans, I test for statistically significant differences in other covariates for survey respondents with and without student loans using a multivariate regression. The results of this analysis are in Table E1. Survey respondents with student loans are statistically significantly more likely to have a Pell Grant (23 percentage points) and to be a first-generation college student (11

²⁹ Using information in the Common Data Set voluntarily reported by Michigan State University, The Institute for College Access & Success concluded that 25% of student debt for college graduates at Michigan State University was non-Federal. See <https://ticas.org/wp-content/uploads/2020/10/Michigan.pdf>. The major source of non-Federal student loan debt is student loans given by private sector financial companies. These companies, as far as I know, do not offer IDR plans. Because I did not ask if a survey respondent's loans were Federal or private, I am unable to know which survey respondents with student loan debt had private student loans.

percentage points). Overall, these results indicate that the main difference for students with and without student loans in my sample is that survey respondents with student loans come from families with a lower socio-economic status than those without student loans.

The treatment effect for seeing the Major Specific Income Treatment for survey respondents with student loans on low-income expectations is a not statistically significant 4.72 percentage points higher than it is for survey respondents without student loans. For survey respondents with student loans, the treatment effect of seeing the Major Specific Income Treatment on earning a low income is a significant 9.09 percentage points. For survey respondents without student loans this effect is a not statistically significant 4.37 percentage points.

The treatment effect for seeing the Major Specific Income Treatment for survey respondents with student loans on the probability of choosing an IDR plan is a not statistically significant -6.06 percentage points different than it is for survey respondents without student loans. For survey respondents with student loans, the treatment effect of seeing the Major Specific Income Treatment is a not statistically significant decrease in the probability of choosing an IDR plan by 4.24 percentage points. For survey respondents without student loans this effect is a not statistically significant increase in the probability of choosing an IDR plan of 1.81 percentage points.

6.8.Heterogeneity by Income of Major

Appendix F contains tables and figures that look at the heterogeneity of results by the income of the survey respondent's major. For this analysis, the survey respondent's major income is equal to the income the respondent would see if they are chosen to receive the Major Specific Income Treatment. This means the major income is the income of MSU graduates with federal financial aid with a major similar to the survey respondent's primary major one year after they graduated. The median major income for the sample is \$37,400. Survey respondents are classified

as having a low-income major if their major income is below the sample median major income. Survey respondents are classified as having a high-income major if their major income is equal to or above the sample median major income.

The treatment effect for seeing the Major Specific Income Treatment for survey respondents with a low-income major on low-income expectations is a statistically significant 13.88 percentage points higher than it is for survey respondents with high-income majors. For survey respondents with a low-income major, the treatment effect of seeing the Major Specific Income Treatment on a survey respondent's subjective probability of earning a low income is a statistically significant 13.91 percentage points. For survey respondents with a high-income major this effect is a not statistically significant 0.04 percentage points.

The treatment effect for seeing the Major Specific Income Treatment for survey respondents with a low-income major on the probability of choosing an IDR plan is a not statistically significant 8.05 percentage points different than it is for survey respondents with a high-income major. For survey respondents with a low-income major, the treatment effect of seeing the Major Specific Income Treatment is a not statistically significant increase in the probability of choosing an IDR plan by 2.06 percentage points. For survey respondents with a high income major this effect is a not statistically significant decrease in the probability of choosing an IDR plan of 5.99 percentage points.

7. Extensions

This section cover analyses of the survey data that do not use the empirical methodology outlined in Section 5.

7.1.Change in Income Expectations, Change in Repayment Plan Choice

One reason for the small effect of the Major Specific Income Treatment on repayment plan choice may be that few survey respondents changed their low-income expectations when they see the income information. Overall, 38% of survey respondents changed their low-income expectations after they see the income

information. 33% of survey respondents who saw the All Graduates Income Treatment changed their low-income expectations. Additionally, 43% of individuals who saw the Major Specific Income Treatment changed their low-income expectations.

Figure 3: Increase in Low-Income Expectations After Treatment by Treatment

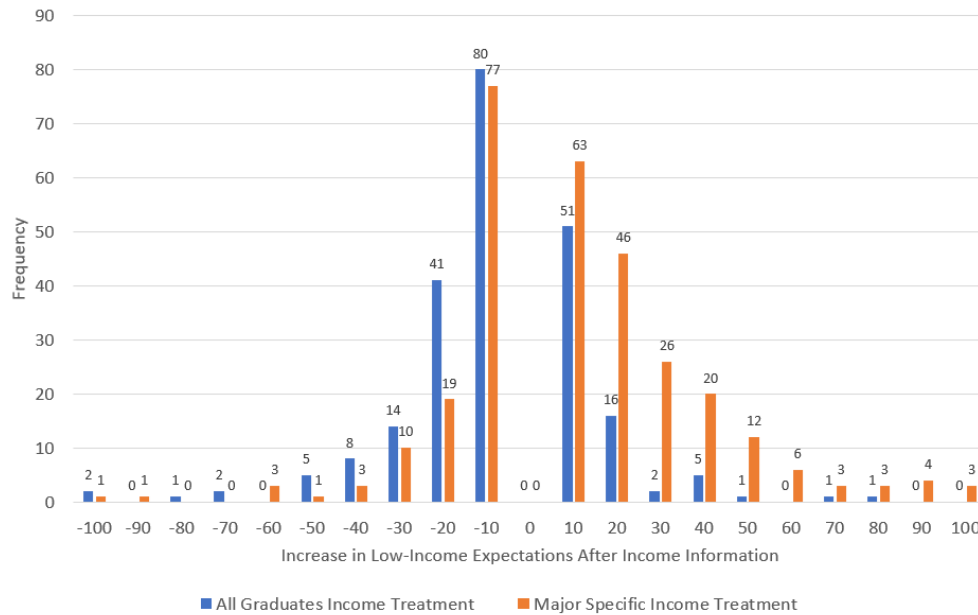


Figure 3 shows the distribution in the increase of low-income expectations after the income information separately for the All Graduates Income Treatment and the Major Specific Income Treatment. Survey respondents who did not change their low-income expectations were removed to make the figure easier to see. Survey respondents who saw the Major Specific Income Treatment are more likely to increase their subjective probability of earning a low income while survey respondents who saw the All Graduates Income Treatment are more likely to decrease their subjective probability of earning a low-income.

Figure 4: Plan Choice After Treatment by Change in Low-Income Expectations

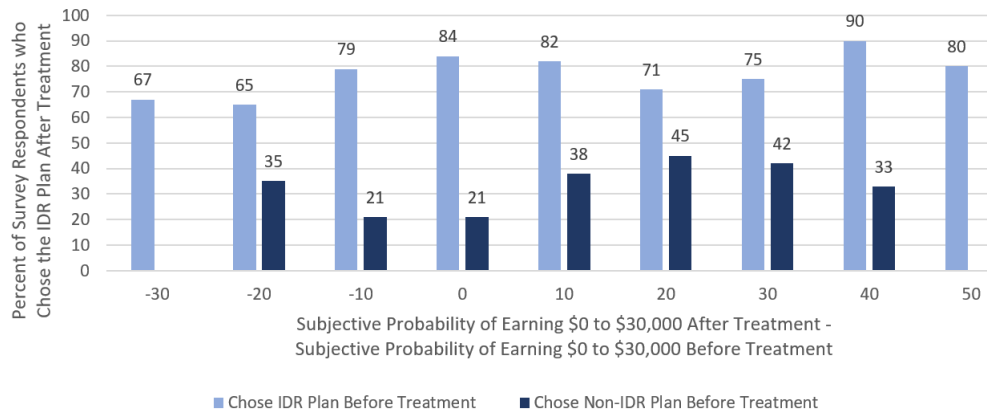


Figure 4 shows the relationship between the change in a survey respondent's low-income expectations and their probability of choosing an IDR plan.³⁰ If low-income expectations were strongly related to repayment plan choice, I would expect the probability of choosing the IDR plan after the treatment to be higher for survey respondents who had a higher increase in their probability of earning a low income after the treatment. In that case, the bars would get higher as you moved to the right on the graph. At best there is a slight increase in the height of the bars for survey respondents who chose the IDR plan before the treatment.

Table 3: Statistical Test of Relationship Between Change in Low Income Expectations and Change in Plan Choice

| Outcome Variable | Variable of Interest | Sample | Coefficient | Standard Error | P-Value |
|------------------|-----------------------------------|----------------------|-------------|----------------|---------|
| IDR to IDR | Change in Low Income Expectations | Full Analysis Sample | -0.0004587 | 0.0007712 | 0.552 |

³⁰ If the number of survey respondents who changed their low-income expectations by a certain number of percentage points conditional on plan choice, like survey respondents who initially chose the IDR plan and whose low-income expectations decreased by 40 percentage points, is less than 10, then those changes in the probability of earning a low income are not shown.

| | | | | | |
|---------------------------------|-----------------------------------|---|------------|-----------|-------|
| | | N = 1,396 | | | |
| IDR to non-IDR | Change in Low Income Expectations | Full Analysis Sample N = 1,396 | -0.0006609 | 0.0005517 | 0.213 |
| Non-IDR to IDR | Change in Low Income Expectations | Full Analysis Sample N = 1,396 | 0.0012151 | 0.0005529 | 0.028 |
| Non-IDR to non-IDR | Change in Low Income Expectations | Full Analysis Sample N = 1,396 | -0.0000955 | 0.0007419 | 0.898 |
| Choose IDR Plan After Treatment | Change in Low Income Expectations | Only Survey Respondents who Choose the IDR Plan Before Treatment N = 884 | 0.0008833 | 0.0010188 | 0.386 |
| Choose IDR Plan After Treatment | Change in Low Income Expectations | Only Survey Respondents who Choose the non-IDR Plan Before Treatment N = 512 | 0.0018812 | 0.0010245 | 0.067 |

IDR to IDR is an indicator variable for the survey respondent choosing the IDR plan both before and after the treatment. IDR to non-IDR is an indicator variable for the survey respondent choosing the IDR plan before the treatment and the non-IDR plan after the treatment. Non-IDR to IDR is an indicator variable for the survey respondent choosing the non-IDR plan before the treatment and the IDR plan after the treatment. Non-IDR to non-IDR is an indicator variable for the survey respondent choosing the non-IDR plan both before and after the treatment. Change in Low Income Expectations is the subjective probability (scaled to be between 0 and 100) that the survey respondent believed they would earn between \$0 and \$30,000 5 years after the graduated from MSU after they saw the treatment minus what they believed that subjective probability was before they saw the treatment. All regressions use the robust option in Stata.

Table 3 shows the results of regressions of different variables related to plan choice on a survey respondent's change after seeing a treatment in the probability they believed they would earn a low income. The only regression which has a coefficient that is statistically significant at the 5% level is the regression on a survey respondent switching from preferring the non-IDR plan before seeing a treatment to the IDR plan after seeing a treatment. Based on that regression a 10 percentage point increase in the change of the probability the survey respondent believed they would earn a low income is associated with an increased probability of switching from the non-IDR plan to the IDR plan of 1.2 percentage points.

The results in Figure 4 and Table 3 show that for the most part how a survey respondent changed their expectations of earning a low-income after seeing the treatment is not related to if they changed which repayment plan they preferred after seeing the treatment.

8. Discussion

Contrary to my hypothesis, I find the Major Specific Income Treatment did not cause survey respondents to be statistically significantly more likely to choose the IDR plan. This is despite the Major Specific Income Treatment causing survey respondents to have statistically significantly higher subjective probability of earning a low-income. When controlling for pre-treatment differences in covariates, the 95% confidence interval of the treatment effect of the Major Specific

Income Treatment on choosing an IDR plan is -9 percentage points to 5 percentage points. This means it is highly unlikely the treatment effect of the Major Specific Income Treatment is above 5 percentage points. Based on these two facts, I conclude the survey respondents in my sample are not choosing a student loan repayment plan based on minimizing their required payments in the event they have a low-income.

One possibility explanation for the results is that survey respondents are worried about the costs of making low payments on their student loans. In general, if a borrower makes a smaller monthly payment on their student loans, they will have to pay more interest over the life of the loan. A lower monthly loan payment will also cause the survey respondent to take them longer to pay off the loan. Survey respondents were shown tables with information about starting monthly payments, estimated total amount of money paid on the loan, and estimated total time making payments for different starting levels of income for both the non-IDR and IDR plan. This information is on the page where students are asked to choose either an IDR or non-IDR plan. These estimates assume a survey respondent's income increases by 5% at the start of every year.³¹

One reason survey respondents might not want to be on a repayment plan that requires them to make lower payments when their income is low is making lower payments may increase the total amount in payments the respondent would make on the loan. This concern is valid if the survey respondent started making either \$30,000, \$40,000, or \$50,000 when they began making payments on their loans. In those cases, their total required payments on the IDR plan would be greater than if they were on the non-IDR plan.³² However, because IDR plans forgive any

³¹ The Department of Education's assumes borrower's incomes increase by 5% per year when they estimate future student loan payments on their exit counseling website.

³² This assumes the survey respondent starts out with \$30,000 in student loan debt, and makes the minimum required payment every month after they started paying back their loans while they have a positive loan balance.

remaining loan balance after 20 years of payments, a student who is on the IDR plan described in the survey, and had \$30,000 of student loan debt when they graduated MSU, might have lower total loan payments on the IDR plan, even if their required monthly payments are generally less than they would be if they were on the non-IDR plan. This is what happens if a survey respondent's income is either \$10,000 or \$20,000 when they begin making payments. Even if survey respondents understood the benefits of being on an IDR plan in terms of total payments when their starting income is \$10,000 or \$20,000, the cost of increased total payments when their starting income is \$30,000, \$40,000, or \$50,000 may have made them less likely to change from the non-IDR plan to the IDR plan when they believed they had a higher probability of earning a low-income.

To test if concerns about having higher total payments might explain the lack of an effect of the Major Specific Income Treatment on repayment plan choice, Appendix G analyzes the effect of the Major Specific Income Treatment on a survey respondent's subjective probability of earning between \$30,000 and \$60,000 a year. It is in that income range that I estimate a survey respondent would have higher total payments on the IDR plan than the non-IDR plan. If the Major Specific Income Treatment causes survey respondents to believe they have a higher probability of earning \$30,000 to \$60,000 a year, the possible additional costs to them in terms of total payments would help explain why the Major Specific Income Treatment did not increase the choice of the IDR plan. Using data from before and after the treatments, the treatment effect of the Major Specific Income Treatment on that probability is a not statistically significant -2.98 percentage points. For all specifications in Appendix G the treatment effect is negative. This result is not consistent with concern about higher total payments explaining the lack of an effect of the treatment on plan choice.

Another aspect survey respondents may have been concerned about is how long they would have student loans. Even if they earned less than \$20,000, and therefore

would not be required to make payments if they were on the IDR plan, they would still have student loan debt. If having student loan debt imposes a mental cost on individuals no matter the level of payments, then having a greater probability of earning a low income would mean a greater probability of having student loan debt for a longer period. This may have discouraged survey respondents who had a higher probability of earning a low-income from choosing the IDR plan. If a borrower's starting salary is \$10,000, \$20,000, \$30,000, or \$40,000, the table in the survey has an estimated time making payments for the IDR plan of longer than the 10 years of payments on the non-IDR plan. There are both costs and benefits to having a low-income while being on the IDR plan. This may help explain why causing survey respondents to have a higher subjective probability of earning a low-income did not coincide with being more likely to choose an IDR plan.

Finally, it may be the case that survey respondents did not respond to having a greater subjective probability of earning a low-income by being more likely to choose the IDR plan because they did not understand the differences between the IDR plan and the non-IDR plan. Survey respondents only answer on average 1.8 of the four questions testing their understanding of the two repayment plans. This is not statistically significantly different by treatment. Survey respondents who see the Major Specific Income Treatment answering 0.11 fewer questions correctly than survey respondents who see the All Graduates Income Treatment.³³ Neither is there a statistically significant difference in the number of correct responses between survey respondents with and without student loans.³⁴ It may be the case that if survey respondents better understood the plans, they would have responded

³³ P-Value 0.155

³⁴ Survey respondents without student loans answer on average 1.86 questions correct while survey respondents with student loans answer on average 1.82 questions correct. The P-value for the difference is 0.569.

to having a greater subjective probability of earning a low income in the way I predicted.

I test the effect of repayment plan understanding on the treatment effect of the Major Specific Income Treatment in Appendix H. To do this, I compare the treatment effect for survey respondents who answer 0 or 1 of the 4 questions correct, I label those survey respondents having low plan understanding, to the treatment effect for students who answer 2 or more questions correct, I label those survey respondents as having a high plan understanding. For both survey respondents with high and low plan understanding, the Major Specific Income Treatment causes survey respondents to believe that they have a statistically significantly higher probability of earning a low income. However, for neither group did the Major Specific Income treatment statistically significantly increase the probability of choosing the IDR plan. The treatment effects for the two groups were not statistically significantly different for either low-income expectations or repayment plan choice. Based on this, I do not think low understanding of the repayment plans explains why the Major Specific Income Treatment did not statistically significantly increase the probability a survey respondent chose the IDR plan.

9. Conclusion

This study tests the hypothesis that a student's subjective probability of earning a low income is a causal factor in if they prefer an IDR student loan repayment plan or a non-IDR student loan repayment plan. I predicted that students who had an exogenously higher subjective probability of earning a low income would be more likely to choose an IDR plan. This study tests that hypothesis using data from a web survey emailed to undergraduate seniors at MSU. The survey randomized the type of information about post-college incomes survey respondents were shown to create two groups of survey respondents with exogenously different probabilities of earning a low income. I find seeing the Major Specific Income Treatment causes

survey respondents to believe they have a statistically significantly higher probability of earning a low-income compared to survey respondents who see the All Graduates Income Treatment. Despite this, survey respondents who see the Major Specific Income Treatment do not have a statistically significantly different probability of choosing the IDR plan than survey respondents who see the All Graduates Income Treatment. This pattern is similar looking at a variety of sub samples such as survey respondents with and without student loans, and survey respondents with lower earning majors, and survey respondents with low and high understanding of the repayment plans.

I conclude that changing a student loan borrower's expectation of earning a low income will not statistically significantly change their repayment plan choice. Attempts to increase take-up of IDR plans may have more success focusing on other changes to student loan repayment plan choice such as emphasizing the benefits of IDR plans (Abraham, Filiz-Ozbay, Ozbay, and Turner, 2020) or making an IDR plan the default repayment plan choice (Cox, Kreisman, and Dynarski, 2020).

Future research could explore what borrowers in general, and students in particular, most care about when paying back their loans. Do they care about minimizing required payments, the total amount their loans cost, how long they have any debt, or some combination of the above? How do borrowers in general, and students in particular, balance the tradeoffs between lower monthly payments and increased amount of time having debt? If students had more choices related to how they repaid their student loans, such as having more control over the length of time they had to pay back their student loans on the non-IDR plan, or how payments were calculated as a function of their annual income on an IDR plan, how would they design their repayment plan?

A second line of future research to expand on this research might be digging deeper into student's expectations of their futures. How do students expect their income to change over time? How do students expect their incomes to change if

they attend graduate or professional school? How accurate are student's beliefs related to how much they will earn and how likely they are to attend graduate or professional school? What do student's think they will be doing when they earn different ranges of income?

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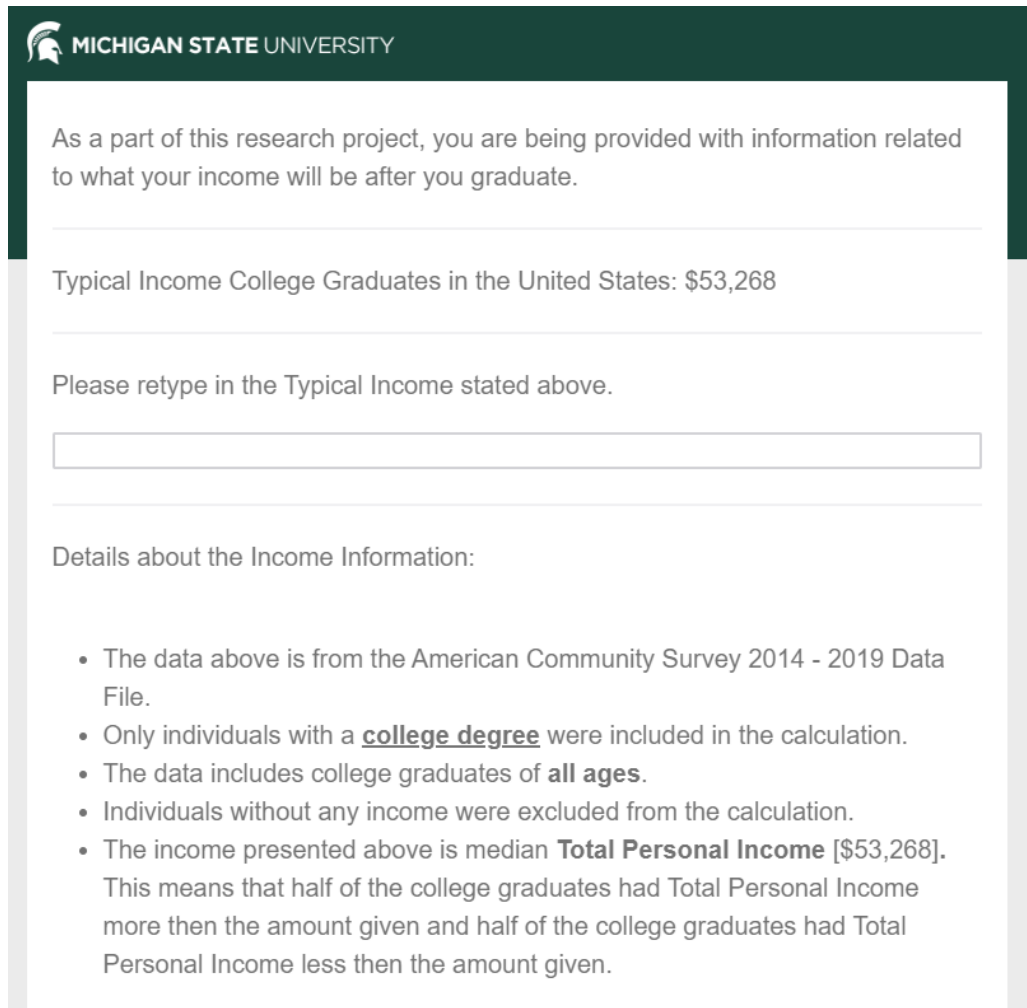
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Appendix A: Survey Screenshots³⁵

Figure A1: All Graduates Income Treatment



The screenshot displays a survey interface for Michigan State University. At the top, the university's logo and name are visible. The main content area contains the following text and elements:

As a part of this research project, you are being provided with information related to what your income will be after you graduate.

Typical Income College Graduates in the United States: \$53,268

Please retype in the Typical Income stated above.


Details about the Income Information:

- The data above is from the American Community Survey 2014 - 2019 Data File.
- Only individuals with a **college degree** were included in the calculation.
- The data includes college graduates of **all ages**.
- Individuals without any income were excluded from the calculation.
- The income presented above is median **Total Personal Income** [\$53,268]. This means that half of the college graduates had Total Personal Income more then the amount given and half of the college graduates had Total Personal Income less then the amount given.

If the survey respondent saw the All Graduates Income Treatment, they were not allowed to continue to the next page of the survey until they typed 53268 into the textbox. This is done to ensure that survey respondents processed the information they saw.

³⁵ Screenshots for the rest of survey available upon request.

Figure A2: Major Specific Income Treatment Primary Major Agribusiness
Management

 MICHIGAN STATE UNIVERSITY

As a part of this research project, you are being provided with information related to what you will earn after you graduate.

Typical Earnings for Agricultural Business and Management **MSU** Graduates:
\$44,300

Please type in the Typical Earnings stated above. If you see "Data Not Available", please type in 0.

Details about the Earnings Information:

- The data above is from the U.S. Department of Education's College Scorecard.
- Only individuals who were **MSU graduates** during the 2015-2016 or 2016 - 2017 academic years were included in the calculation.
- The data is for the **first** year of earnings after graduation.
- The only students included in the calculation were students with federal financial aid.
- Individuals without any earnings were excluded from the calculation.
- The earnings presented above are **Median Earnings**. This means that half of MSU graduates with federal financial aid in the given major earned more than the amount given and half of MSU graduates with federal financial aid in the given major earned less than the amount given.

Individuals who saw the above page were not allowed to continue with the survey until they typed in 44300 into the textbox. Survey Respondents with other majors

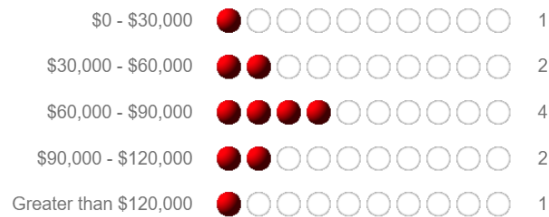
who saw the Major Specific Income Treatment also had to type in the typical income shown before the could continue to the next page of the survey. The major or group of majors and the income that was shown was based on what the survey respondent indicated their primary major was.

Figure A3: Question to Elicit Own Income Expectations

What do you expect your income to be 5 years after receiving an undergraduate degree from MSU? Do not count any time in graduate or professional school as part of those 5 years.


Remember, you should place exactly 10 balls.

In order to select 0 in a specific income range, click on the number next to the income range you are interested in changing and type in 0.



This question was asked twice: once before the survey respondent saw the treatment and once after the survey respondent saw the treatment. The survey respondent was not allowed to continue with the survey until the number of balls they placed in the various income ranges equaled 10.

Figure A4: Intro to Question Eliciting Repayment Plan Preferences

 MICHIGAN STATE UNIVERSITY

Imagine the following scenario.

You have just graduated from MSU **with your current major(s)** with \$30,000 in student loan debt.

You are now required to pick one of the following repayment plans.

The interest rate for both repayment plans is 5%. This is the fee that the lender is charging for having lent you \$30,000.

Payments for both plans are due the first day of each month.

You can pay more than the required payment without penalty.

If you attend graduate or professional school you may pause payments under either plan.

If you are unemployed you may pause payments under either plan.

Figure A5: Repayment Plan Choice Question Table Describing the Two
Repayment Plans

| | Minimum Monthly Payment | Loan Forgiveness | Payments Change when Income Changes | Must Pay When Earn Less than \$20,000 a year | Must Pay When in Education | Must Pay When Unemployed |
|---------------------|--|--|---|--|-------------------------------|--------------------------------|
| Repayment Plan 1 | 10% of your annual income above \$20,000 split into 12 monthly payments | Any remaining loan balance after 20 years of payments is forgiven | Yes | No | No | No |
| Repayment Plan 2 | Payments are set so the loan is paid off in 10 years | No loan forgiveness | No | Yes | No | No |

This table appeared directly below the information in Figure A4.

Figure A6: Repayment Plan Choice Question Payment Information Tables

| Repayment Plan 1 Payment Information | | | |
|---|---------------------------------|--------------------------------|---|
| Yearly Income when Starting Payments | Initial Minimum Monthly Payment | Estimate of Total Amount Paid* | Estimate of Length of Time Making Payments* |
| \$10,000 | \$0 | \$1,4897.39 | 20 Years |
| \$20,000 | \$0 | \$26,131.91 | 20 Years |
| \$30,000 | \$83.33 | \$51,945.90 | 18 Years 9 Months |
| \$40,000 | \$166.67 | \$42,331.96 | 12 Years 7 Months |
| \$50,000 | \$250 | \$38,334.80 | 9 Years 3 Months |
| \$60,000 | \$333.33 | \$36,233.53 | 7 Years 3 Months |
| \$70,000 | \$416.67 | \$34,959.78 | 5 Years 11 Months |
| \$80,000 | \$500.00 | \$34,112.72 | 5 Years |
| \$90,000 | \$583.33 | \$33,511.35 | 4 Years 4 Months |
| *These estimates assume that income increases 5% a year and that the minimum monthly payment is made on the first day of each month | | | |

| Repayment Plan 2 Payment Information | | | |
|---|---------------------------------|--------------------------------|---|
| Yearly Income when Starting Payments | Initial Minimum Monthly Payment | Estimate of Total Amount Paid* | Estimate of Length of Time Making Payments* |
| \$10,000 | \$318.20 | \$38,184.00 | 10 Years |
| \$20,000 | \$318.20 | \$38,184.00 | 10 Years |
| \$30,000 | \$318.20 | \$38,184.00 | 10 Years |
| \$40,000 | \$318.20 | \$38,184.00 | 10 Years |
| \$50,000 | \$318.20 | \$38,184.00 | 10 Years |
| \$60,000 | \$318.20 | \$38,184.00 | 10 Years |
| \$70,000 | \$318.20 | \$38,184.00 | 10 Years |
| \$80,000 | \$318.20 | \$38,184.00 | 10 Years |
| \$90,000 | \$318.20 | \$38,184.00 | 10 Years |
| *These estimates assume that income increases 5% a year and that the minimum monthly payment is made on the first day of each month | | | |

These tables appeared directly below the table in Figure A5.

The \$318.20 monthly payment was calculated using the bankrate.com loan calculator (URL: <https://www.bankrate.com/calculators/mortgages/loan-calculator.aspx>). The monthly payment is for a \$30,000 loan with a loan term of 10 years at a 5% interest rate. The estimate of Total Amount Paid = \$318.20 payment * 120 monthly payments over 10 years.

The 5% increase in income comes from the U.S. Department of Education’s Loan Simulator. On the page where individuals provide their yearly salary and how much their incomes grow each year the default income growth is 5%. On that page is written “*According to a U.S. Department of Education and U.S. Department of Treasury analysis of a representative sample of actual student loan borrower incomes, the borrower incomes increase, on average, at a rate of 5% per year.” See <https://studentaid.gov/loan-simulator/repayment/wizard/personal-info/income-info> accessed January 20th, 2022.

Figure A7: Repayment Plan Choice Question

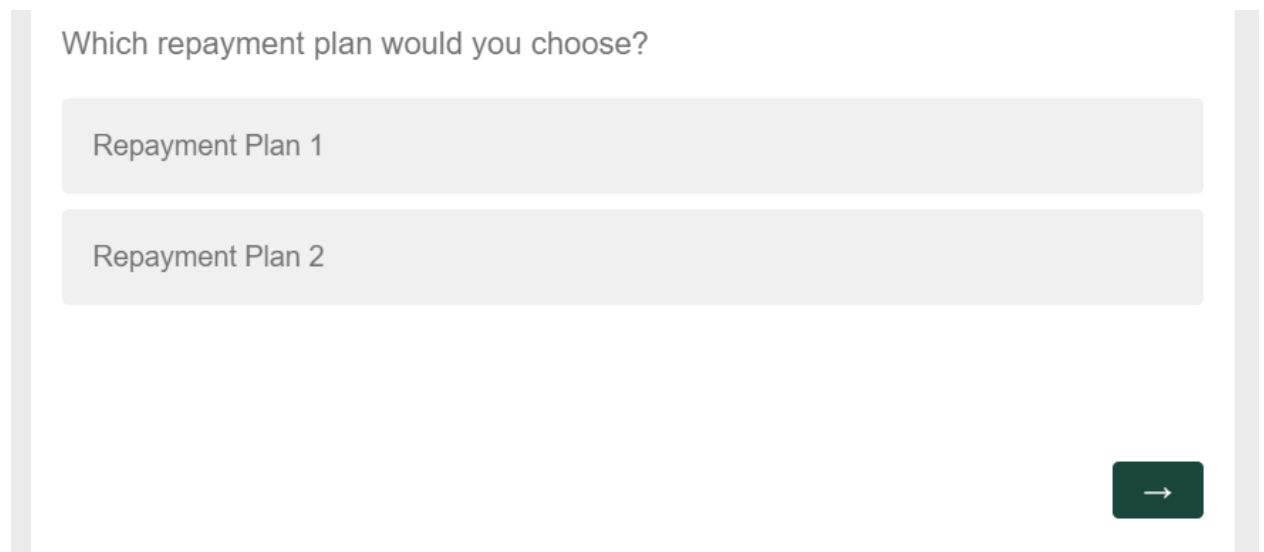

A screenshot of a web form titled "Which repayment plan would you choose?". Below the title are two light gray rectangular buttons labeled "Repayment Plan 1" and "Repayment Plan 2". At the bottom right of the form is a dark green button with a white right-pointing arrow.

Figure A7 appeared directly below figure A6.

Figure A8: Test of Understanding of Repayment Plans Introduction


MICHIGAN STATE UNIVERSITY

| | Minimum Monthly Payment | Loan Forgiveness | Payments Change when Income Changes | Must Pay When Earn Less than \$20,000 a year | Must Pay When in Education | Must Pay When Unemployed |
|------------------|---|---|-------------------------------------|--|----------------------------|--------------------------|
| Repayment Plan 1 | 10% of your annual income above \$20,000 split into 12 monthly payments | Any remaining loan balance after 20 years of payments is forgiven | Yes | No | No | No |
| Repayment Plan 2 | Payments are set so the loan is paid off in 10 years | No loan forgiveness | No | Yes | No | No |

Instructions

Please use a **calculator** to answer the following questions.

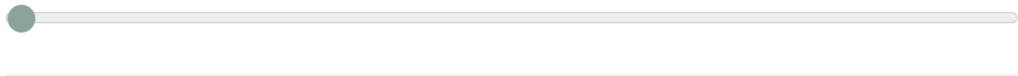
The slider below will allow you to pick one of 6 possible answers: \$0, \$200, \$400, \$600, \$800, \$1000. The correct answer to each of the next 4 questions is one of those 6 options.

Figure A9: Test of Understanding of Repayment Plans Questions 1 and 2

If you have \$30,000 in student loan debt, you earned \$20,000 this year, and you were on the Repayment Plan 1, what would your **monthly payment** be this year?

0 200 400 600 800 1000

Monthly Payment



If you have \$30,000 in student loan debt, you earned \$44,000 this year, and you were on the Repayment Plan 1 what would your **monthly payment** be this year?

0 200 400 600 800 1000

Monthly Payment

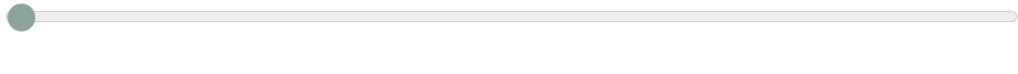


Figure A9 appeared directly below Figure A8.

The answer to Question 1 is \$0. Per the table in Figure A12, the borrower does not need to make payments if they are on Repayment Plan 1 and they make less than \$20,000 per year. 41% of respondents answered this question correctly.

The answer to Question 2 is \$200. This is the formula to calculate a monthly payment on Repayment Plan 1 given an annual income above \$20,000: $0.1 * (\text{Annual Income} - \$20,000) / 12$. Plugging \$44,000 for Annual Income into the formula the expression equals \$200. 38% of respondents answered this question correctly.

Figure A10: Test of Understanding of Repayment Plans Questions 3 and 4

Assume you have student loan debt and you are on **Repayment Plan 2** (different repayment plan from previous question). Your income decreased from \$68,000 last year to \$44,000 this year. Last year your minimum monthly payment was \$400. What is your **minimum monthly payment** this year?

0 200 400 600 800 1000

Monthly Payment

You have been on Repayment Plan 1. It has been 21 years since you started paying off your student loans. At the end of the 20th year, your balance was \$10,000. Your income is the same for both the 20th year and 21st year. During your 20th year, your minimum monthly payment was \$800. What is your **minimum monthly payment** for your 21st year?

0 200 400 600 800 1000

Monthly Payment

Figure A10 appeared directly below Figure A9.

The answer to Question 3 is \$400. Per the table in Figure A8, if you are Repayment Plan 2, your payments do not change when your income changes. Therefore, the payment stays at \$400. 66% of respondents answered this question correctly

The answer to Question 4 is \$0. Per the table in Figure A8, “Any remaining loan balance after 20 years of payments is forgiven.” Therefore, at the end of the borrower’s 20th year their \$10,000 was forgiven. Therefore, during the borrower’s 21st year they are not required to make any payments. 39% of respondents answered this question correctly.

Survey respondents see Figures A8, A9, A10 on the same page. That page comes after survey respondents are asked for their repayment plan choice a second time and before questions about covariates like age and gender.

Appendix B: Summary Statistics

Table B1: Number of Majors

| Number | Frequency | Percent of Analysis Sample |
|-----------|-----------|-------------------------------|
| 1 | 1208 | 86.5% |
| 2 | 180 | 12.9% |
| 3 | 5 | 0.4% |
| 4 or More | 3 | 0.2% |

Table B2: Gender

| Gender | Frequency | Percent of Analysis Sample |
|--------|-----------|-------------------------------|
| Female | 826 | 59.2% |
| Male | 548 | 39.3% |
| Other | 22 | 1.6% |

Table B3: Race

| Race | Frequency | Percent of Analysis Sample |
|--|-----------|-------------------------------|
| American Indian or Alaska Native | 2 | 0.1% |
| Asian | 118 | 8.5% |
| Black or African American | 74 | 5.3% |
| Native Hawaiian or Pacific Islander | 6 | 0.4% |
| White | 1135 | 81.3% |

| | | |
|-------|----|------|
| Other | 61 | 4.4% |
|-------|----|------|

Table B4: Student Loans

| How much student loan debt did the respondent have when they answered the survey? | Frequency | Percent of Analysis Sample |
|---|-----------|----------------------------|
| \$0 | 567 | 40.6% |
| \$1 - \$10,000 | 217 | 15.5% |
| \$10,001 - \$20,000 | 226 | 16.2% |
| \$20,001 - \$30,000 | 174 | 12.5% |
| \$30,001 - \$40,000 | 78 | 5.6% |
| \$40,001 - \$50,000 | 48 | 3.4% |
| Greater than \$50,000 | 86 | 6.2% |

Table B5: Pell Grant

| Has the respondent ever had a Pell Grant? | Frequency | Percent of Analysis Sample |
|---|-----------|----------------------------|
| Yes | 428 | 30.7% |
| No | 968 | 69.3% |

Table B6: First Generation College Student

| Is the respondent a first-generation college student? | Frequency | Percent of Analysis Sample |
|---|-----------|----------------------------|
| Yes | 267 | 19.1% |
| No | 1129 | 80.9% |

Table B7: Summary Statistics Continuous Variables

| Variable | Mean | Standard Deviation | Min | Max |
|---|-------|-----------------------|-----|-----|
| Age | 21.35 | 1.76 | 12 | 46 |
| Probability will Attend Graduate or Professional School in the Next 20 Years | 65.41 | 31.93 | 0 | 100 |

Appendix C: Balance Tests

Table C1: Multivariate Regression Test

| Variable | Coefficient | Standard Error | P-Value |
|---|-------------|----------------|---------|
| Single Major | 0.0935 | 0.0391 | 0.017 |
| Is Female | 0.0187 | 0.0280 | 0.050 |
| Is White | 0.0142 | 0.0354 | 0.689 |
| Has Pell Grant | 0.0374 | 0.0325 | 0.251 |
| Is First Generation College Student | -0.0054 | 0.0372 | 0.884 |
| Has Student Loans | -0.0544 | 0.0284 | 0.056 |
| Age | 0.0001 | 0.0082 | 0.994 |
| Probability Attend Graduate or Professional School | -0.0000 | 0.0004 | 0.968 |

| | | | |
|----------|------|--------|-------|
| Constant | 0.42 | 0.1851 | 0.024 |
|----------|------|--------|-------|

N = 1,396

Each coefficient in the above table comes from a single regression using the following estimating equation

$$\begin{aligned}
 \text{Major_Specific_Treatment}_i &= \beta_0 + \beta_1 \text{Single_Major}_i + \beta_2 \text{Is_Female}_i + \beta_3 \text{Is_White}_i \\
 &+ \beta_4 \text{Has_Pell_Grant}_i + \beta_5 \text{Is_First_Gen_Col}_i \\
 &+ \beta_6 \text{Has_Student_Loans}_i + \beta_7 \text{Age}_i + \beta_8 \text{Prob_Grad_School}_i \\
 &+ \epsilon_i
 \end{aligned}$$

Major_Specific_Treatment is a binary variable which equals 1 if the respondent saw the Major Specific Income Treatment.

Single Major, Is Female, Is White, Has Pell Grant, Is First Generation College Student, and Has Student Loans are binary variables which equal 1 if the respondent has the attribute in the variable name.

Appendix D: Robustness Check

Table D1: Effect of Treatment on Probability of Earning \$0 to \$60,000

| Variable | Covariates | Coefficient | Standard Error | P-Value |
|--|------------|-------------|----------------|---------|
| Major Specific Treatment | No | 5.2699 | 1.8612 | 0.005 |
| Major Specific Treatment | Yes | 5.4729 | 1.8042 | 0.002 |
| Major Specific Treatment * After Treatment | No | 4.1118 | 2.5362 | 0.105 |

For rows 1 and 2 the sample is N = 1,396. For row 3 each survey respondent has two observations: one observation before the treatment and one after the treatment. Therefore, for row 3 N = 1,396 * 2 = 2,792.

This table shows the results of an the subjective probability (scaled to be between 0 and 100) a survey

respondent believed they would earn \$0 to \$60,000 5 years after graduating from MSU regressed on binary variables for the survey respondent seeing the major specific income treatment (Major Specific Treatment) (rows 1 and 2) or a binary variable for seeing the Major Specific Income Treatment, a binary variable for the question about income expectations coming after the treatment (After Treatment) and an interaction between those variables. All regressions use the robust option in Stata. In row 2 the covariates are binary variables for the survey respondent: being female, being white, having only 1 major, having a Pell Grant, being a first-generation college student and having student loans. There are also 2 other covariates: the survey respondent's age and the probability the survey respondent believed they would attend graduate or professional school within 20 years of answering the survey.

Appendix E: Heterogeneity by Having Student Loans

Table E1: Differences Between Survey Respondents with and Without Student Loans

| Variable | Coefficient | Standard Error | P-Value |
|---|-------------|----------------|---------|
| Single Major | 0.0440 | 0.0371 | 0.236 |
| Is Female | 0.0314 | 0.0265 | 0.235 |
| Is White | 0.0002 | 0.0324 | 0.995 |
| Has Pell Grant | 0.2340 | 0.0287 | 0.000 |
| Is First Generation College Student | 0.1146 | 0.0325 | 0.000 |
| Age | 0.0130 | 0.0088 | 0.140 |
| Subjective Probability of Attending Graduate or Professional School | -0.0004 | 0.0004 | 0.328 |
| Constant | 0.1924 | 0.1923 | 0.317 |

N = 1,396. The above table shows the results of a regression of an indicator variable for the survey respondent having student loans on indicator variables for the student having a single major, being female, being white,

having a Pell Grant, and being a first-generation college and continuous variables for the survey respondent's age and their subjective probability of attending graduate or professional school. This regression uses the robust option in Stata.

Has Student Loans Only Sample (829 Survey Respondents)

Table E2: Effect of Treatment on Change in Probability of Earning a Low Income
Have Student Loans

| Outcome Variable | Variable of Interest | Coefficient | Standard Error | P-Value |
|-------------------------------------|--|-------------|----------------|---------|
| Probability of Earning a Low-Income | Major Specific Treatment * After Treatment | 9.0887 | 2.2186 | 0.000 |
| Choose IDR Plan | Major Specific Treatment * After Treatment | -0.0424 | 0.0479 | 0.376 |

For this table, each survey respondent has two observations: one observation before the treatment and one after the treatment. Therefore, $N = 829 * 2 = 1,658$. This table shows the results of the subjective probability (scaled to be between 0 and 100) a survey respondent believes they will earn \$0 to \$30,000 5 years after graduating from MSU (row 1) or a binary variable for the survey respondent choosing the IDR plan (row 2) regressed on a binary variable for seeing the Major Specific Income Treatment, a binary variable for the question about income expectations coming after the treatment (After Treatment) and an interaction between those variables. All regressions use the robust option in Stata.

No Student Loans Sample (568 Survey Respondents)

Table E3: Effect of Treatment on Change in Probability of Earning a Low Income
No Student Loans

| Outcomes Variable | Variable of Interest | Coefficient | Standard Error | P-Value |
|-------------------|----------------------|-------------|----------------|---------|
|-------------------|----------------------|-------------|----------------|---------|

| | | | | |
|-------------------------------------|--|--------|--------|-------|
| Probability of Earning a Low-Income | Major Specific Treatment * After Treatment | 4.3709 | 2.4929 | 0.080 |
| Choose IDR Plan | Major Specific Treatment * After Treatment | 0.0181 | 0.0574 | 0.752 |

For this table, each survey respondent has two observations: one observation before the treatment and one after the treatment. Therefore, $N = 568 * 2 = 1,136$. This table shows the results of the subjective probability (scaled to be between 0 and 100) a survey respondent believed they would earn \$0 to \$30,000 5 years after graduating from MSU (row 1) or a binary variable for the survey respondent choosing the IDR plan (row 2) regressed on a binary variable for seeing the Major Specific Income Treatment, a binary variable for the question about income expectations coming after the treatment (After Treatment) and an interaction between those variables. All regressions use the robust option in Stata.

Models with Interaction Terms

Table E4: Effect of Treatment on Change in Probability of Earning a Low Income by Having Student Loans

| Outcome Variable | Variable of Interest | Coefficient | Standard Error | P-Value |
|-------------------------------------|---|-------------|----------------|---------|
| Probability of Earning a Low-Income | Major Specific Treatment * Have Student Loans * After Treatment | 4.7178 | 3.3369 | 0.158 |
| Choose IDR Plan | Major Specific Treatment * Have Student | -0.0606 | 0.0747 | 0.418 |

| | | | | |
|--|----------------------------|--|--|--|
| | Loans * After Treatment | | | |
|--|----------------------------|--|--|--|

For this table each survey respondent has two observations: one observation before the treatment and one after the treatment. Therefore, $N = 1,396 * 2 = 2,792$. This table shows the results of the subjective probability (scaled to be between 0 and 100) a survey respondent believes they will earn \$0 to \$30,000 5 years after graduating from MSU (row 1) or a binary variable for the survey respondent choosing the IDR plan (row 2) regressed on a binary variable for seeing the Major Specific Income Treatment, a binary variable for the question about income expectations coming after the treatment (After Treatment), a binary variable for the respondent having student loans (Have Student Loans), and all possible interaction terms using those 3 binary variables. All regressions use the robust option in Stata.

Appendix F: Heterogeneity by Income of Major

Survey respondents are categorized as having a low-income major if the income they would have seen if they had seen the Major Specific Income Treatment was below \$37,400. All other survey respondents are classified as having a high-income major. This cutoff is chosen because it was the median income survey respondents would have seen if they had been shown the Major Specific Income Treatment.

Low Income Majors (694 Survey Respondents)

Table F1: Effect of Treatment on Change in Probability of Earning a Low Income

Low-Income Majors

| Outcome Variable | Variable of Interest | Coefficient | Standard Error | P-Value |
|-------------------------------------|--|-------------|----------------|---------|
| Probability of Earning a Low Income | Major Specific Treatment * After Treatment | 13.9117 | 2.6683 | 0.000 |
| Choose IDR Plan | Major Specific Treatment * | 0.0206 | 0.0524 | 0.694 |

| | | | | |
|--|--------------------|--|--|--|
| | After Treatment | | | |
|--|--------------------|--|--|--|

For this table, each survey respondent has two observations: one observation before the treatment and one after the treatment. Therefore, $N = 694 * 2 = 1,388$. This table shows the results of the subjective probability (scaled to be between 0 and 100) a survey respondent believed they will earn \$0 to \$30,000 5 years after graduating from MSU (row 1) or a binary variable for the survey respondent choosing the IDR plan (row 2) regressed on a binary variable for seeing the Major Specific Income Treatment, a binary variable for the question about income expectations coming after the treatment (After Treatment) and an interaction between those variables. All regressions use the robust option in Stata.

High Income Majors (702 Survey Respondents)

Table F2: Effect of Treatment on Change in Probability of Earning a Low Income
High-Income Majors

| Outcome Variable | Variable of Interest | Coefficient | Standard Error | P-Value |
|-------------------------------------|---|-------------|----------------|---------|
| Probability of Earning a Low Income | Major Specific Treatment * After Treatment | 0.0362 | 1.6340 | 0.982 |
| Choose IDR Plan | Major Specific Treatment * After Treatment | -0.0599 | 0.0516 | 0.246 |

For this table each survey respondent has two observations: one observation before the treatment and one after the treatment. Therefore, $N = 702 * 2 = 1,404$. This table shows the results of the subjective probability (scaled to be between 0 and 100) a survey respondent believes they will earn \$0 to \$30,000 5 years after graduating from MSU (row 1) or a binary variable for the survey respondent choosing the IDR plan (row 2) regressed on a binary variable for seeing the Major Specific Income Treatment, a binary variable for the question about income expectations coming after the treatment (After Treatment) and an interaction between those variables. All regressions use the robust option in Stata.

Models with Interaction Terms

Table F5: Effect of Treatment on Change in Probability of Earning a Low Income
by Income of Major

| Outcome Variable | Variable of Interest | Coefficient | Standard Error | P-Value |
|-------------------------------------|---|-------------|----------------|---------|
| Probability of Earning a Low Income | Major Specific Treatment * Low Income Major * After Treatment | 13.8754 | 3.1288 | 0.000 |
| Choose IDR Plan | Major Specific Treatment * Low Income Major * After Treatment | 0.0805 | 0.0735 | 0.274 |

For this table each survey respondent has two observations: one observation before the treatment and one after the treatment. Therefore, $N = 1,396 * 2 = 2,792$. This table shows the results of the subjective probability (scaled to be between 0 and 100) a survey respondent believes they will earn \$0 to \$30,000 5 years after graduating from MSU (row 1) or a binary variable for the survey respondent choosing the IDR plan (row 2) regressed: on a binary variable for seeing the Major Specific Income Treatment, a binary variable for the question about income expectations coming after the treatment (After Treatment), a binary variable for the respondent having a low income major (Low Income Major), and all possible interaction terms using those 3 binary variables. All regressions use the robust option in Stata.

Appendix G: Treatment Effect on Subjective Probability of Earning \$30,000 to \$60,000

Table G1: Treatment Effect on Subjective Probability of Earning \$30,000 to \$60,000

| Variable | Covariates | Coefficient | Standard Error | P-Value |
|--|------------|-------------|----------------|---------|
| Major Specific Treatment | No | -2.7190 | 1.3939 | 0.051 |
| Major Specific Treatment | Yes | -2.5806 | 1.3828 | 0.062 |
| Major Specific Treatment * After Treatment | No | -2.9829 | 1.8282 | 0.103 |

For rows 1 and 2 the sample is $N = 1,396$. For row 3 each survey respondent has two observations: one observation before the treatment and one after the treatment. Therefore, for row 3, $N = 1,396 * 2 = 2,792$. This table shows the results of an the subjective probability (scaled to be between 0 and 100) a survey respondent believes they will earn \$30,000 to \$60,000 5 years after graduating from MSU regressed on binary variables for the survey respondent seeing the major specific income treatment (Major Specific Treatment) (rows 1 and 2) or a binary variable for seeing the Major Specific Income Treatment, a binary variable for the question about income expectations coming after the treatment (After Treatment) and an interaction between those variables. All regressions use the robust option in Stata. In row 2 the covariates are binary variables for the survey respondent: being female, being white, having only 1 major, having a Pell Grant, being a first-generation college student and having student loans. There are also 2 other covariates: the survey respondent's age and the probability the survey respondent believed they would attend graduate or professional school within 20 years of answering the survey.

Appendix H: Heterogeneity by Repayment Plan Understanding

Survey respondents are classified as having low plan understanding if they got 0 or 1 questions right on the 4-question test of repayment plan understanding in the survey.

Survey respondents are classified as having high plan understanding if they got 2, 3, or 4 questions right on the 4-question test of repayment plan understanding in the survey.

This way of categorizing survey respondents was chosen to split the sample as evenly as possible.

Low Plan Understanding (672 Survey Respondents)

Table H1: Effect of Treatment on Change in Probability of Earning a Low Income

Low Plan Understanding

| Outcome Variable | Variable of Interest | Coefficient | Standard Error | P-Value |
|-------------------------------------|--|-------------|----------------|---------|
| Probability of Earning a Low-Income | Major Specific Treatment * After Treatment | 7.7501 | 2.5706 | 0.003 |
| Choose IDR Plan | Major Specific Treatment * After Treatment | 0.0117 | 0.0543 | 0.829 |

For this table each survey respondent has two observations: one observation before the treatment and one after the treatment. Therefore, $N = 672 * 2 = 1,344$. This table shows the results of the subjective probability (scaled to be between 0 and 100) a survey respondent believes they will earn \$0 to \$30,000 5 years after graduating from MSU (row 1) or a binary variable for the survey respondent choosing the IDR plan (row 2) regressed on a binary variable for seeing the Major Specific Income Treatment, a binary variable for the question about income expectations coming after the treatment (After Treatment) and an interaction between those variables. All regressions use the robust option in Stata.

High Plan Understanding (724 Survey Respondents)

Table H2: Effect of Treatment on Change in Probability of Earning a Low Income

High Plan Understanding

| Outcome Variable | Variable of Interest | Coefficient | Standard Error | P-Value |
|------------------------|----------------------------|-------------|----------------|---------|
| Probability of Earning | Major Specific Treatment * | 6.6260 | 2.1355 | 0.002 |

| | | | | |
|-----------------|--|---------|--------|-------|
| a Low-Income | After Treatment | | | |
| Choose IDR Plan | Major Specific Treatment * After Treatment | -0.0462 | 0.0489 | 0.345 |

For this table each survey respondent has two observations: one observation before the treatment and one after the treatment. Therefore, $N = 724 * 2 = 1,448$. This table shows the results of the subjective probability (scaled to be between 0 and 100) a survey respondent believed they would earn \$0 to \$30,000 5 years after graduating from MSU (row 1) or a binary variable for the survey respondent choosing the IDR plan (row 2) regressed on a binary variable for seeing the Major Specific Income Treatment, a binary variable for the question about income expectations coming after the treatment (After Treatment) and an interaction between those variables. All regressions use the robust option in Stata.

Models with Interaction Terms

Table H3: Effect of Treatment on Change in Probability of Earning a Low Income by Plan Understanding

| Outcome Variable | Variable of Interest | Coefficient | Standard Error | P-Value |
|-------------------------------------|---|-------------|----------------|---------|
| Probability of Earning a Low-Income | Major Specific Treatment * Low Plan Understanding * After Treatment | 1.1241 | 3.3419 | 0.737 |
| Choose IDR Plan | Major Specific Treatment * Low Plan Understanding * After Treatment | 0.0580 | 0.0731 | 0.428 |

For this table each survey respondent has two observations: one observation before the treatment and one after the treatment. Therefore, $N = 1,396 * 2 = 2,792$. This table shows the results of the subjective probability (scaled to be between 0 and 100) a survey respondent believes they will earn \$0 to \$30,000 5 years after graduating from MSU (row 1) or a binary variable for the survey respondent choosing the IDR plan (row 2) regressed: on a binary variable for seeing the Major Specific Income Treatment, a binary variable for the question about income expectations coming after the treatment (After Treatment), a binary variable for the respondent having a low amount of understand of the repayment plans (Low Plan Understanding), and all possible interaction terms using those 3 binary variables. All regressions use the robust option in Stata.