Navigating Higher Education Insurance: An Experimental Study on Demand and Adverse Selection

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Abstract

Insurance markets exist to help individuals manage inherent risks in health, housing, automobile driving, durable appliances, and other markets. Higher education is increasingly risky with the returns to schooling being variable across multiple dimensions. Indeed, some students experience no return to education. Nonetheless, insurance in educational markets is not as prevalent as other markets. Partnering with a large, non-profit university, we surveyed nearly 3,000 students who are eligible for a potential income share agreement (ISA), which includes income insurance by design because monthly payments are pegged to incomes. We study the factors affecting students' decisions to opt in for built-in educational insurance as well as the nature of adverse selection in educational insurance markets. We randomize students, who are offered a hypothetical ISA and a more traditional student loan, into two groups: those presented a neutral framing, and those offered a framing emphasizing educational insurance. We find a strong take-up response to the insurance framing. The insurance framing increases the likelihood of taking up the ISA compared to the student loan by roughly ten percentage points. We find that uncertainty about future income and college completion increases the likelihood of the ISA take-up, signaling the presence of adverse selection in a potential educational insurance market. Familiarity also plays a significant role when choosing an educational financing contract. Students who currently borrow government federal student loans are less likely to prefer educational insurance. The results suggest that educational insurance could have substantial demand, and the findings have implications for public policies concerning design of more effective student financing contracts.

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1 Introduction

In markets for durable goods, individuals face large expenditures and inherent risks. To protect themselves against this risk, consumers engage in insurance markets. Insurance markets are well developed in the case of housing purchases and vehicle ownership but do not exist in higher education markets. College is an increasingly risky investment (Webber, 2022), and while college returns are positive on average (Lovenheim and Smith, 2022), the distribution of returns is more nuanced (Webber, 2016). The distribution of returns, for example, varies across institutions (e.g. selective vs. non-selective; 4-year vs. 2-year) and fields of study (e.g. education vs. engineering vs. economics), and perhaps more importantly, returns vary within each of these given unobservable student skill (to both themselves and the institution) and uncertain labor market conditions. Furthermore, some students do not financially benefit from college at all. (cite needed here) Indeed, some studies regarding community colleges suggests that many majors offer little to no financial return (Kirkeboen et al., 2016; Eide et al., 2016).

There are many ways in which policymakers, colleges, and students manage this risk. For example, work by Stange (2012) shows that many students treat attending the first year of college akin to purchasing an options contract—completing an initial year so as to develop a better sense of their likely returns, after which they decide whether to exercise the option for a second year. Another example is the free college movement, which is a way of transferring risk from students to taxpayers. Interestingly, individual insurance policies where students pay a premium to shift risk are either not well developed or non-existent. One reason for the lack of insurance in education markets could be the presence of adverse selection (Einav et al., 2023).

To pool risk, education insurance would require broad participation, including from students who achieve significant returns to college. However, students who are likely to know more about their potential college outcomes — their employment and income potential — than funders, potentially creating adverse selection in these markets (Akerlof, 1970). Similarly, moral hazard may result if students who choose a particular contract change their behavior as a result of their choice. For example, a student who might otherwise have worked and earned wages may choose to leave or reduce their involvement in the labor market to keep their income-contingent repayment low.

Our paper makes a unique contribution to understanding the relevance of adverse selection in terms of the demand for educational insurance. We partnered with The University to conduct a randomized survey experiment of 2,776 students who were potential candidates to take up an ISA facilitated by The University (provided by a partner lender). In the survey, we randomized students to either a hypothetical financing choice between a federal student loan with IDR and a hypothetical ISA that emphasized the insurance features (income contingency and repayment term) of the two financing products or a risk-neutral framing

that only explained differences in monthly payments. We find that students have a significant preference for the built-in income insurance and our insurance framing greatly increases this demand. Our survey and follow-up questions also allow us to characterize how adverse selection enters the educational insurance market.

Increasingly, students manage the financial consequences of educational risk through income contingent loan repayment, where borrowers pay a share of their income above a minimum income threshold for a certain number of years before satisfying the loan obligation. The most prominent versions of this income contingency are eitherincome driven repayment (IDR) plans, typically offered by the federal government or income share agreements (ISAs), typically offered by universities or private lenders.[1] Our study examines student preferences over different flavors of income contingent education financing and the accompanying adverse selection that may exist (Herbst and Hendren, 2021). We do so by asking students at a large, non-profit university (hereafter "The University") to compare a hypothetical ISA with a federal student loan with IDR where, similar to Abraham et al. (2020), we vary the framing of the choices.

Though focused on educational insurance markets, our paper contributes to other lines of research, including the literature on financial aid, education finance, and student debt. As the cost of higher education has risen and the purchasing power of public subsidies have fallen, families have had to incur debt or forego consumption to afford post-secondary education. Recent research has emphasized the burden that student loans place on students (Chakrabarti et al., 2020) - including on their other consumer spending (e.g. Mezza and Sommer, 2015), "life milestones" (Mezza et al., 2020), and educational outcomes (e.g. Black et al., 2020, Denning and Jones, 2021). Because the monthly payment is proportional to income, education insurance such as IDR and ISAs can hedge against the adverse effects of student loans. As such, take-up of such products, particularly among populations where student loans have had adverse effects (e.g. students at technical or public regional colleges with higher variance in college outcomes), is important. Many families do not apply for aid (i.e. do not complete the required financial aid forms) because of a lack of information or uncertainty of eligibility (e.g. Kofoed (2017), Bettinger et al. (2012)). Even for families that apply for aid, the protection of some assets within the Pell eligibility formula lead to less financial aid eligibility for students from disadvantaged families (Levine and Ritter, 2022) which results in higher student loan burdens and less access to selective institutions. Forms of built-in educational insurance are potentially more attractive to these students, as they automatically reallocate some of the risk from the student to the provider and may reduce uncertainty around financial aid eligibility.

[1]The key distinction between federal student loans with IDR and ISAs is that the income contingency is built into the ISA, while borrowers have to apply for IDR and, typically, re-certify their eligibility each year. Recent policy changes around the Saving on a Valuable Education (SAVE) IDR plan simplify some of these processes for federal student loans, but the income protection is still far from built in.

Additionally, our research contributes to the behavioral literature on student take-up of financial aid programs under varied framing.[2] Abraham et al. (2020) and Marx and Turner (2019) demonstrate that framing matters for government-sponsored IDR plans and traditional student loan take-up, respectively. In this literature, researchers manipulate the students' norms, the terms, risk, and the costs communicated to students with respect to specific financial instruments. Our paper contributes to this discussion by showing that students prefer income contingent financing when we emphasize the built-in educational insurance of the ISA.Notably, when we offer differential contract terms after their original choice, respondents prefer lower income shares even when combined with longer repayment terms.

Finally, our paper contributes to the literature on the myriad strategies individuals employ to hedge risks in their financial lives. Diversification, including the use of derivative instruments like futures and options, remains a primary strategy for risk management in the face of uncertain economic outcomes (e.g. Merton (1971); Fama and French (1992); Bodie (1994); Goyal and Welch (2007)). Thakor (2020) emphasizes the role of financial technology in democratizing access to advanced risk management solutions. Most closely to our setting, individuals purchase insurance to mitigate financial losses (e.g. Arrow, 1963), buffer against income shocks (e.g. Chetty and Szeidl (2007)), and for a variety of other reasons. Guiso and Paiella (2008) document the increasing propensity of households to hedge against labor income risk in particular, indicating a rising awareness of employment/income uncertainties. In light of evidence that college students are often overoptimistic about future earnings (e.g. Baker et al. (2018)), our study contributes unique insights about the relative importance of different types of income and employment risk in college students' decisions regarding financing instruments.

Our paper is organized as follows. Section 2 reviews students' college financing and the prospect for education insurance in financing education. Section 3 details the experimental design of our research questions. Section 4 lays out our empirical strategy and elaborates on the data collection. Section 5 provides empirical results. Section 6 offers concluding remarks and policy considerations.

2 College Financing and Educational Insurance

Up until the past decade or so, students and parents typically repaid educational loans in fixed monthly payments over a fixed repayment period, akin to a traditional mortgage loan (Karamcheva et al., 2020). This meant that - barring enrollment in a temporary forbearance program - most student loan borrowers faced the same monthly loan payment regardless of their educational outcome, employment status, income level,

[2]Cox et al. (2020) examine why students don't choose IDR when they are worried about future income expectations. They conduct a laboratory experiment where they provide information about IDR and default students into the plan. They find that extra information and correct defaulting does increase enrollment.

or family circumstances. Yet, research on student loans finds that most individuals face higher repayment burdens early in the repayment term, when their income is often lower, and that repayment burdens can vary widely for individuals with variable or uncertain income and/or employment (Chapman and Lounkaew, 2015; Chapman and Dearden, 2017). In other words, many borrowers face temporary repayment challenges (e.g. due to periods of unemployment or underemployment) or chronic repayment struggles due to low incomes (e.g. because of degree non-completion, or degree/major with poor financial return on investment).

Recognition of these repayment patterns and increasing debt-to-income ratios have led to the expansion in offerings and an increase in take-up of various types of income-contingent (sometimes referred to as income-driven repayment, or IDR) plans, particularly for federal student loans. These plans reduce student loan payments to 5-15% of income above a threshold (depending on program), typically expressed as a multiple of the poverty rate. Herbst (2023) uses randomized variation in loan servicer outreach to find that enrollment in an IDR plan reduces student loan delinquencies by 22 percentage points and decreases outstanding balances within a year of take-up. As of 2019, about 35% of borrowers with federal Direct student loans were enrolled in one of the several IDR plans offered by the Department of Education (Trends in Student Aid, 2019). Herbst (2023) links access to education insurance to reduced incidence of financial distress for borrowers.

Yet, enrollment rates in these repayment plans remain low for myriad reasons such as administrative hurdles, poor design, and servicer misconduct (e.g. Mueller and Yannelis, 2022). Many students do not qualify for federal student loans — perhaps because they have exhausted the federal lifetime undergraduate borrowing limit (approximately $30,000), or because they are ineligible for federal loans (e.g. due to parental income/assets, due to attending a non-eligible institution, or due to not being US citizens). Others still do not hold the type of loan that is eligible for an IDR program. Whatever the reasons, the IDR safety net is out of reach for many students.

States and institutions have investigated and experimented with ISA's in part due to rising student debt burdens, and increased cost of programs that do not qualify for Title IV funding. ISA providers have approached these private educational loans both to fill funding gaps faced by students and to signal that programs are confident that graduates will succeed in the labor market, as repayment rates are tightly linked to students' post-college employment and income (Ritter and Webber, 2019). Over the past decade, ISAs have covered the spectrum of postsecondary education, from large public systems and private non-profit colleges to certificate programs and small for-profit coding bootcamps (Ritter and Webber, 2019).

However, ISAs are neither a traditional loan product nor a traditional financial aid instrument. They are intentionally designed to share some of the risks of pursuing post-secondary education between the student and the ISA provider. These include academic risks and life risks. Historically, 6-year completion rates

have hovered around 60%, and even lower for nontraditional college students and non-selective institutions (Bowen et al., 2009). Financial circumstances, lack of academic preparedness, and a host of academically orientated challenges may put students' financial investment in college at risk. Additionally, there are "life" risks that students face, including emergencies arising from physical to emotional health to family circumstances. Adult learners, in particular, report that child-care emergencies, children's health, and even transportation emergencies can derail their educational careers (Markle, 2015).

Perhaps the largest risks that students face involve the returns to their educational investment or completion. The average financial return for the average graduate of a 4-year college or university is large, and handily outweighs the implicit and explicit costs of attending college. However, returns are heterogeneous across many dimensions, so there is still a substantial downside risk that attending college (particularly if a student does not earn a degree) will be a losing financial proposition. This notion of risk is a key consideration when discussing the question of whether the investment in college is "worth it" (Webber, 2016; Balakrishnan and Cynamon, 2018; Hendricks and Leukhina, 2018; Akers, 2021). Since student populations particularly at risk of low or negative returns to college enrollment tend to skew toward vulnerable groups, addressing the riskiness of college attendance with product/program design and effective public policy is imperative.

ISAs are one means of funding higher education which — when properly designed and regulated — may help manage risks. Under an ISA agreement, students pledge a proportion of their future earnings (e.g. four percent of earnings over ten years for each $10,000 in funding) in lieu of paying tuition in the present. ISAs typically include, as built-in features of the financial product, downside protections (a minimum income threshold below which no payments are due, a maximum repayment window, and/or and maximum number of payments) and upside protections (maximum cap for the amount that can be repaid before the obligation is satisfied). Monthly payments vary with income by design, and there is no interest rate, per se, which could be welcome (as payments will never be overly burdensome) or unwelcome (because payments may be seen as unpredictable) for borrowers. While some of these protections (as well as others not listed) are presently available under IDR plans for federal student loans, they are not the default option in the United States. Borrowers have to bear the time and effort cost of enrolling and often fulfill many requirements in order to remain enrolled, including burdensome annual recertification processes for the most generous programs. Additionally, the menu of IDR programs has changed multiple times since the introduction of the first repayment program of this style, meaning that the availability of a particular repayment plan for federal loans is uncertain, at best. Some students may find attractive the ex-ante agreement to repayment terms that will be in effect for the duration of the contract inherent with an ISA.

Despite the increase in use of ISAs in recent years, there is a surprising dearth of evidence regarding

student preferences over features of income-contingent financing generally or ISAs in particular. Students' decisions to enroll in an ISA are ultimately about earnings expectations (both level and stability), risk tolerance, and risk aversion. They are very similar to the decisions made in purchasing other types of insurance. Understanding the preferences and characteristics of students likely to take up an ISA sheds light on which of them can be helped or harmed by educational insurance and why. Despite the recent proliferation of these financing products, there have to date in the United States been no studies exploring why students may choose an ISA or a product like it over a more traditional student loan. There are limited studies discussing which types of students may benefit from an ISA, or addressing the effects an ISA might have on students' educational success and financial well-being. Thus, the experimental evaluation we conduct in the present paper has high practical importance.

From a policy perspective, ISAs are currently not as clearly regulated as traditional student loans, with a hodgepodge of state-level approaches to enforcing consumer protection and prudential regulations and an emerging federal regulatory framework for ISAs.[3] A more thorough understanding of the types of students who are likely to take up ISAs could provide information useful not only to educational programs and students, but also to regulators as they decide how to apply or augment regulations in the coming years. Furthermore, given the similarities between ISAs and IDR plans for federal student loans, insights into student preferences over different features of income-contingent financing can be highly relevant to plans for the expansion or redesign of IDR.[4]

3 Research Questions and Experimental Setting

3.1 Research Questions

Given the possible presence of adverse selection in education markets, we study the following research questions. First, what is the nature of adverse selection in educational insurance markets? Next, how can framing an ISA as educational insurance affect student take-up? Third, what factors influence students' decision to take up educational insurance?

The first question aims to understand the nature of adverse selection and how personal perceptions of risk affect students' decisions to participate in hypothetical ISA programs. In education markets, adverse selection is when students use private information about their academic ability, possible major choice, and

[3]The CFPB considers ISAs private student loans, but has provided limited guidance regarding how existing regulations apply to them. For example, the Truth in Lending Act governs the disclosures of APR, among things, which is a distinctly loan-specific term and does not straightforwardly apply to an ISA-style contract.

[4]For example, the Department of Education has recently undertaken the design of a new version of an IDR plan for Direct student loans, https://www.whitehouse.gov/briefing-room/statements-releases/2023/06/30/fact-sheet-president-biden-announces-new-actions-to-provide-debt-relief-and-support-for-student-loan-borrowers/.

potential labor market outcomes to sort either into educational insurance such as ISA programs and student loans. Given the rich administrative data provided by the “University" and the results on risk tolerance and income forecasts from our survey, we can show which types of students are interested in educational insurance ex ante.

The second is behavioral testing whether explicitly framing the ISA as insurance affects take-up relative to a federal student loan with the option of IDR. Many students are unaware of what an ISA program entails and the downside risk protections that ISAs offer. In our experimental portion of the paper, we randomize students into an education framing of the ISA to see if insurance related attributes increase interest in the program and draw students with private information into the risk pool.

The third question examines moderators. For example, ISAs are typically offered by universities to help students manage the risks of non-completion, unemployment, and low earnings; as we show below, students with high risks for these situations are precisely the students who stand to benefit the most from the ISA and are most likely to take-up the ISA. More generally, we measure how take-up and the efficacy of an insurance framing varies by student characteristics, specifically those associated with the risks that ISAs insure against.

3.2 Survey and Experimental Settings

The survey targeted a sample of 8,000 students enrolled in programs that The University may, through a third-party provider, offer ISA funding in the future. The University received a 35% response rate for the survey. Eligible students were undergraduates who were either juniors or seniors (or approximately two years from degree completion). The University was interested in focusing on students who were majoring in pre- and post- license nursing, health information management, cyber security, or business administration. Eligible students had to complete a FAFSA, but had exceeded borrowing limits under the Federal Direct Loan program. Thus, all students in our sample could be potentially credit constrained.

Potential study participants received an invitation from the University offering them the opportunity to help the University better understand the student experience and their relationship with financial aid. The University offered students a $10 Amazon gift card to compensate them for their time and effort and were informed that they were consenting to be part of the study and could withdraw at any time. The University branded the study with its logo and name as opposed to the institutions of the research team.

In our experiment, we first randomized students into two different framings that compared the terms of a hypothetical ISA to a federal student loan with an option of IDR. First, we randomized half of the participants into the treatment arm that emphasized the ISA as a form of insurance that protects against

downside employment risk, with the stress placed on fixed repayment term as opposed to a balance. This treatment measured the effects of emphasizing the possible need of “education insurance" given potential downside risk of costly human capital investment. The control group received of half of the students into a “risk neutral” framing which focused on monthly payments, and repayment terms. In both treatment arms, students were asked their preference and the intensity of their preference between the ISA and the student loan. This survey experiment serves as our primary comparison throughout the paper. Figure A2a displays a flow-chart that describes the randomization.

Second, given that students’ risk and time preferences may shed light on the nature of insurance take-up, we also created a subsequent survey module varying the terms of the students’ funding choice. If a student chose a federal student loan with the option of IDR in either of the treatment arms, we provided them with more favorable options of ISA terms, varying income share percentage and term length to do so. These alternative ISA options and the students’ selections provide a revealed preference measure of discount rates, which could be an important marker of potential adverse selection. Of course, an important caveat is that the sequential nature of the experiment induces selection at each stage, such that the estimates are not representative of the survey population as a whole. . We describe this in greater detail in Section 5.4.

Details of the research design and analysis were preregistered on the Social Science Registry (Balakrishnan et al., 2023). We discuss our findings below.

4 Data and Econometric Model

4.1 Data Sources

For our analysis, we combine data from two unique sources: our primary survey and administrative data from the University.

Our first data source comes from the survey of students that We conducted in June-July 2022. Of the 8,000 students that we invited to complete the survey, The University received 2,776 responses, a 35% participation rate. The survey data includes detailed information about household composition, current living situation, personal income as well as household income, financial stability, current education financing, and financial literacy. Within the survey, we randomized how recipients learned about a hypothetical ISA framing it as either an insurance option or a risk-neutral option in comparison to a federal student loan with an option of IDR. Our dependent variable is whether they selected the ISA or the federal student loan. Given the importance of career expectations on the desirability of insurance, we also ask questions on career,

income, and employment expectations, perceptions on graduation, and risk preferences.

The University's Administrative Data: The administrative data includes detailed information about social and demographic characteristics such as age, gender, race/ethnicity, marital status, state of residency, household size, highest education level, employment status, and household income. Along with academic records showing students' majors, we received information on how many semesters they have completed, attempted and completed number of credits, transfer credits if any, and credits needed to graduate. The sample includes 5,465 observations for 2,776 students — our survey sample — where all variables were observed in both June 2022 and July 2022, when available, to match the time frame of the survey's administration. The administrative data also includes variables on student finance. The financial aid data includes information on students' academic careers such as their enrollment status (active, dropped, taking a term break, etc.), grade level (undergraduate or graduate), academic standing, receipt of financial aid or award, lifetime federal loan borrowings, and proximity to aggregate federal loan limits. The financial aid sample includes 7,028 observations with 2,776 unique students. The data is structured as an unbalanced panel with annual observations of each student for financial aid years on file with the University, between Fall 2018 and Fall 2022. These help us track the financial aid history and academic progress of the students.

4.2 Econometric Model

To estimate the determinants, both experimental and descriptive of preferences for ISA take-up, we estimate Equation 1:

$$y_i = \beta_0 + \beta_1 T_i + \beta_2 C_i + \gamma X_i + \epsilon_i \tag{1}$$

where y_i, the outcome variable of interest, denotes student i's preference for a hypothetical ISA (coded as 1), or a federal student loan (coded as 0). T is a treatment indicator, randomly assigned to respondents that represents either the insurance-based framing of an ISA (coded as 1) or an a risk-neutral framing (coded as 0). C is a vector of the key student characteristics associated with risk and potentially adverse selection. Specifically, we include the following characteristics: current income and employment status, career expectations including both income and employment expectations after graduation, perceived barriers to graduation, and risk preferences.

X is a vector of control variables, including baseline demographics. Specifically, we include the following variables from the University's records: age, gender, race/ethnicity, and marital status. In the survey administered to students, The University also collected data on household size and current educational status.

Unlike in many RCTs, where respondent characteristics and control variables are primarily included to reduce bias or increase precision, we do have a first-order interest in the coefficients on every variable, as we wish to assess both the existence and extent of adverse selection. We test for both effects of each variable on ISA preference.

We also test for heterogeneous effects to determine effects on adverse selection by estimating Equation 2:

$$y_i = \beta_0 + \beta_1 T_i + \beta_2 T_i \times H_i + \beta_3 H_i + \delta C_i + \gamma' X_i + \varepsilon_i \tag{2}$$

where H_i is an indicator variable for the dimension of heterogeneity including race/ethnicity, gender, household size, age, marital status and risk aversion. As in Equation 1, T is a treatment indicator, C is a vector of the key student characteristics associated with risk and X is a vector of demographic variables.

4.3 Balance

We do not see any imbalance between our two randomized groups across pre-treatment covariates that include age, sex, race/ethnicity, marital status, household size, education level, current income and employment, future income and employment expectations, risk aversion, current financing choice, and barriers to graduation. Table 1 summarizes the characteristics of our sample overall and also checks for balance between treatment and control groups. The average student in the survey sample is in their late 30s (37.8) and employed. A greater fraction of students are white (55%) and female (71%). Half of the students are married. Most students have an associate's degree (64%) or a bachelor's degree (20%). For half of the students, their annual total personal income is between $40,000 and $90,000 whereas almost one-third of the students have an annual total household income that is $120,000 or more. Students in our sample believe that they are highly likely to be employed full-time within years of graduation and to earn an income around the average of the individual middle-income spectrum at $80,000. Among barriers to graduation, they see work responsibilities (79%), family constraints (57%), and financial constraints (40%) as the main reasons for not getting as much out of their educational experience as they would like to. In terms of enrollment balance, Columns 3 and 4 show that the students randomized into the treatment group are overall very similar to those in the control group, confirming that our random assignment was correctly conducted.

5 Results

5.1 Impact of Insurance Framing in Take-up

Table 2 summarizes our findings. We build our empirical model in the following way: Model 1 captures the baseline effect of treatment with no additional controls. Model 2 additionally controls current personal income, employment status, and financial stability to the control set. Model 3 adds to Model 2 by controlling for the expectations for career, income and employment. Model 4 includes risk preferences. In Model 5, we incorporate current financing choice of the student. Model 6 adds on Model 5 by controlling for barriers to graduation. Finally, Model 7 additionally controls demographic variables — age, gender, race/ethnicity, marital status, household size, and educational status. Model 7 reflects the specification listed in our pre-registration. Except for Model 1, all models include fixed effects for student's major.

Our results indicate that the insurance framing increases the likelihood of taking up ISA compared to a federal loan with the option of IDR by roughly ten percentage points. The results are robust to our model choice and statistically significant. Given a mean of 23 percentage points ISA take-up for the control group, this effect corresponds to a 43 percent relative increase in the take-up rate for ISAs in the treatment group. The large baseline effect is striking, and emphasizes the value that individuals place on the ISA's built-in insurance against adverse employment/income outcomes and the shorter maximum repayment term. The treatment effect is stable across observable dimensions and demographic characteristics.

5.2 Adverse Selection in Take-up

Adverse selection is a main concern to the stability of any insurance market, in particular, preference for a financing contract that depends on a prediction of future income is difficult to navigate. If the degree of selection is too large, the market can quickly unravel. Historical examples include dental insurance, certain annuity markets, and even lifetime airfare products (Einav et al., 2023).

There are several dimensions on which adverse selection could present itself in an ISA context. First, the current financial conditions of individuals (high income, stable employment, etc.) may play a significant role in whether they wish to pledge a percentage of future income in exchange for downside risk protection. Contrary to our expectations, we do not find that current income or employment status is predictive of ISA takeup.

Similarly, individuals may have private information about their future income/employment prospects, irrespective of their current income/employment, which could substantially influence the decision to buy insurance. A student may believe they are likely to have a high income for any number of reasons. For

instance, they may have an internship with a virtually guaranteed job offer, or their degree may open up a promotion in their current job. In such cases, this private information would lead to these students selecting out of the insurance market. Conversely, students who know they are unlikely to have incomes above the ISA income threshold would be disproportionately likely to opt for insurance, as it would render their tuition bill effectively free. The measurement of adverse selection is the key determinant of whether a given insurance market is viable, and is thus an important aspect of our current investigation.

To examine this aspect of adverse selection, we asked students to rate the likelihood (based on a 5-point Likert scale) that they would be employed/unemployed 5 years after graduating. The same exercise was done for expectations around future income. We define a similar measure of income uncertainty. Of particular note, at the time students reported their beliefs about future income/employement, they were unaware of the ISA context of our study. As with the current income/employment variables, uncertainty over future employment probabilities does not seem to drive ISA preferences, indicating a somewhat surprising lack of adverse selection in this dimension. However, uncertainty over future income does appear to have an economically large and marginally statistically significant impact.

Employment and wage risk are not the only risks. Another dimension where adverse selection could emerge relates to the likelihood that students do not complete their college degree. Students who believe they are less likely to complete based on private information should be more likely to wish to insure against future negative outcomes. We see some evidence of this in the "college-related risks" variable in Table 2.

We also investigate other risks, including housing security, family health risks, and current work responsibilities/risks. We find no evidence that these risks seem to be driving take-up. We do find that certain student characteristics are strongly associated with take-up. Race, marital status, and the specific way in which students are already financing their education all have some power in predicting take-up.

Overall, there is less evidence of adverse selection across a variety of variables than we might have imagined ex ante. Employment uncertainty, for example, does not seem to influence/suggest take-up. However, we do find strong suggestive evidence of adverse selection based on uncertainty around future incomes. Given that income uncertainty is the focal point for educational insurance decisions, this finding is an important contribution of our study.

5.3 Heterogeneous Treatment Effects

Adverse selection may reveal itself through heterogeneity in several risk factors. Various demographic groups or individuals with different risk preferences may have disparate susceptibilities to default risk and therefore may be affected differently by the framing of a financing contract. We test for heterogeneous

treatment effects along several dimensions including race/ethnicity, gender, household size, age, marital status and risk aversion. We use the Coefficient of Relative Risk Aversion (CRRA), a measure for risk preferences following a similar method to Kimball et al. (2008). We focus on students' characteristics where we would expect to see a differential impact ex ante.We, however, do not find any statistically significant heterogeneous treatment effects under the context of any of these characteristics. Tables 3 - 8 show the results.

For all subsamples we investigate, we observe that the insurance framing is the driving force behind the ISA take-up. While individual characteristics predict take-up, we do not find differential effects of the insurance framing. One might have expected that some aspects of adverse selection (e.g. future income risk) could have led to heterogeneous impacts; however, we do not find any evidence of this. One possibility is that the impact of insurance framing is symmetric although they might start from different bases. Another possible explanation for the lack of differential effects may be related to the the imperfect nature of the risk metrics and the small sample size. This measurement error and small sample may leave us with little power to estimate any differential effect precisely (Balakrishnan et al., 2023). We aim to overcome these shortcomings by presenting some visual evidence for the relationship between future expectations and ISA take-up, and also facilitating a machine learning-inspired methodology, both of which we explain in the next section.

5.3.1 Additional Analysis

We further investigate the heterogeneous treatment effects based on future expectations and uncertainty to uncover adverse selection, if any. Figure 2 looks at the percentage of students choosing an ISA given the employment uncertainty and the treatment status. One can observe that treatment increases the percentage of students choosing ISA in every category of employment uncertainty. For example, among the people who are very certain that they would get a job in the future, 22% of students in the control group in this category chose ISA whereas the number is 32% for the treated students. We investigate whether these percentages are significantly different from each other within and across categories. The confidence intervals drawn on the graph answer that question. We see that the percentage of students choosing ISA is significantly higher in the treatment group than the control group for those who are very certain and are moderately uncertain of their employment prospects. One can also conclude that the percentage of students choosing ISA for treatment and control groups separately across categories are not statistically different from each other at the 5% significance level.[5]

[5]We note that the treatment group, the percentage of students choosing ISA is statistically different at the 10% significance level between those who are moderately uncertain and very certain, and moderately uncertain and very uncertain about their future employment.

Figure 3 carries out the same analysis for income uncertainty. Similar to what we observe for employment uncertainty, the treatment increases the percentage of students choosing ISA in every category of income uncertainty. The gap is the smallest for those with highest income uncertainty. For people who are very and moderately certain about their income prospects, the treatment significantly increases the percentage of students taking up ISA.[6]

Figure 2 and Figure 3 reveal that the results are most clear for the income expectations, likely because this category does not have the added complexity of full-time/part-time expectations. As would be expected, there is a stronger preference for the ISA contract among those with very uncertain beliefs about future income and employment. Among the most uncertain respondents, there is no discernible treatment effect. However, as the certainty expressed by respondents increases, the framing of the ISA contract becomes much more important. It is these respondents with relatively certain/secure beliefs about the future that appear to be driving the baseline results.

One possible mechanism driving this result is the salience of downside risk among different types of respondents. For those who initially express significant uncertainty about their future prospects, they are already prone to imagining negative outcomes, and hence did not need the extra framing to view an ISA in terms of its insurance properties. One should also, once again, note that the small sample size — 103 students in the "Very uncertain" category — and the fact that the uncertainty measures are defined based on the Likert scale questions in the survey and may not entirely capture the actual risk.

As a robustness check and to incorporate the other dimensions of risk, we also employ the data-driven approach by Athey and Imbens (2016) to estimate treatment effect heterogeneity. We investigate several risk factors including perceived barriers to graduation, current financing choices, risk aversion and future expectations as well as demographics[7] as candidates for sources of heterogeneity. The suggested methodology builds on regression tree methods from the prediction-based machine learning literature (Breiman et al., 1984; Breiman, 2001). The sample is first divided into two parts: training and estimation data. We use the training data to create partition of the population according to covariates, and then we use the estimation data to estimate treatment effects for each subpopulation. The approach provides an advantage for cases where there are many covariates by letting the data tell the researcher the relevant subgroups where one should look for heterogeneity. By separating the datasets used to select the model structure and to estimate, Athey and Imbens (2016) mitigate the possible bias in machine learning methods where spurious correlations between covariates and outcomes affect the selected model. They argue that although the reduced sample size in each step through partition leads to loss of precision, the estimates are unbiased for every

[6] One can also note that for the control group, the percentage of students choosing ISA is statistically different at the 10% significance level between those who are very certain and very uncertain about their future income.

[7] The demographics include age, sex, race and ethnicity, household size and educational attainment.

subpopulation.

In this exercise, we simulate with different cut-off points in the sample to get the training and the estimation data. In general, all simulations return housing insecurity and other financial constraints, college-related risks, work responsibilities, having government or private student loans and risk aversion as the main sources of heterogeneity. We present evidence that many of these subsamples have significant effects; however, when we test the symmetry of the treatment effects, we find few significant forms of heterogeneous treatment effects.

Figure A1 in Appendix C summarizes our findings when we use 40% of our sample as the training data and the rest as our estimation sample.

5.4 Change in Preferences in Response to Changes in Price

Another dimension we investigate is whether students' preferences change when offered alternative ISA contracts with different income share percentage and term lengths. As mentioned in section 3.2, students who chose a federal student loan with an option of IDR against the original ISA contract (2.3% share for 10 years) in either of the treatment arms were asked if they would switch to an ISA contract where they would pay smaller installments over a longer period (2.2% share for 12 years). Those who still chose the federal student loan option in this group were then asked to choose between the same federal student loan and an ISA contract where they would pay larger installments over a shorter period (2.8% share for 7 years). Similarly, the students who chose the original ISA contract against the federal student loan were also presented with the two other ISA options with different pricing and payment terms described above. Figure 4 depicts the two arms of the variations in framing depending on student's initial choice. Table 10 and Table 11 show the results for these scenarios for students who initially chose a federal student loan. There are strong indications that students prefer smaller payments for longer term lengths. We see that out of 2001 students who initially chose the federal student loan, 365 (18% of the sample) switch to the new ISA contract. Treatment increases the likelihood of switching from student loan to ISA with a longer term by 5.1 percentage points in our preferred model. The effect is robust across all specifications and statistically significant. For those who still prefer student loan over the original and the longer-term ISA, 285 out of 1636 (17%) would now switch to the ISA contract where they would pay a higher share of their income for a shorter term. We, however, do not observe a significant treatment effect when we look at the likelihood of switching from federal student loan to this new ISA contract. This is also consistent with Mumford (2020).

On the other hand, we see contrary results for those who chose the ISA contract in the first place.

Among 775 students, 162 would still choose the original ISA. 137 switch to the longer term ISA contract where they pay a lower percentage of their income while 475 opt for the shorter term ISA with higher percentage payments. We see that treatment increases the likelihood of switching to a shorter-term contract significantly by 8.6 percentage points in our preferred model. We do not find a similar effect for switching to a longer-term ISA. Table A1 and Table A2 in Appendix B show the results.

6 Conclusion

Income contingent education financing is designed to lessen the burden of repaying federal student loans with an option of IDR by tying the monthly payments to the borrower's income. Students' preferences, the risk factors that may affect their take-up and hence the potential adverse selection in educational insurance markets are of interest for both policymakers and researchers. We address these questions by randomizing the messaging of hypothetical financing contracts for 2,766 students at a large, non-profit university to understand how the framing of financial contracts, along with students' characteristics and future expectations, can influence decisions.

The results from this study have key implications for how student financing contracts should be designed, and they offer crucial insights into the behavioral responses of students. First, student choices depend on the presentation of contract terms. The single biggest result from our intervention is the degree to which information and framing impacts students' preference for how to finance their education. The fact that emphasizing the insurance aspects of an ISA leads to a roughly fifty percent increase in hypothetical take-up underscores how important messaging is for both ISA providers and the Department of Education.

Our study clearly shows that providing more details about the nuances of financial contracts, and how repayments would be affected by employment and financial circumstances, enables students to make more informed choices about their financing decisions. The defining feature of the ISA is its proportional payment structure with insurance components. Specifically, the ISA contract requires repayments proportional to income while providing contingencies in periods of low income; and it caps the maximum amount to repayment. Students do perceive downside income protection risk as a insurance while also creating an income smoothing effect. Our study shows that information about these features has a strong effect on student preference.

Second, uncertainty about future income contributes to adverse selection in the ISA insurance market. We find some evidence that take-up of ISAs is related to uncertainty about future income. While current income and future unemployment status are not related to take-up, income uncertainty matters. Other risks, with the exception of college completion risks, do not seem to predict ISA take-up.

Third, contract choice may depend on familiarity with existing financial contracts: A significant barrier that ISA providers (or any alternative form of financing higher education) is that the student loan system is well-known, even if not well-liked, by many students. Indeed, our survey finds that students currently financing their education with government federal student loans are significantly less likely to prefer ISAs. Given the pervasiveness of participation in the federal student loan market, this descriptive result illustrates the uphill climb that any potential competitor to the student loan model faces. This is especially true given the the recent expansion of lenient repayment terms via IDR and the continuing possibility of loan forgiveness being expanded to more federal student loan borrowers. Indeed, the University largely abandoned their potential ISA plan shortly after Biden administration's lowering of mandatory monthly payments.

Finally, there are indications that students prefer different financial contracts when they are presented with different versions of monthly payments and contract lengths. Specifically, students who chose the federal student loan/IDR changed their preference to ISA when they were given a longer contract with a lower income share percentage. In contrast, students who chose the original ISA contract preferred a shorter term contract with larger monthly payments. Conventional wisdom suggests that borrowers are averse to the long-time horizon for forgiveness offered by previous IDR plans. This proposition is one of the justifications both for the system-wide student loan forgiveness and also the recent redesign of IDR. Our results cast some doubt on this assertion, as we find that hypothetical borrowers prefer lower payments stretched out over a longer time horizon. This result is likely more useful for the design of future government repayment programs than for ISAs, as the government is in a unique position to be able to forego repayment over a long period of time.

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7 Tables

Table 1: Summary Statistics and Balance

	(1)	(2)	(3)	(4)
	N (overall)	Overall mean (std. dev)	Control mean (std. dev)	Treatment dummy
Current income	2776	70235.951	69244.060	1985.211
		(37762.513)	(37023.692)	(1433.248)
Employed	2315	0.834	0.839	-0.011
		(0.372)	(0.367)	(0.014)
Future income uncertainty	103	0.040	0.040	-0.002
		(0.195)	(0.197)	(0.008)
Future employment uncertainty	350	0.128	0.125	0.006
		(0.334)	(0.331)	(0.013)
Risk aversion	2776	3.854	3.848	0.012
		(1.095)	(1.108)	(0.042)
Current financing choice				
Cash (self and from family and friends)	1416	0.510	0.500	0.021
		(0.500)	(0.500)	(0.019)
Institutional and federal/state grants	916	0.330	0.328	0.003
		(0.470)	(0.470)	(0.018)
Government and private student loans	1205	0.434	0.437	-0.006
		(0.496)	(0.496)	(0.019)
Other	777	0.280	0.275	0.010
		(0.449)	(0.447)	(0.017)
Barriers to graduation				
Housing insecurity	210	0.076	0.080	-0.009
		(0.264)	(0.271)	(0.010)
Difficulty doing college-level work	266	0.096	0.091	0.010
		(0.294)	(0.287)	(0.011)
Work responsibilities	2193	0.790	0.790	-0.001
		(0.407)	(0.407)	(0.015)
Family constraints	1595	0.575	0.581	-0.013
		(0.494)	(0.494)	(0.019)
Disability or health concerns (physical or mental)	576	0.207	0.201	0.013
		(0.406)	(0.401)	(0.015)
Financial constraints	1124	0.405	0.400	0.011
		(0.491)	(0.490)	(0.019)
Internet connectivity issues	257	0.093	0.088	0.009
		(0.290)	(0.283)	(0.011)
Issues with academic support services	260	0.094	0.102	-0.016
		(0.291)	(0.302)	(0.011)
Difficulty being a transfer student	59	0.021	0.024	-0.005
		(0.144)	(0.152)	(0.005)
Other	123	0.044	0.045	-0.001
		(0.206)	(0.207)	(0.008)
Age	0	37.778	37.917	-0.278
		(9.188)	(9.237)	(0.349)
Female	1970	0.710	0.715	-0.011
		(0.454)	(0.452)	(0.017)
Race/Ethnicity				
African-American	196	0.071	0.069	0.003
		(0.256)	(0.254)	(0.010)
Hispanic	417	0.150	0.143	0.014
		(0.357)	(0.350)	(0.014)
Asian	200	0.072	0.068	0.007
		(0.259)	(0.253)	(0.010)
Other race/ethnicity	1666	0.600	0.614	-0.028
		(0.490)	(0.487)	(0.019)

No ethnicity reported	297	0.107	0.105	0.004
		(0.309)	(0.307)	(0.012)
Married	1399	0.504	0.511	-0.014
		(0.500)	(0.500)	(0.019)
Household size	778	2.932	2.952	-0.042
		(1.783)	(1.717)	(0.068)
Highest degree earned				
High school degree or less	409	0.147	0.138	0.020
		(0.355)	(0.345)	(0.013)
Some college degree	2313	0.833	0.843	-0.020
		(0.373)	(0.364)	(0.014)
Graduate degree	46	0.017	0.017	-0.001
		(0.128)	(0.130)	(0.005)

Notes. The minimum age is 19 whereas the maximum is 71. The minimum and maximum values for the household size are 1 and 15, respectively. A continuous current income variable is created from a 12-category categorical variable (less than $20,000, $20,000 - $29,999, ..., $110,000 - $119,999, $120,000 or more) where the middle point of each category is assigned to students who chose that category as their current income value. The minimum current income is $10000 whereas the maximum is $150,000.

Future income and employment uncertainty are defined as dummy variables taking value of 1 if one is very uncertain of their future prospects (See Section 5.2 for details) and 0 otherwise.

Table 2: Determinants of ISA Take-up

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treatment	0.099***	0.099***	0.104***	0.105***	0.103***	0.102***	0.102***
	(0.017)	(0.017)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Current income		-0.007	0.001	0.001	0.001	-0.001	-0.003
		(0.014)	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)
Employed		0.020	0.023	0.022	0.027	0.026	0.033
		(0.031)	(0.032)	(0.032)	(0.032)	(0.032)	(0.033)
Future income uncertainty			0.090*	0.090*	0.082*	0.077	0.073
			(0.049)	(0.049)	(0.049)	(0.049)	(0.049)
Future employment uncertainty			0.016	0.015	0.012	0.010	0.015
			(0.028)	(0.028)	(0.028)	(0.028)	(0.028)
Risk aversion				-0.003	-0.001	-0.001	-0.000
				(0.008)	(0.008)	(0.008)	(0.008)
Current financing choice							
Cash (self and from family and friends)					0.017	0.015	0.015
					(0.021)	(0.021)	(0.021)
Institutional and federal/state grants					0.030	0.029	0.033
					(0.020)	(0.020)	(0.021)
Government and private student loans					-0.069***	-0.071***	-0.073***
					(0.022)	(0.022)	(0.022)
Other					0.011	0.009	0.008
					(0.021)	(0.021)	(0.021)
Barriers to graduation							
Housing security and other financial risks						-0.015	-0.009
						(0.016)	(0.016)
College-related risks						0.031*	0.030*
						(0.016)	(0.016)
Family and health risks						0.014	0.013
						(0.016)	(0.016)
Current work responsibilities and other risks						0.040*	0.037
						(0.024)	(0.025)
Race/Ethnicity							
African-American							-0.095**
							(0.043)
Hispanic							-0.000
							(0.038)
Asian							-0.011
							(0.046)
Other race/ethnicity							-0.041
							(0.032)
Married							0.034*
							(0.020)
Control Mean	0.230	0.230	0.230	0.230	0.230	0.230	0.230
Control Std	0.421	0.421	0.421	0.421	0.421	0.421	0.421
Total number of observations	2776	2776	2599	2599	2599	2599	2594
Adjusted R-Squared	0.012	0.011	0.013	0.013	0.019	0.021	0.022

Notes. The regression model also controls for (not reported) age, gender, household size, highest degree earned, career expectations, and financial stability. We also use log-transformation for current income. Please see Appendix X for the full specification.

Future income and employment uncertainty are defined as dummy variables taking value of 1 if one is very uncertain of their future prospects (See Appendix A for details) and 0 otherwise.

Barriers to graduation - originally 10 variables - are reduced to 4 main categories by maximum likelihood factor analysis. We report the coefficients for the set of standardized factor estimates. College-related risks include difficulty doing college work, being a transfer student and the lack of support from advisor/academic support services.

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Treatment Effect on Hypothetical ISA Take-Up - by Race

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Treatment	0.092*	0.094**	0.106**	0.107**	0.111**	0.112**	0.110**
	(0.048)	(0.048)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)
White	0.026	0.022	0.015	0.015	0.023	0.028	0.079*
	(0.036)	(0.036)	(0.037)	(0.037)	(0.037)	(0.037)	(0.045)
Black or African American	-0.020	-0.019	-0.065	-0.064	-0.063	-0.060	0.003
	(0.051)	(0.052)	(0.051)	(0.051)	(0.051)	(0.051)	(0.057)
Hispanic	0.014	0.010	0.011	0.011	0.016	0.019	0.076
	(0.044)	(0.044)	(0.046)	(0.046)	(0.045)	(0.045)	(0.051)
No response	0.066	0.065	0.062	0.062	0.061	0.068	0.144**
	(0.049)	(0.049)	(0.051)	(0.051)	(0.051)	(0.051)	(0.058)
Treatment × White	0.001	-0.002	-0.007	-0.008	-0.016	-0.018	-0.017
	(0.053)	(0.053)	(0.056)	(0.056)	(0.056)	(0.056)	(0.056)
Treatment × Black or African American	0.040	0.035	0.024	0.023	0.022	0.019	0.015
	(0.078)	(0.078)	(0.079)	(0.079)	(0.079)	(0.080)	(0.080)
Treatment × Hispanic	0.049	0.048	0.060	0.059	0.053	0.052	0.058
	(0.065)	(0.065)	(0.069)	(0.069)	(0.069)	(0.069)	(0.069)
Treatment × No response	-0.035	-0.040	-0.073	-0.074	-0.076	-0.077	-0.073
	(0.072)	(0.072)	(0.074)	(0.075)	(0.075)	(0.075)	(0.075)
N	2776	2776	2599	2599	2599	2599	2594

Out of 2,776 respondents, 1,537 are White, 196 are Black or African American, 417 are Hispanic, 329 identify with other race/ethnicities whereas 297 declined to answer. Other race/ethnicities include Asian (200), American Indian or Alaska Native (29), Native Hawaiian or Other Pacific Island (22) and mixed race (78).

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Treatment Effect on Hypothetical ISA Take-Up - by Gender

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Treatment	0.102***	0.101***	0.098***	0.099***	0.100***	0.102***	0.100***
	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)	(0.033)
Female	-0.011	-0.016	-0.014	-0.013	-0.001	-0.002	-0.004
	(0.025)	(0.028)	(0.028)	(0.029)	(0.029)	(0.029)	(0.030)
Treatment $\times$ Female	-0.004	-0.002	0.008	0.008	0.004	0.001	0.002
	(0.038)	(0.038)	(0.039)	(0.039)	(0.038)	(0.039)	(0.039)
N	2776	2776	2599	2599	2599	2599	2594

Out of 2,776 respondents, 1,970 are female.

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Treatment Effect on Hypothetical ISA Take-Up - by Household Size

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Treatment	0.100***	0.100***	0.109***	0.109***	0.111***	0.111***	0.107***
	(0.033)	(0.033)	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)
Household size	0.004	0.004	0.003	0.003	0.005	0.003	0.001
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Treatment × Household size	-0.000	-0.000	-0.002	-0.002	-0.002	-0.003	-0.002
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
N	2776	2776	2599	2599	2599	2599	2594

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Treatment Effect on Hypothetical ISA Take-Up - by Age (Median Split)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Treatment	0.114***	0.114***	0.118***	0.118***	0.116***	0.114***	0.112***
	(0.024)	(0.024)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Below median age	0.031	0.031	0.024	0.023	0.016	0.016	0.026
	(0.023)	(0.023)	(0.023)	(0.023)	(0.024)	(0.024)	(0.034)
Treatment × Below median age	-0.031	-0.031	-0.027	-0.027	-0.025	-0.024	-0.021
	(0.034)	(0.034)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
N	2776	2776	2599	2599	2599	2599	2594

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Treatment Effect on Hypothetical ISA Take-Up - by Marital Status

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Treatment	0.093***	0.094***	0.099***	0.100***	0.099***	0.096***	0.091***
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.025)	(0.025)
Married	0.029	0.031	0.033	0.033	0.035	0.033	0.024
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.025)
Treatment × Married	0.013	0.011	0.011	0.011	0.010	0.015	0.021
	(0.034)	(0.034)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
N	2776	2776	2599	2599	2599	2599	2594

Out of 2,776 respondents, 1,399 are married.

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Treatment Effect on Hypothetical ISA Take-Up - by Risk Aversion

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Treatment	0.058	0.059	0.042	0.042	0.031	0.033	0.029
	(0.062)	(0.062)	(0.064)	(0.064)	(0.064)	(0.064)	(0.064)
Risk aversion	-0.012	-0.010	-0.011	-0.011	-0.010	-0.010	-0.009
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Treatment × Risk aversion	0.011	0.010	0.016	0.016	0.019	0.018	0.019
	(0.015)	(0.015)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
N	2776	2776	2599	2599	2599	2599	2594

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Heterogeneous Treatment Effect on Hypothetical ISA Take-Up

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	White × Treated	Black or African-American × Treated	Hispanic × Treated	No response for race/ethnicity × Treated	Female × Treated	Household Size × Treated	Below Median Age × Treated	Married × Treated	Risk Aversion × Treated
ISA take-up	-0.017	0.015	0.058	-0.073	0.002	-0.002	-0.021	0.021	0.019
	(0.056)	(0.080)	(0.069)	(0.075)	(0.039)	(0.010)	(0.035)	(0.035)	(0.016)
Sample composition	55.37% White	7.06% African-American	15.02% Hispanic	10.70% No response	70.97% Female	—	50% below-median age	50.40% married	—

All estimates are based on our preferred model, Model 7.

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 10: The Likelihood of Switching from Student Loan to ISA with Longer Term - ISA (2.2% share for 12 years)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Treatment	0.057***	0.060***	0.051***	0.051***	0.051***	0.051***	0.051***
	(0.017)	(0.017)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
N	2001	2001	1878	1878	1878	1878	1874

Our sample is the 2,001 people who originally chose student loan over ISA.

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11: The Likelihood of Switching from Student Loan to ISA with Shorter Term - ISA (2.8% share for 7 years)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Treatment	-0.017	-0.019	-0.015	-0.015	-0.017	-0.017	-0.013
	(0.019)	(0.019)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
N	1636	1636	1543	1543	1543	1543	1539

Our sample is the 1,636 people who originally chose student loan over ISA and haven't switched to ISA when first offered ISA with the option of 2.2% share for 12 years.

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

8 Figures

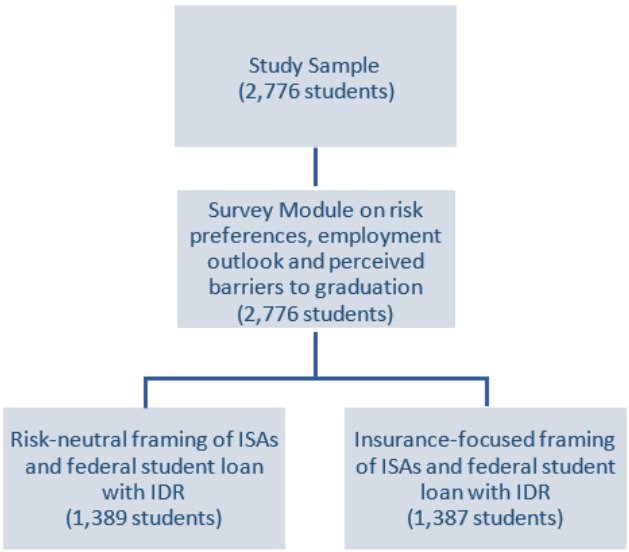


Figure 1: Experimental Setting

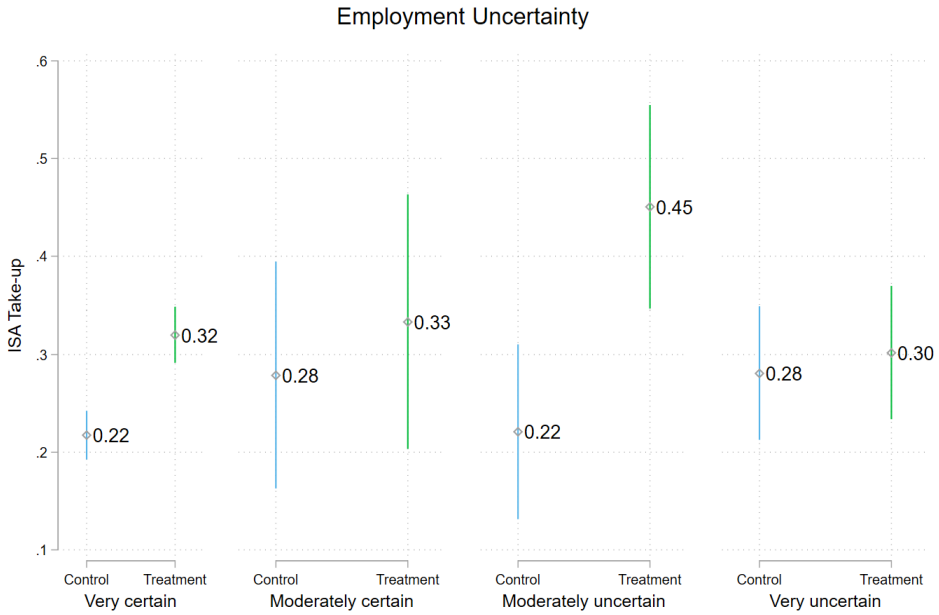


Figure 2: Distribution of ISA Take-up by Treatment given Employment Uncertainty

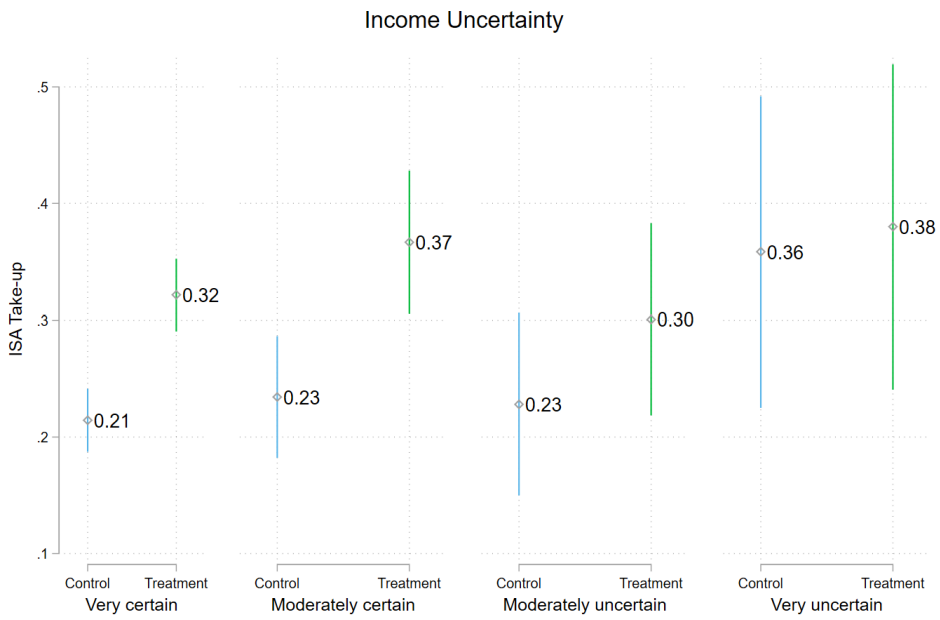
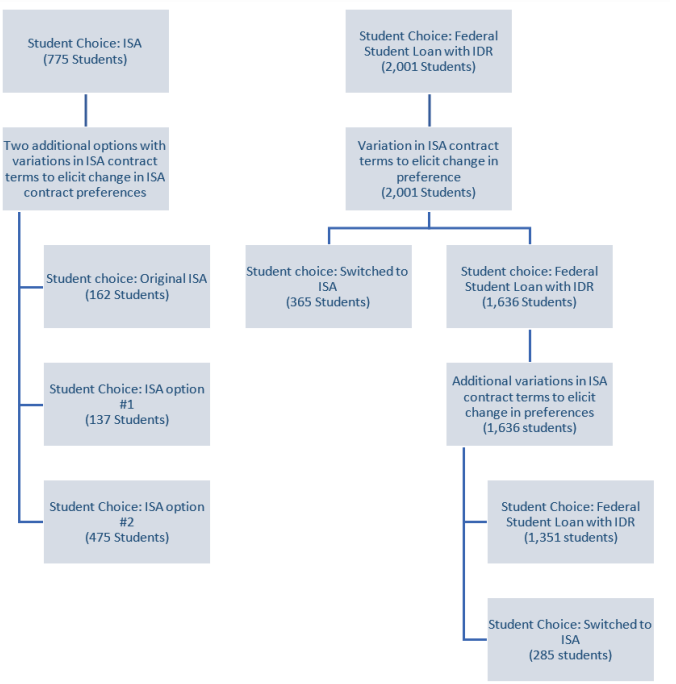


Figure 3: Distribution of ISA Take-up by Treatment given Income Uncertainty



Notes: Students who chose a student loan against the original ISA contract (2.3% share for 10 years) in either of the treatment arms were presented with another ISA contract where they would pay smaller installments over a longer period (ISA option #1: 2.2% share for 12 years). Those who still chose the student loan option over the new ISA contract were then given the option to choose between the same student loan and an ISA contract where they would pay larger installments over a shorter period (ISA option #2: 2.8% share for 7 years). Similarly, the students who chose the original ISA contract against the student loan were also presented with the two other ISA options with different pricing and payment terms described above.

Figure 4: Variations in Framing

Appendix A

Definition of future employment and income expectations

For employment certainty/uncertainty, we use the following convention to categorize respondents:[8]

- Category 1 (Very Certain): People who answered "Likely" to be fully employed and "Unlikely" to be unemployed
- Category 2 (Moderately Certain): People who answered “Unlikely” to be unemployed and “Likely” or “Neither likely nor unlikely” to be employed part-time
- Category 3 (Moderately Uncertain): People who answered “Neither likely nor unlikely” to be unemployed
- Category 4 (Very Uncertain): People who answered “Likely” to be unemployed

In a similar manner, the degree of certainty over future income is categorized as follows:

- Category 1 (Very Certain): People who answered “Likely” to earn more than US$75,000 and “Unlikely” to earn less than US$35,000
- Category 2 (Moderately Certain): People who answered "Unlikely" to earn less than US$35,000 and “Likely” or “Neither likely nor unlikely” to earn between US$55,001 and US$75,000
- Category 3 (Moderately Uncertain): People who answered "Likely" to earn between US$35,001 and US$55,000
- Category 4 (Very Uncertain): People who answered “Likely” or “Neither likely nor unlikely” to earn less than US$35,000

[8] It is, of course, possible to create more categories given the high level of granularity of the data. The categories here are decided in a manner that the certainty monotonically goes from higher to lower and that there are enough observations to make a meaningful inference in each category.

Appendix B

Tables

Table A1: The Likelihood of Switching from the original ISA (2.3% share for 10 years) to ISA with Longer Term - ISA (2.2% share for 12 years)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Treatment	-0.035	-0.032	-0.022	-0.025	-0.023	-0.022	-0.032
	(0.028)	(0.028)	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)
N	775	775	721	721	721	721	720

Our sample is the 775 people who originally chose ISA over student loan.

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A2: The Likelihood of Switching from the original ISA (2.3% share for 10 years) to ISA with Shorter Term - ISA (2.8% share for 7 years)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Treatment	0.088**	0.086**	0.084**	0.086**	0.085**	0.083**	0.086**
	(0.036)	(0.036)	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)
N	775	775	721	721	721	721	720

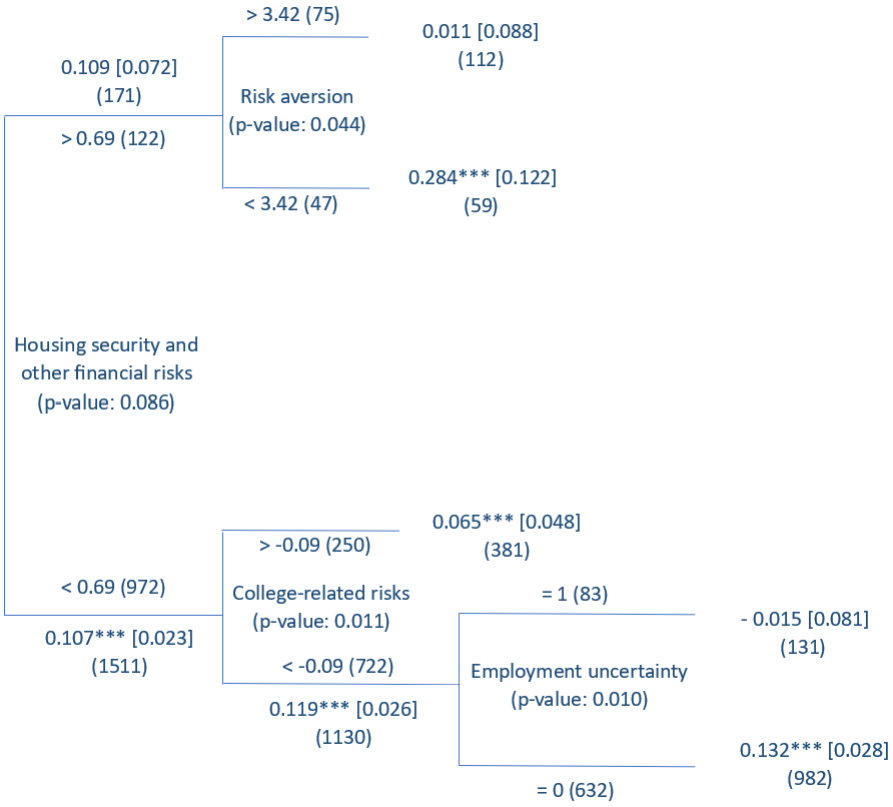
Our sample is the 775 people who originally chose ISA over student loan.

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Appendix C

Figures



Notes: We use the Coefficient of Relative Risk Aversion (CRRA), a measure for risk preferences following a similar method as Kimball, Sahm, and Shapiro (2008). The indices for housing security and other financial risks and college-related risks are created via factor analysis based on students' answers to survey questions on barriers to graduation. The partition, and hence the p-values, that determines the subsamples where treatment heterogeneity exists are based on the training data. The numbers in parentheses at the leaves indicate how many data points in the training data belong to each leaf. All treatment effects are estimated using the estimation data for each subsample with the standard errors shown in brackets and sample size in parentheses.

Figure A1: Athey and Imbens (2016) regression tree

Appendix D

	Option 1: Student Loan with IDR	Option 2: ISA
Group #1 (Treatment group) & Group #2 (Control group)	*Repayment Terms:* You borrow $10,000 in student loans and pay back the money you owe in equal monthly payments of $106 over the next 10 years. Your payments cover both the interest (calculated at 5% per year) and the amount you borrowed. *Lender Type:* You borrow from the federal government.	*Repayment Terms:* You take $10,000 in an Income Share Agreement and commit to paying 2.3% of your monthly pretax personal income for 10 years. Your monthly payment rises and falls with your income. If your total payments reach $20,000 (2x the original funding amount), your obligation ends earlier than 10 years. *Lender Type:* You borrow from a bank on your university's preferred lender list.

(a) Same Repayment Terms and Lender Types Provided to both Treatment and Control Groups

	Option 1: Student Loan with IDR	Option 2: ISA
Group #1 (Treatment group)	*Borrower Protections:* In years in which your income is low, you can apply for and enroll in an income-driven payment plan that caps your monthly payments at 10% of your monthly income over $1,600. ***Because your payments are lower than under the standard plan, you may be paying longer than 10 years, up to 20 years. As long as you make your payments on time, any unpaid balance remaining after 20 years of payments is forgiven; your obligation is satisfied.***	*Borrower Protections:* If your income is at or below $3,000 in a month, you will make no monthly payment. Each monthly payment you skip, your term will extend by a month, but only up to 13 years. ***After at most 13 years, your obligation expires regardless of what you could pay. You will never pay more than $20,000 (2x the original funding amount).***
Group #2 (Control group)	*Borrower Protections:* In years in which your income is low, you can apply for and enroll in an income-driven payment plan that caps your monthly payments at 10% of your monthly income over $1,600.	*Borrower Protections:* If your income is at or below $3,000 in a month, you will make no monthly payment. Each monthly payment you skip, your term will extend by a month, but only up to 13 years.

(b) Different Framings of Borrower Protections between Treatment and Control Groups

Details of Hypothetical Financing Options in the Survey