# Effects of the Menu of Loan Contracts on Borrower Behavior*

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**Abstract**

We study how the menu of contracts presented to a decision maker – including contracts she may be precluded from choosing – affects her choice of remunerative but risky actions relative to lower paying, less risky alternatives. We do this through a series of lab experiments modeled after the loan repayment options offered to U.S. student borrowers, analyzing borrowers' task (career) choices in settings that vary the menu of available and unavailable loan repayment plans and knowledge of unavailable options. In these experiments, we observe behavior that is inconsistent with predictions from standard economic models in which agents can easily make complex decisions and each alternative in a choice set is evaluated independently of other potential options. Instead, we provide evidence that expanding the menu of choices or making an agent aware of choices that she has been denied can affect how a contract is valued. Our empirical findings are most consistent with behavioral models that allow for anticipated regret over a choice that turns out to be suboptimal *ex post* or preferences for simplicity and gratitude for being unburdened from having to make a choice.

*Keywords:* contract choice, task choice, reference dependence, designing menu of contracts

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# 1 Introduction

According to standard economic theory, agents should prefer a larger set of options when choosing from a menu. This result assumes that, if presented with additional options, agents are easily able to identify the best available choice and that having additional choices can never make the agent worse off. In reality, however, agents may find it hard to choose among competing options or the availability of alternatives may reduce the value of an existing option. In this paper, we present results from a series of lab experiments that allow us to study agents' valuation of contracts presented on different types of menus. Our analysis focuses on the following questions: (i) Can an agent receive additional value from a contract when it is the only option rather than being one of multiple offered options? (ii) If the agent values a contract more when it is part of a smaller menu, does making her aware that she has been offered a smaller menu of options than her peers affect her evaluation of the contract? (iii) How does the content of the menu of contracts affect the agent's choice over actions that vary in risk and expected returns?

To make our analysis more concrete, we explore how a menu of contracts may affect an agent's valuation of alternative contracts and decisions about their activities in an environment inspired by the current debate over the design of student loan repayment plans in the United States. Outstanding student loan debt has grown considerably in recent years (Federal Reserve Bank of New York, 2020) and a significant share of borrowers default on their student loans (U.S. Department of Education, 2020a,b). Income-driven repayment plans have been introduced and promoted in response to concerns that the traditional mortgage-style payment plan aligns poorly with borrowers' post-college earnings profiles (Dynarski and Kreisman, 2013).

We present findings from lab experiments in which agents are offered a menu of contracts with choices designed to capture the key features of the options currently offered to U.S. student borrowers. Existing student loan repayment options include contracts in which borrowers must pay a mortgage-style fixed repayment (FR) amount each period over a set term and income-driven repayment (IDR) contracts that link repayments to realized earnings, with no payment required when earnings are low. Relative to the FR option, IDR reduces the risk of default due to poor labor market outcomes but potentially increases the length of repayment and total amount paid. In our

setup, agents choose both a loan repayment contract and an income generating task that varies in risk to fulfill the contract requirements. We find that offering an IDR contract alone, rather than together with the option of an FR plan, makes a riskier but higher paying task more attractive to agents who would have chosen IDR irrespective of the availability of the alternative option. This implies that, in our setup, agents value IDR more when it is offered on a smaller menu. This effect is amplified when the fact that the offered menu of loan repayment options has been restricted is made more salient.

Since a borrower's utility from choosing a repayment plan is not observable, we cannot directly measure how the menu of options affects her utility. Instead, we infer the presence of menu-dependent shifts in the evaluation of different repayment plans from borrowers' choices over income generating tasks that offer differing risks and rewards.[1] Since IDR provides insurance against default in periods when low income would make payments under FR unaffordable, it also lowers the risk of pursuing more rewarding career paths that have a higher risk of income fluctuation. We focus on the question of whether the menu of plans offered in addition to IDR affects career choice. Specifically, we consider borrowers' choice of career in three settings: (i) when both IDR and FR plans are available to all borrowers, (ii) when all borrowers must participate in IDR and are unaware of FR as an option that could have been offered; and (iii) when some borrowers can choose between IDR and FR while others have no choice and must participate in IDR. Our results indicate that borrowers are most likely to choose risky but more rewarding income generating paths in settings in which they are aware that their choice of repayment plans is restricted to IDR and least likely to choose those paths when they are allowed to choose between IDR and FR.

The three repayment regimes we study are policy relevant. The first is a simplified version of the menu of options currently offered to U.S. student borrowers. Many countries have transitioned to the second regime – universal IDR – over the past three decades, and recently proposed legislation would place all new U.S. borrowers into IDR as well.[2] The third regime can be thought of as representing the transition period between the first and second regimes, since as when FR plans

[1] A handful of previous studies provide evidence that student loan debt affects borrowers' career choices (Field, 2009; Rothstein and Rouse, 2011; Weidner, 2016; Gervais and Ziebarth, 2019). Krishnan and Wang (2019) show that the removal of student loans from bankruptcy protection reduced the likelihood of successful entrepreneurship.

[2] Countries that have adopted universal IDR since 1989 include Australia, New Zealand, South Africa, the United Kingdom, Hungary, South Korea, and the Netherlands (Chapman, 2006; Lochner and Monge-Naranjo, 2016). In the U.S. context, the 2013 ExCEL Act and the 2014 Dynamic Repayment Act would have limited new borrowers to IDR.

are eliminated, there will still be some borrowers who had been allowed to choose their plans in the past, while new borrowers will have only the IDR option.

To mimic the characteristics of existing FR and IDR plans in a simplified setting, our experiments involve a two-period environment in which borrowers vary in their probability of success in a difficult (risky but high paying) career. A borrower decides between FR and IDR (when this choice is available) and between a difficult and an easy (safe but low paying) career. The borrower's earnings will depend on her career choice and ability. If the borrower performs her job successfully, she is paid; otherwise, she receives no income. Borrowers who choose the FR plan must make a fixed payment only in the first period (mirroring the shorter horizon of the standard repayment plan), but risk "default" if they do not have sufficient earnings. The easy job pays enough to fulfill the FR repayment obligation, thus, only borrowers who choose the difficult career risk defaulting on their loans. Borrowers who default do not have the opportunity to earn income in the second period. In contrast, under IDR, the borrower pays a percentage of her income in both periods but does not risk default. We set earnings for each career choice and the loan repayment parameters so that borrowers with ability below a threshold – defined with respect to the probability of success in the difficult option – always should choose the easy career, independent of repayment plan options. Further, in our setup, borrowers with sufficiently high ability always should choose the difficult career and FR (if available). We are especially interested in borrowers with intermediate ability. Under the conditions of the experiment, such borrowers should choose the difficult job and IDR.[3] In the absence of behavioral motives, offering only IDR or offering both IDR and FR should lead the same percentage of intermediate-ability borrowers to choose the difficult job. Our findings are at odds with this prediction, suggesting the presence of behavioral motives.

It is well established in the psychology, marketing and behavioral economics literatures that having more options does not always benefit an agent (e.g. Schwartz, 2004). Several theoretical explanations have been offered for why agents might prefer a smaller menu of options. Reference-dependent utility is one such reason for preferring a smaller menu. For a decision maker with reference-dependent utility, an option's relative value may depend on the other choices on the

[3]The exact ability cutoffs that define the three groups (i.e., borrowers who should choose the easy task, borrowers who should choose the difficult task and IDR, and borrowers who should choose the difficult task and FR) will be higher in the presence of risk aversion, but the qualitative predictions should remain the same.

menu. Having more options does not necessarily increase well-being and may in fact lead to lower well-being. This is true in models of regret (Bell, 1982; Loomes and Sugden, 1982) and in models of temptation and self-control (Gul and Pesendorfer, 2001). Anticipated regret may be a particularly powerful source of reference-dependence in utility in the presence of uncertainty. Consider, for example, a person who faces the risk of making a choice that, in the realized state of the world, turns out to be less desirable than an alternative available choice. Restricting such a person's options could have the beneficial effect of reducing anticipated regret. Limitations in an agent's ability to consider all available options is another possible reason. The consideration set model of Lleras et al. (2017), for example, studies agents who may not be able to evaluate all the options they are offered and, as a result, instead optimize only over the subset of the options they consider. If agents are more likely to choose sub-optimally from a larger menu, they may benefit from having their options restricted to reduce the complexity of their decisions. Choosing the optimal loan repayment plan is a complex problem that requires the borrower to take her future earnings prospects into account. IDR may be particularly difficult for borrowers to evaluate given uncertainty over future earnings.[4] We find evidence that subjects value the IDR repayment option more when it is offered alone rather than together with the FR option. As we will discuss later, this finding is consistent with the predictions of both complexity aversion (or preference for simplicity) and regret as influences on decision-making.

In an environment where people are better off when faced with fewer options, we can ask whether a person also would benefit from knowing she was offered a smaller menu. On the one hand, that knowledge could lead an agent to be frustrated that her freedom of choice was restricted. She could view the limitation as unfair or be envious of those who were given greater choice. On the other hand, if the borrower is sophisticated enough to foresee that having a larger set of choices is not necessarily a good thing, she may feel gratitude that she need only consider a smaller menu of options. We address this question by examining a repayment regime that makes the absence of FR for those forced into IDR more salient by allowing some borrowers to choose between FR and IDR, while restricting the remaining borrowers to only IDR. If a borrower feels gratitude for the

[4] A growing body of research on students' borrowing and repayment decisions highlights their complexity and suggests that borrowers are influenced by factors such as debt aversion, framing, self-control issues, and default bias (e.g., Field, 2009; Cadena and Keys, 2013; Cox et al., 2018; Marx and Turner, 2019; Abraham et al., 2020).

elimination of the need to choose a repayment plan, she should evaluate the choice of IDR more highly and, as a result, be more likely to pursue the difficult career than if she were allowed to choose between loan repayment plans. We find empirical support for such behavior. To the best of our knowledge, ours is the first paper in the literature to identify a positive effect resulting from the salient exclusion of a utility-diminishing option. We suggest gratitude for the simplification of a complex problem and gratitude for the elimination of a potentially regret-generating option as possible behavioral motives for the observed behavior.

Although our experiment and discussion are framed within the specific context of student loan repayment and borrowers' career choices, the behavioral concerns we identify likely are applicable to many other settings that require agents to make significant decisions over varying menus of contracts, where such decisions could be affected by the set of options agents see. For example, consider an entrepreneur who is seeking financing for her business. She may be offered the choice between either a standard loan contract, in which she commits to repaying the full loan amount but retains the right to all of the potential upside returns, or an equity contract, in which both downside losses and upside returns are shared with investors. Along with a possible choice between these contracts, the entrepreneur also must consider how much risk to take in growing her business, recognizing that taking greater risks may create the possibility of greater returns. The menu of financing options presented to the entrepreneur, as well as options to which she may not have access, may affect both how she values the different contracts and her willingness to take risks. A second example is that of a buyer seeking financing for a home purchase. Available loans could include both fixed-rate and adjustable-rate mortgages, with the latter offering lower initial payments and a lower expected lifetime cost but greater risk in the form of potentially higher future payments. In addition to potentially choosing between these contracts, the homebuyer also must decide how expensive of a home to purchase and thus how much financing to obtain. The menu of mortgage options offered to the homebuyer, as well mortgage options she learns about but cannot access, may affect both how she values the different options and which house she decides to purchase.

A third relevant example is Unilever's recent introduction of a richer menu of employee compen-

sation options for some employees.[5] While most Unilever employees are offered a single contract —either a fixed payment or a company-determined combination of fixed and bonus payments— a limited number of employees now have the option to choose the weights on the fixed and variable components of their compensation. Offering these options to only some employees may affect how employees in both groups evaluate the different compensation schemes as well as their effort and career path choices. Employer-provided health insurance plans provide a fourth potential application. In many cases, employees can choose between either a high premium/low deductible plan or a low premium/high deductible plan. Health insurance menus may change over time, resulting in variation in available plans across employees. Again, the menu of options on offer may affect employees' valuations of the different plans, as well as their health behaviors and use of health care services.

The remainder of the paper proceeds as follows: Section 2 introduces a career and loan repayment choice problem for borrowers, discusses the predictions of the standard model for the menus of plans in which we are interested, and states how behavioral concerns may challenge those predictions. Section 3 explains the experimental procedures. Section 4 presents the empirical results. Section 5 discusses potential behavioral explanations for our findings and the extent to which they can account for our findings. Section 6 concludes.

## 2 A Choice Problem of Student Borrowers

We lay out the student borrower's choice problem as a finite period model in which individuals choose a loan repayment plan and an income-generating task. Although we motivate our investigation with reference to how the available student loan repayment plans may affect borrowers' behavior, the key insights generated by our setup are applicable to other settings in which agents must choose from a menu of contracts and decide among income-affecting actions with differing associated risk levels.

Assume that there is a risk-neutral agent who has previously taken out a loan; this can be thought of as an education loan. The agent now must choose a task to be performed in the current and

[5] See https://www.ft.com/content/c7da13b2-fb42-11e9-a354-36acbbb0d9b6

following period to earn income that will be used to repay the loan and for consumption. In this environment, the choice of task can be thought of as the choice of a career and we use these two terms interchangeably.[6] There are two types of tasks available to the agent – an Easy task (E) and a Difficult task (D). There is no risk associated with choosing the Easy task; the agent completes this task successfully every time she attempts it. Neither the theory nor the experiments require a risk-free Easy task. We assume it to simplify the theoretical model and eliminate one variable (success rate in the Easy task). Choosing the Difficult task entails risk, as the agent's performance in that task is uncertain, with a success rate denoted by $p \in [0, 1]$. The probability of success at the Difficult task is known to the agent.

Successfully performing the Easy task in a given period pays $L$, while successfully performing the Difficult task pays $H$, where $H > L > 0$. Assume that performance of the tasks is costless to the agent. From the perspective of an omniscient social planner who wishes to allocate agents to tasks to maximize total surplus, in any period, an agent with a success rate of $p$ such that $p \geq \frac{L}{H}$ should choose the Difficult task, and an agent with a success rate of $p$ such that $p < \frac{L}{H}$ should choose the Easy task. In other words, there exists a unique cut-off:

$$p^* = \frac{L}{H}$$

such that the surplus-maximizing choice of any agent with $p \geq p^*$ is the Difficult task.[7]

Both the requirement that agents repay their loans and the menu of available repayment options may shift agents' career choices away from those that would be surplus-maximizing. We consider two repayment plans.[8] The first is the standard mortgage-style Fixed Repayment (FR) plan, which requires the agent to make a fixed payment of $k > 0$ in the first period. If the agent does not earn enough to make this payment, she defaults on the loan and is denied the opportunity to

[6] We study a two-period model, as two periods represent the minimum horizon over which the fixed repayment plan can have a shorter repayment period than the income-driven repayment plan, corresponding to the typical student loan repayment period under FR (10 years) being shorter than that for IDR (up to 25 years).

[7] Under the assumption of risk neutrality, the total surplus depends only on agents' earnings, as the loan repayment is just a transfer from the borrower to the lender. For notational simplicity, we set the discount rate equal to 1. Having two periods does not change the surplus maximizing cutoff for the success rate, $p^* = \frac{L}{H}$ , since $p^2(2H) + 2p(1-p)H \geq 2L$ also implies the same threshold $p^* = L/H$.

[8] Note that, consistent with evidence that recent college graduates are liquidity constrained (e.g., Rothstein and Rouse, 2011), we assume that the agent does not save for the future and cannot borrow against future expected earnings.

earn money in the second period. This feature of the model is an admittedly simplified means of incorporating the idea that defaulting on a loan imposes large financial costs on borrowers. If the agent successfully makes the required payment in the first period, she has fully paid off her loan and keeps all of her second period earnings for consumption. For a borrower who is repaying a loan under the FR plan, choosing the Easy career is the safe option, since $L > k$ and the borrower is certain to earn enough to make her required loan payment.[9] The two-period payoff for choosing the Easy task and the FR plan is shown in equation $(1)$ below.

On the other hand, the agent who repays her loan under the FR plan and attempts the Difficult career is taking a risk. If the agent fails to perform the Difficult task successfully in the first period, she earns nothing in that period, defaults on her loan, and loses the opportunity to earn in the second period. The expected two-period payoff for choosing the Difficult task and FR plan is shown in equation $(2)$.

The second repayment plan we consider is Income Driven Repayment $(\text{IDR})$, which eliminates the risk of default. IDR requires the agent to pay back a set percentage $(\text{denoted by } i)$ of her earnings in each of the two periods in the model.[10] If the agent fails at her chosen task in the first period $(\text{and thus has no earnings})$, she is not required to make a loan payment and is allowed to work and potentially receive earnings in the second period.

To highlight the particular features of students' decisions that are most relevant for the fundamental question of how borrowers would respond to having more versus less choice over repayment options, our description of IDR abstracts from many of the complexities in U.S. borrowers' current choices $(\text{e.g., time and information gathering costs associated with plan choice})$.[11] The IDR features of particular interest are: $(i)$ IDR removes the risk of loan default due to low earnings, $(ii)$

[9] In reality, the risk of unemployment means that new graduates may have no safe career option. The lack of a fully risk-free option is one of the motivations for the introduction of IDR in recent years. IDR also may encourage borrowers to pursue career paths that involve more risk. Since we are interested primarily in the extent to which available loan repayment options affect the choice of career, we have simplified the decision problem for participants in our experiment by making the Easy task risk-free. If both tasks in the experiment involved risk, the IDR option would become more desirable and the threshold probability for being assigned by a social planner to the Difficult task would fall, but the essence of our analysis would continue to hold.

[10] Since the IDR plan is offered to remove the risk of loan default and there is no risk of defaulting when an agent chooses the Easy task, we set $i$ such that a borrower choosing the Easy task will be indifferent between the FR and IDR plans. This assumption is not required for the model's predictions, but making it allows us to focus on the task choice of moderate ability borrowers in an environment that offers varied repayment options.

[11] Appendix A includes detailed descriptions of the repayment options currently available to U.S. student borrowers.

IDR may lower the return to higher-paying jobs by linking payments to earnings, and $(iii)$ IDR commonly results in a longer repayment period than FR. Both the model and the experiment are structured to reflect these features. Borrowers will pay more on average under IDR than under FR, as lower payments early in a borrower's career lead to larger total interest payments over the longer IDR payment term.[12] This can be thought of as the cost of being insured from default under IDR. The simplified IDR plan in our experiment is also similar to a so-called "human capital contract" or "income-share agreement" (which can be thought of as a fixed-length IDR contract), in that borrowers are required to pay a share of their income for a set length of time, regardless of the amount repaid in the initial period.[13] To simplify the design, we do not allow subjects to repay the loan in full early or switch plans between periods.[14] Note that if she fails at the Difficult task in both periods, the agent earns zero and repays zero. The expected two-period payoff from choosing the Difficult and Easy tasks under IDR are shown in equations (3) and (4), respectively.

$$\Pi_{E,FR} = L - k + L = 2L - k \tag{1}$$

$$\Pi_{D,FR}(p) = p^2(2H - k) + p(1-p)(H - k) \tag{2}$$

$$\Pi_{D,IDR}(p) = p^2(2H(1-i)) + 2p(1-p)H(1-i) = 2pH(1-i) \tag{3}$$

$$\Pi_{E,IDR} = 2L(1-i) \tag{4}$$

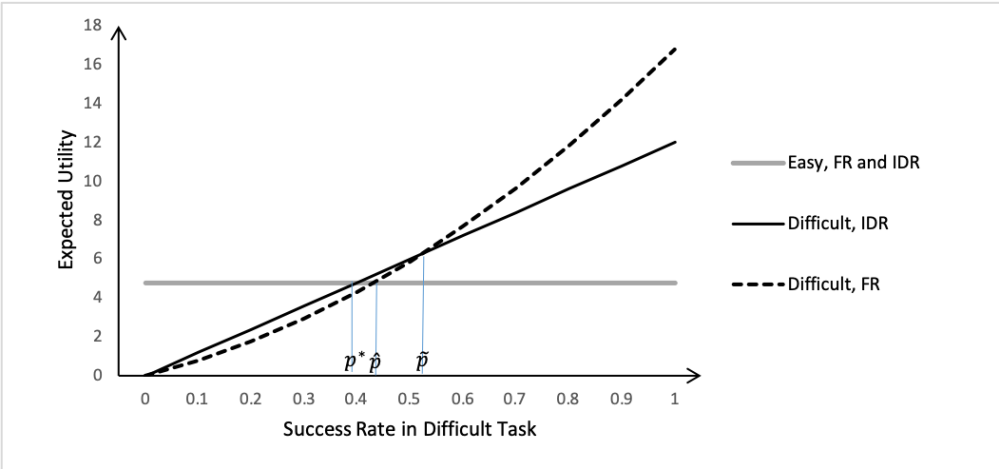
A lender seeking to maximize revenue would like to set a high value of $i$. For lower-ability borrowers who choose the Easy task however, the insurance provided by IDR has no value and thus, it would penalize such borrowers to set $i$ so high that they paid more under IDR than they would

[12]The reason that IDR plans typically lead to a longer period of repayment is that periods of low income lead to lower payments. A borrower who had very high income relative to student debt early in their careers could end up repaying their loan sooner under IDR, and as a result, pay less in total (principal plus interest) than borrowers with the same debt and income path who choose FR, but this is not typical. The logic of our setup is applicable to situations in which borrowers start their careers with lower earnings but, depending on career choice, either experience high earnings growth with some probability (equivalent to the Difficult task) or continue to have low but certain earnings (equivalent to the Easy task).

[13]In recent years, several universities have begun to offer such options as an alternative to federal student loans. See Appendix A for additional details.

[14]In the U.S. federal student loan context, borrowers are allowed to switch between plans, but switching is costly. Extending the model to allow for costly switching would not be theoretically difficult, but incorporating costly switching in the experiments would have required participants to make an additional decision (i.e., whether to switch or not) and to consider more than two periods. Since our main research question is not about rational switching between loan repayment plans, we chose to shut down that channel in our setup.

Figure 1: Expected Utility of Tasks by Loan Repayment Plan




*Notes*: The figure assumes evaluation of the options by an agent who seeks to maximize expected monetary returns. $p^*$ denotes the threshold probability at which an expected payoff maximizer would switch from the Easy task to the Difficult task when IDR is available. $\hat{p}$ denotes the threshold probability at which an expected payoff maximizer would switch from the Easy task to the Difficult one when IDR is not available. $\tilde{p}$ denotes the threshold probability at which an expected payoff maximizer performing the Difficult task would switch from IDR to FR when both plans are available.

have paid under FR. The highest that $i$ can be set without making agents who choose the Easy task worse off under IDR is to set it at the level that makes such agents indifferent between the IDR and FR plans, i.e., to set $i = \frac{k}{2L}$. We set $i$ in this way so that we can focus on the behavior of agents for whom the insurance provided by IDR has value and could affect their choice of task.

## 2.1 Predictions from the Standard Theory

Figure 1 illustrates the predictions of the standard theory and shows the cut-offs in the probability of success at the Difficult task that would be used by agents for making their task and plan choices.

A risk-neutral agent maximizing her expected return will choose the Difficult task when its expected payoff exceeds the payoff for the Easy task. Under IDR, the expected two-period payoff from choosing the Difficult task will equal the payoff from choosing the Easy task at the same threshold probability that the omniscient social planner would use as the surplus-maximizing threshold for assigning borrowers to the Difficult task (i.e., $\Pi_{D,IDR}(p) = \Pi_{E,IDR}$ at $p = p^*$). In other words, under IDR, risk-neutral borrowers will make the same decision about which task to perform that the social planner would have chosen for them.

Under FR, agents are indifferent between the two tasks when $\Pi_{D,FR}(p) = \Pi_{E,FR}$, which occurs

at the threshold probability $\hat{p}$ in Figure 1. This threshold is higher than the surplus maximizing threshold $p^*$, resulting in fewer than the surplus-maximizing number of people choosing the Difficult task. Intuitively, a borrower who defaults on her loan loses the opportunity to earn in the second period, meaning that the risk of default lowers her expected two-period payoff relative to that from choosing the Easy task. This is partially offset by the risk of default also reducing the amount she expects to repay on her loan. On net, however, the risk of default reduces the payoff expected from choosing the Difficult task relative to that from choosing the Easy task.[15]

The switching threshold, $\tilde{p}$, is the probability of success in the Difficult task at which the expected return to the Difficult task under IDR equals the expected return under FR (i.e., $\Pi_{D,IDR}(p) = \Pi_{D,FR}(p)$ at $p = \tilde{p}$). Above this threshold, an agent performing the Difficult task has a higher expected return if she chooses FR. Proposition 1 below summarizes these predictions.

**Proposition 1.** *When both plans are available, an expected return maximizing agent chooses her task and repayment plan as follows:*

$$(Task, Plan)(p) = \begin{cases} (Easy, EitherPlan), & \text{if } p < p^* \\ (Difficult, IDR), & \text{if } p^* \leq p < \tilde{p} \\ (Difficult, FR), & \text{if } \tilde{p} \leq p \end{cases}$$

## 2.2 Possible Menus of Contracts with IDR

At present, U.S. borrowers can choose between IDR and FR when repaying their student loans. Some have suggested that eliminating FR would benefit borrowers. If such a policy were to be enacted, the shift from a richer set of plans to a smaller set due to the elimination of FR would result in a transition period where new borrowers would still know that FR had been an option in the past. For such new borrowers, the elimination of FR would be more salient than for borrowers in a regime when IDR had been the only option for longer time.[16] Thus, we focus on three scenarios representing the status quo (FR and IDR), the longer-run regime with only IDR available, and the

[15] The proof of this statement is part of the proof of Proposition 1 and it is provided in Appendix B.

[16] The fact that the elimination of the FR option is under consideration in the student loan repayment application makes it the more relevant option to consider, but we could symmetrically have studied different ways to introduce a menu with only FR. From a menu-design perspective, this also could be an interesting option to consider.

transition period from a menu with both options to a menu with only IDR:

**Choice (C):** Both the FR and the IDR plans are available and borrowers are free to choose between the two options.

**No Choice (NC):** Borrowers are offered only the IDR plan.

**No Choice with a Reference Group (NCR):** Both the FR and the IDR plans are available to some borrowers, but the agents of interest do not have a choice and are assigned to the IDR plan. The remaining agents are offered a choice between FR and IDR. Members of both groups are aware of the choices (or lack thereof) provided to members of the other group.

Proposition 1 predicts that, under all three scenarios, the threshold probability of success at which the borrower chooses the the Difficult task is determined by the intersection of expected payoffs to the Easy and Difficult tasks under IDR.[17] The existence of the FR plan does not determine this cutoff but only determines which among the agents choosing the Difficult task will select IDR and which will select FR (if available). Hence, as long as IDR is offered to borrowers, the same agents should choose the Difficult task independent of what other plans are presented on the menu of options. In other words, the standard theory predicts no difference in the number and type of agents choosing the Difficult task in settings C, NC, and NCR. Therefore, based on Proposition 1, we have the following hypothesis:

**Hypothesis 1:** The same proportion of borrowers will choose the Difficult task in settings C, NC, and NCR.

### 2.3 Menu Dependent Evaluation of Loan Repayment Plans

For any of several reasons, if borrowers have menu-dependent preferences, they may appreciate an alternative differently in the context of a smaller versus a larger set of options. As examples, a preference for simplicity or the anticipation of regret over choosing an option that later turns out to be sub-optimal could generate utility-diminishing references to other available options.

In the event of a discrepancy between an agent's ex-post payoff and the best payoff associated with

[17] Depending on the agents' attitudes towards risk the exact value of the cutoff may be different from $p^*$. As we discuss in Section 5, however, risk aversion would not lead to any differences across the C, NC, and NCR settings in task choice for moderate-ability borrowers.

a forgone alternative in the realized state, she may suffer from the negative emotion of regret.[18] If the agent is given more options from which to choose, there is more opportunity for her to feel regret over her decisions.

In the environment we have described, there are two potential sources of regret – regret over choice of repayment plan and regret over choice of task. We hypothesize that, even holding the characteristics of an agent's chosen plan constant, having more plans in the market may reduce the agent's expected utility by increasing the likelihood she will regret her choice of plan. Simplifying the agent's decision problem by eliminating some choices could actually raise utility by shutting down potential sources of regret.

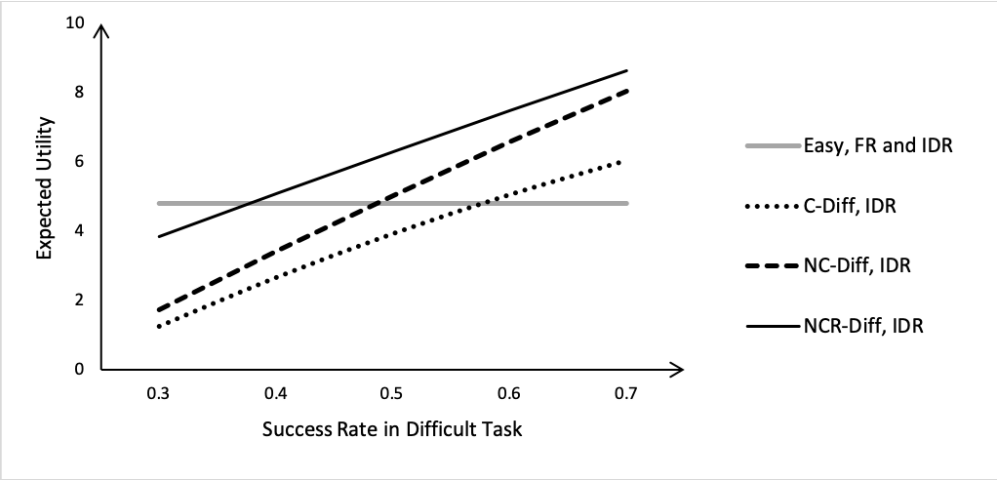
In our context, for an agent who chooses the Difficult task, selecting IDR rather than FR may cause regret if she succeeds at the Difficult task and realizes she did not need the insurance provided by IDR. Referring back to Figure 1, if having FR as a menu choice diminishes the utility of IDR, someone evaluating the Difficult task will place a higher value on IDR in setting NC than in setting C. In this case, we would expect to see a lower threshold probability for switching to the Difficult task in setting NC than in setting C.

If borrowers value IDR more in the absence of FR, making the elimination of FR more salient may further affect their choice of task. For example, if a borrower is sufficiently sophisticated that she can predict the disutility she would experience if offered a larger menu of contracts, she may feel gratitude when she sees a smaller menu. This motivates the NCR setting. Whereas the agents in the NC setting do not know that the FR option might exist, it is obvious to the non-choosing borrowers in the NCR setting that they are being denied that option. If borrowers appreciate being offered a smaller menu, they may evaluate IDR even more highly in NCR than in NC. This would encourage more borrowers to choose the Difficult task and we would expect to see a lower threshold probability for switching to the Difficult task in the NCR setting compared to the NC setting.

These potential outcomes are illustrated in Figure 2. As shown in the figure, if agents experience disutility from a richer menu, the evaluation of IDR will be diminished in setting C relative to

[18] A related possibility is that borrowers rejoice when they realize ex post that they made the right choice. Theoretically, the effects of anticipated rejoicing due to having made the right choice will be the opposite of the effects of anticipated regret due to having made the wrong choice (see, e.g., Loomes and Sugden (1982)). Our analysis thus can be viewed as capturing the net effect of the negative emotion of regret and the positive emotion of rejoicing.

Figure 2: Behavioral Shifts in Expected Utility of Difficult Task under IDR




*Notes*: The figure is based on a decision model that allows for regret and gratitude. Model details are provided in Appendix B; linear regret and gratitude functions with parameters of 0.8 and 0.2, respectively, are used in the figure.

setting NC. The relatively higher preference for choosing IDR with a smaller menu is represented by the higher expected utility curve for NC than for C. Further, if agents receive additional utility when they are made aware of the elimination of the FR option, IDR will be valued more highly in the NCR setting than in the NC setting. The gratitude resulting from making the elimination of FR salient is represented by the utility curve for NCR being the highest in the figure.

Shifts in the evaluation of the Easy task should be minimal in our settings. This is because the repayment levels under FR and IDR are equal for agents choosing the Easy task, so that agents who find it optimal to choose the Easy task should not be affected by the menu of contracts. That idea is illustrated by a fixed horizontal line in Figure 2.

If the changes in the threshold probability for choosing the Difficult task occur as suggested by Figure 2, there are several implications:

- **Task switching cutoffs:** The highest cutoff probability for switching from the Easy to the Difficult task will occur in C and the lowest cutoff will occur in NCR.
- **Percentage of borrowers choosing the Difficult task:** The highest percentage of borrowers choosing the Difficult task will be observed in NCR, and the lowest percentage will be observed in C.

- **Behavior of borrowers with mid-range skills:** In all three cases, borrowers with a very high (very low) rate of success in the Difficult task will choose the Difficult (Easy) task. The treatment effects due to behavioral influences, if present, will occur for borrowers with mid-range success rates.

As discussed in Section 4, all of these predictions are borne out in our experimental data.

Figure 2 is inspired by intuitive behavioral concerns and, as such, is only suggestive. Depending on the nature of borrowers' menu preferences, the shifts in the utility curves could look different. For example, if a borrower seeks to maximize her expected monetary return but dislikes it if her choices are more limited than those available to some of her peers, she could attach the same value to IDR in C and NC but a lower value in NCR. Contrary to our experimental findings, that would imply the same switching cutoff in C and NC, but a higher cutoff in NCR.

In our experiments, we offer subjects the menus of choices implied by the C, NC and NCR environments and observe their behavior. In Section 5, based on the observed differences in subjects' behavior across the three environments, we revisit a number of potentially relevant behavioral theories and discuss which provide predictions that are most consistent with our findings.

## 3 Experiment Setup and Procedures

In the experiment, we set the payment $L$ (for performing the Easy task) equal to \$4 and the payment $H$ (for successfully performing the Difficult task) equal to \$10. The fixed loan repayment amount under the FR plan, $k$, is set at \$3.20. The percentage of pay-back under IDR, $i$, is set at 40%, which implies a payment of \$1.60 per period for an agent performing the Easy task and \$4.00 per period for an agent successfully performing the Difficult task. As was the case in the model presented in the previous section, the agent who chooses the Easy task should be indifferent between FR and IDR. While the total loan payment under IDR for agents performing the Easy task is \$3.20 (equal to the FR payment), the total loan payment for agents performing the Difficult task can be \$0, \$4, or \$8 depending on the outcomes that are realized.[19]

[19] Our parameter selection implies that a borrower who performs the Difficult task under IDR and succeeds in the first period will pay \$0.80 more in the first period than the total required FR payment. In practice, some, but not all, IDR plans cap payments at the FR payment amount, a feature that minimizes switching between plans. To simplify our setup, we do not cap payments and also do not allow borrowers to switch between plans. The same result could have

Up to four different combinations of task and loan repayment plan choices are available to an agent. Plugging the parameter values specified for the experiment into the model from Section 2, the two-period payoff for task $X$ and loan plan $Y$ generates the following expected return, $\Pi_{X,Y}$, for $X \in \{\text{Easy}, \text{Difficult}\}$, $Y \in \{\text{FR}, \text{IDR}\}$, and a success rate of $p$ at the Difficult task:

$$\Pi_{E,FR} = (4 - 3.2) + 4 = 4.8$$
$$\Pi_{D,FR}(p) = p^2(20 - 3.2) + p(1-p)(10 - 3.2) = 10p^2 + 6.8p$$
$$\Pi_{E,IDR} = 4(1 - 0.4) + 4(1 - 0.4) = 4.8$$
$$\Pi_{D,IDR}(p) = p^2[20(1 - 0.4)] + 2p(1-p)[10(1 - 0.4)] = 12p$$

Figure 1 displays the expected payoffs under FR and IDR as a function of the probability of success at the Difficult task. By design, the expected payoff for an agent who chooses the Easy task is the same under FR and IDR. Given the parameter values we have chosen, according to Proposition 1 and as illustrated in Figure 1, there are two critical levels for $p$: $p^* = 0.40$ and $\tilde{p} = 0.52$. Any agent whose probability of success in the Difficult task is between 0.40 and 0.52 earns the highest expected payoff by choosing the Difficult task and IDR. For these agents, the insurance provided by IDR is more valuable than the possibility of making smaller loan payments under FR. Agents whose probability of success in the Difficult task is greater than 0.52 will earn the highest expected payoff by choosing the Difficult task and FR (if available). For these agents, the insurance provided by IDR is not as valuable as making lower loan repayments under FR.

We administered the three treatments described in Section 2—Choice (C), No Choice (NC), and No Choice with a Reference Group (NCR). We are primarily interested in whether the same proportion of subjects in all the treatments choose the Difficult task, i.e., whether the threshold probability for switching from the Easy to the Difficult task is the same in each treatment.

Nineteen sessions were conducted in the Experimental Economics Laboratory at the University of Maryland in 2016. One of the three treatments was administered during each of these sessions –

been obtained by imposing an explicit switching cost of \$4.80 or more.

Treatment C (Choice) (7 sessions), Treatment NC (No Choice) (6 sessions), and Treatment NCR (No Choice with a Reference Group) (6 sessions). A total of 91, 90 and 91 subjects participated in Treatments C, NC, and NCR, respectively.[20] No subject participated in more than one session. Instructions were provided to subjects in the form of printed handouts and also were read aloud to ensure that all participants received the same information.[21] The experiments were programmed and conducted with the software z-Tree (Fischbacher, 2007). Each session lasted approximately one hour and subjects earned $14.50 on average. The characteristics of our experimental subject pool align closely with those of the University of Maryland undergraduate student body in terms of gender, age, SAT results, student loan debt, and financial literacy (see Appendix C for details).

All of our experimental sessions were divided into three parts. Subjects received the instructions for each part of the session at its beginning, so that those engaged in the earlier parts of the experiment did not know what would come later. In Part 1, which was the same for all three treatments, each subject performed 30 Easy tasks and 30 Difficult tasks.[22] Each Easy task consisted of typing a five-letter word that was shown on the subject's screen. Subjects had 20 seconds to type each word and they were paid $0.10 per correctly typed word. Each Difficult task required subjects to answer a question from a sample SAT test. Subjects had one minute to answer the question, and they were paid $0.10 for each question they answered correctly. At this point, subjects did not know exactly how their performance on these tasks would affect their later earnings, but they were told that performing better would have a positive and significant impact on their earnings in the next part of the experiment.

At the end of Part 1, subjects' computer screens showed them how many of the 30 questions of each task they had answered correctly. Figure 3 displays the distribution of the share of Difficult task questions subjects answered correctly. Recall that, in any given period, when $p \geq 0.40$, choosing the Difficult task generates the highest expected earnings. More than 80% of participants were able to answer at least 40% of the Difficult task questions correctly.

The subjects next received the instructions for the second part of the experiment, which varied

[20] One additional subject was recruited for Treatment C, but left in the middle of a session. We exclude this participant from all analyses.

[21] The instructions for the experiment are provided in Appendix D.

[22] The instructions given to subjects referred to these as Type A tasks and Type B tasks rather than as Easy tasks and Difficult tasks.

Figure 3: Distribution of Success Rate in the Difficult Task


according to the treatment for the subject's session. Subjects learned that they had to take out a $2 loan to participate in Part 2 of the experiment, that they would have the opportunity to earn income over two periods, and that this income would be used to repay their loan. They were told how their earnings would be determined in each period depending on whether they chose to perform the Easy task or the Difficult task and also how their loan repayment amount would be determined depending on their loan repayment plan (either chosen by the subject or assigned to them, depending on the treatment). The subjects then were asked to choose the type of task that would determine their earnings and, in the case of Treatment C (and for one subject in each of the Treatment NCR sessions), to choose their loan repayment plan.

The subjects did not perform their chosen type of task again in Part 2. Instead, they were told that, for each earnings period, the computer would randomly choose one of the questions that they had already answered in Part 1 according to their choice of task, and that their performance on the randomly selected question would determine their earnings in the period. For example, suppose that a subject chose to base her earnings on her performance in the Difficult task. In the first earnings period, the computer would select one Difficult question out of the 30 she had answered in Part 1 as the basis for determining her earnings. If the subject had answered that question correctly, she would earn $10 and make her loan payment from those earnings. Assuming the borrower avoided default in the first period, the same procedure would be followed in the second period. At the point when the subject was asked to decide which type of task would be used to determine her earnings, her screen displayed her Part 1 performance so that she knew

the exact probability of success for both the Easy and the Difficult tasks before making her choice. We did not ask subjects to perform their chosen type of task again in Part 2 because we wanted them to be certain about their chances of success. This was intended in part to allow us to rule out the influence of over- and under-confidence biases regarding their own skill level on subjects' decisions.[23]

Our treatments are distinguished by the menu of loan repayment options available in the session. The instructions for Part 2 provided the details of the repayment plans available in each subject's session. In Treatment C, both the FR and the IDR option were described. In Treatment NC, only the IDR option was described. In Treatment NCR, both the FR and the IDR options were described to all subjects and subjects were told that some participants would be allowed to choose between the FR or the IDR plan, while the remainder of the subjects would have no choice and be assigned to the IDR plan. At the time the instructions regarding the plans were given, a subject did not know if she would be a choosing subject or a non-choosing subject. Participants in the NCR sessions were told that the choosing and non-choosing subjects were randomly determined and that all participants had an equal chance of being a choosing subject independent of their Part 1 performances.[24] Since our interest in Treatment NCR lies with the behavior of non-choosing subjects in the presence of choosing subjects, we assigned only one choosing subject in each session; all other participants in each Treatment NCR session were non-choosing subjects and our analysis makes use only of the data for the non-choosers. Once the instructions for Part 2 had been provided, each Treatment NCR subject's screen displayed whether they were allowed to choose their repayment plan. Choosing subjects then decided on their loan repayment plan and all subjects decided on their task type.

A subject's task choice applied to both periods. To ensure that subjects understood the decision about task and plan, subjects were given a quiz that presented them with scenarios and asked them to calculate the earnings, loan payments, and net payoffs associated with those scenarios. A subject could not proceed until they had answered the quiz questions correctly. After the subjects

[23] Earnings for those choosing the Difficult task are based on the given subject's objective probability of success in that task and subjects know this to be the case. Nevertheless, some subjects still may be using some probability weighting function in their evaluations, as in prospect theory. Such deviations from expected utility theory would not affect either the predictions of the model or our behavioral conjectures so long as agents' probability weighting functions are not affected by the treatment to which they are assigned.

[24] This clarification was emphasized to avoid a subject interpreting her assignment to non-choosing as an indication that the experimenter wanted her to receive the insurance provided by IDR, which could have been viewed as an encouragement to choose the Difficult task.

made their task choices and (when allowed) plan choices, the computer reported the subjects' performance on the randomly selected task for period 1, the randomly selected task for period 2, their earnings in each period, and loan repayments according to their loan repayment plan. This concluded Part 2 of the experiment.

In Part 3, we elicited subjects' risk preference using a method devised by Holt and Laury (2002).[25] This was the last incentivized activity of the experiment. After that, the subjects completed a short questionnaire (available in Appendix D) that included questions about gender, age, student debt, the subject's self-assessed willingness to take risk (measured on a scale from 0 for the most unwilling to 10 for the most willing), and SAT and/or ACT scores, together with two questions designed to assess subjects' financial literacy.

## 4 Results

Table 1 reports the average success rates of subjects assigned to the three different treatments on the 30 Difficult tasks completed in Part 1 of the experiment. As intended, in all three treatments, participants' success rates on the Easy task were very high. In each treatment, however, a handful of participants did not succeed at the Easy task 100% of the time. Specifically, 2 out of 91 subjects in Treatment C, 3 out of 90 subjects in Treatment NC, and 3 out of 91 subjects in Treatment NCR made at least one error when completing the Easy task. Recall that the theoretical model in Section 2 assumed that the Easy task was risk-free. This allowed us to focus on the probability of success in the Difficult task as the only factor in the decision problem that varied across subjects. For consistency with the theoretical model, we exclude the 8 subjects who did not perform the Easy task with 100% success from all analyses. Participants who were given a choice over repayment plans in Treatment NCR (6 subjects) are also excluded from Table 1 and the remainder of our analyses, as we are interested only in the behavior of the non-choosing subjects in this treatment. As shown in Table C.1. in Appendix C, these restrictions do not substantially affect the average success rate in the Difficult task either overall or by treatment group.

[25] Appendix D includes a screen shot of the ten binary choice problems that we used for eliciting the risk preferences. In each problem, subjects chose between an Option A and an Option B, with the problems designed so that Option B becomes gradually less risky relative to Option A as one moves from the first to the tenth problem. More risk-averse decision makers should switch to Option B at a later problem in the sequence.

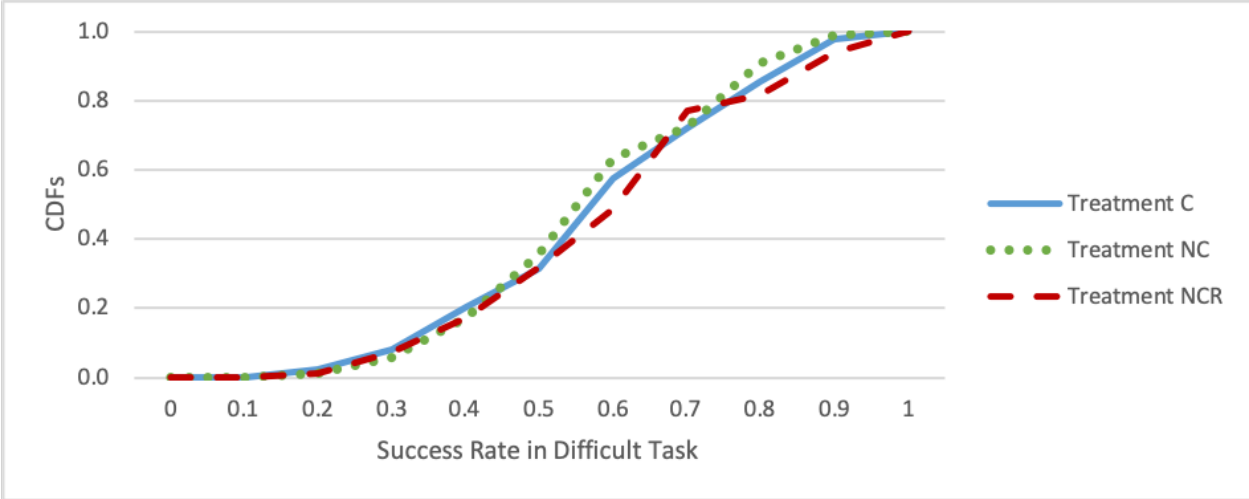
Table 1: Average Success Rate by Task and Treatment

| | Treatment C | Treatment NC | Treatment NCR | All |
|---|---|---|---|---|
| Success Rate in Difficult Task | 0.588 | 0.578 | 0.603 | 0.590 |
| | (0.188) | (0.176) | (0.195) | (0.186) |
| Observations | 89 | 87 | 82 | 258 |

*Notes*: Standard deviations are in parentheses. The sample excludes the 8 subjects with less than 100% success on the Easy task and the 6 choosing subjects in Treatment NCR.

The distributions of participants' success at the Difficult task also do not vary across treatments. Figure 4 shows the cumulative distributions of the Difficult task success probability in each of the three treatments based on the same samples as Table 1. Kolmogorov-Smirnov tests do not reject the hypothesis that the distributions are the same ($p$-values from all pairwise comparisons are greater than 0.5). Hence, we deem our assumption that the subject pools participating in the different treatments did not differ from each other in terms of their ability to perform the Difficult task to be reasonable.

Figure 4: Cumulative Density Functions of the Success Rate in the Difficult Task in Treatments C, NC, and NCR




## Switching from the Easy to the Difficult Task

Hypothesis 1 states that, under the standard theory without any behavioral motives and assuming a common distribution of success rates in the Difficult task across treatments, the share of subjects choosing the Difficult task should be equal across treatments. The actual percentages of the restricted sample of subjects choosing the Difficult task were 58.4%, 68.9%, and 82.9% in Treatments

C, NC, and NCR, respectively, a pattern that rejects Hypothesis 1 ($\chi^2(2) = 12.19, p = 0.002$). These aggregate percentages are reported in the fourth row of Table 2.

We conjecture that the behavioral concerns hinted at by the overall differences across treatments in the share of subjects choosing the Difficult task are driven by changes in the behavior of subjects with mid-range success rates on the Difficult task (as indicated by Figure 2). There are multiple ways to define what constitutes a mid-range success rate. We consider participants to have mid-range skills if their probability of success in the Difficult task falls between 0.25 and 0.75, an interval that includes $p = 0.40$, the success rate at which a subject seeking to maximize her expected payoff should switch to the Difficult task.[26] As can be seen in Table 2, in all treatments, subjects in our experiments with a very low probability of success (at or below 0.25) pick the Easy task 100% of the time and subjects with a very high probability of success (at or above 0.75) pick the Difficult task 100% of the time. All of the differences in behavior across treatments occur among participants with moderate ability. The lowest percentage of subjects of mid-range ability choose the Difficult task under Treatment C (50.7%) and the highest percentage do so under Treatment NCR (81.7%).

Table 2: Percentage of Subjects Choosing Difficult Task, by Treatment and Success Rate

| Success Rate in Difficult Task | Treatment C | Treatment NC | Treatment NCR |
|---|---|---|---|
| $p \leq 0.25$ | 0 % | 0 % | 0 % |
| $0.25 < p < 0.75$ | 50.7 % | 61.9 % | 81.7 % |
| $p \geq 0.75$ | 100 % | 100 % | 100 % |
| All | 58.4 % | 68.9 % | 82.9 % |

*Notes*: The sample excludes the 8 subjects with less than 100% success on the Easy task and the 6 choosing subjects in Treatment NCR. See Section 3 for descriptions of the three treatments. $p$ represents the probability of success at the Difficult task.

Proposition 1 predicts that, absent behavioral motives, there should be a single threshold for the probability of success in the Difficult task across all treatments such that any subject with a success rate above this threshold should choose the Difficult task. Among the subjects with a success rate

[26] The general pattern shown in Table 2 is robust to different choices for the range of $p$ used to classify subjects as having mid-range skills. Table C.2 in Appendix C shows similar results using mid-range skill boundaries of 0.33 and 0.66.

greater than or equal to 0.4, the percentages who chose the Difficult task were 67.6%, 76.7%, and 91.4% in Treatments C, NC, and NCR, respectively. Differences across treatments in the share of subjects choosing the Difficult task could be driven by the differences in the task switching threshold. The fact that the lowest percentage of subjects choose the Difficult task in Treatment C and the highest percentage of subjects do so in Treatment NCR is consistent with the conjecture that the task-switching threshold is lowest in Treatment NCR and highest in Treatment C. The fact that changes are present only among subjects with mid-range skills offers further corroboration for this conjecture.

To further explore the differences across treatments, we estimate the threshold probability for choosing the Difficult task for each treatment. Note that we would expect the perfect step function suggested by Proposition 1 to appear in the data only if all subjects are homogeneous such that they are maximizing an identical utility function; in reality, the threshold dividing those who choose the Difficult task from those who choose the Easy task is likely to be fuzzier. We therefore look instead for the threshold probability of performing the Difficult task successfully such that more than half of agents with any probability above the threshold choose the Difficult task.

We first estimate these thresholds via logistic regressions in which we relate choice of the Difficult task to the probability of performing the Difficult task correctly; results are shown in Table 3. Note that, as predicted by the theory, in all three logistic regressions, the coefficient on success rate is positive and statistically significant. In other words, the likelihood of choosing the Difficult task increases with the success rate. Importantly, these regressions can be used to identify the thresholds. Formally, the logistic function is $\frac{e^{(a+bx)}}{1+e^{(a+bx)}}$, and thus, it takes the value of $\frac{1}{2}$ when $a+bx=0$. In our case, the variable $x$ is the probability of performing the Difficult task correctly, and we are interested in identifying the threshold value of $x$ such that subjects have a 50% probability of taking either action (Cabral et al., 2014). This threshold $x^*$ can be found by setting $x^* = -\frac{a}{b}$, where $a$ is the constant term and $b$ is the coefficient estimated for the variable $x$ (the success rate at the Difficult task) in Table 3 regressions. This methodology yields estimates of the threshold values for the three treatments of $p^C = 0.54$, $p^{NC} = 0.45$, and $p^{NCR} = 0.38$. The implied ranking of the estimated cutoffs for being more likely than not to choose the Difficult task is consistent with the expected utility from choosing IDR being the lowest in Treatment C, higher in Treatment NC

and the highest of all in Treatment NCR, in line with the behavior suggested by Figure 2.

Table 3: Logistic Regressions Relating Choice of Difficult Task to Success Rate in the Difficult Task, by Treatment

| | Treatment C | Treatment NC | Treatment NCR |
|---|---|---|---|
| Success Rate in Difficult Task | $11.90^{***}$ | $9.34^{***}$ | $15.08^{***}$ |
| | (2.510) | (2.181) | (3.904) |
| Constant | $-6.42^{***}$ | $-4.19^{***}$ | $-5.73^{***}$ |
| | (1.434) | (1.180) | (1.727) |
| Observations | 89 | 87 | 82 |
| Log Likelihood | -36.47 | -39.62 | -19.25 |

*Notes*: Success Rate in Difficult Task is the proportion of the 30 Difficult tasks in the first part of the experiment completed successfully by the subject. The sample excludes the 8 subjects with less than 100% success on the Easy task and the 6 choosing subjects in Treatment NCR. Standard errors in parentheses; $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

We also calculate threshold probabilities for choosing the Difficult task using the methodology of Cabral et al. (2014). There are two ways to deviate from the step function – either choosing the Difficult task when the probability of success is below the cutoff or choosing the Easy task when the probability of success is above the cutoff. We identify the minimum number of observations that would need to be eliminated to generate a data set in which the task choice becomes a step function. When we use this cutoff calculation strategy, we estimate $p^C \in [0.57, 0.60]$ by eliminating 15 out of 89 observations; $p^{NC} \in [0.41, 0.43]$ by eliminating 20 out of 87 observations; and $p^{NCR} \in [0.27, 0.33]$ by eliminating 8 out of 82 observations. This approach thus yields the same ranking of the cutoffs across treatments as the previous cutoff calculations based on the logistic regression coefficients. Again, this finding is consistent with the shifts in the expected utility of choosing IDR and the Difficult task illustrated by Figure 2. Assuming that the utility of the Easy task is the same in all three treatments, these results align with an upward shift in the expected utility of IDR in Treatment NC relative to Treatment C and a further upward shift in the expected utility of IDR in Treatment NCR relative to the other two treatments.

In Table 4, we further investigate the robustness of these findings to accounting for the effect of attitudes towards risk and other subject characteristics on task choice. As in Table 3, the dependent variable in these logistic regressions is whether the subject chose the Difficult task. The pooled sample used for Table 4 includes all subjects for whom we have the information on risk attitudes and

other individual characteristics needed to estimate all of the included specifications. The model in column (1) includes only treatment dummies and the success rate in the Difficult Task; controls for subjects' willingness to take risks and other characteristics are added in the later columns. In all of the regressions, consistent with subjects' behavior being rational, the coefficient on the success rate in the Difficult Task is positive and significant. As expected given the results already presented, the model in column (1) implies that, holding constant a subject's probability of completing the Difficult task successfully, those in Treatment C (the omitted treatment group) are least likely, and those in Treatment NCR the most likely to choose the Difficult task.

Our two measures of risk attitudes are introduced in the next three columns —the Holt-Laury Switch measure in column (2), the subject's self-assessment of their willingness to take risk in column (3), and both together in column (4). The point estimates of the coefficients on these variables have the expected sign – negative for the Holt-Laury measure, which has larger values for people who are less willing to take risk, and positive for the self-assessment measure, which has larger values for people who are more willing to take risk – though none are statistically significant in any of the models. More importantly for our purposes, their inclusion has a negligible effect on the estimated treatment dummy coefficients.

Measures of various other subject characteristics are introduced in the next two columns – gender, age in years, and raw SAT score on a 2400 point scale in column (4) and those same variables plus the number of financial literacy questions answered correctly (0, 1 or 2) and whether the subject had any student loan debt in column (5). These characteristics are not significantly correlated with plan choice. Additionally, controlling for subject-level characteristics has no effect on the estimated treatment effects.

Finally, we calculate the share of subjects in each treatment who choose the surplus maximizing task. Recall that, for the parameter values in this experiment, the surplus-maximizing allocation of subjects to tasks occurs when subjects with a success rate in the Difficult task of 0.4 or higher choose the Difficult task and those with lower success rates choose the Easy task. If subjects tend to be risk averse, as suggested by the signs of the estimated coefficients on the risk aversion variables (even though insignificant) in Table 4, we might expect the success probability cutoff for choosing the Difficult task to be higher. The share of subjects choosing the surplus-maximizing task is lowest

Table 4: Logistic Regressions Relating Choice of Difficult Task to Treatment, Success Rate in the Difficult Task, Risk Attitudes and Other Characteristics

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| NC Treatment | 0.948** | 0.941** | 0.964** | 0.956** | 1.005** | 0.981** |
| (yes=1) | (0.477) | (0.480) | (0.482) | (0.485) | (0.499) | (0.500) |
| NCR Treatment | 2.677*** | 2.645*** | 2.698*** | 2.651*** | 2.549*** | 2.567*** |
| (yes=1) | (0.635) | (0.642) | (0.636) | (0.643) | (0.662) | (0.666) |
| Success Rate in Diff. Task | 13.52*** | 13.42*** | 13.82*** | 13.71*** | 13.65*** | 13.89*** |
| | (2.032) | (2.040) | (2.094) | (2.107) | (2.286) | (2.331) |
| Holt-Laury Switch | | -0.186 | | -0.192 | -0.166 | -0.165 |
| | | (0.125) | | (0.125) | (0.131) | (0.130) |
| Willingness to Take Risk | | | 0.130 | 0.138 | 0.140 | 0.134 |
| | | | (0.0918) | (0.0939) | (0.0997) | (0.100) |
| Female (yes=1) | | | | | -0.0854 | -0.143 |
| | | | | | (0.467) | (0.482) |
| Age (years) | | | | | -0.181 | -0.152 |
| | | | | | (0.153) | (0.161) |
| SAT(600-2400) | | | | | 0.0003 | 0.0005 |
| | | | | | (0.0009) | (0.0009) |
| Financial Literacy (0,1, or 2) | | | | | | -0.215 |
| | | | | | | (0.337) |
| Loan (yes=1) | | | | | | 0.0346 |
| | | | | | | (0.437) |
| Constant | -7.622*** | -6.292*** | -8.347*** | -7.001*** | -4.014 | -4.811 |
| | (1.223) | (1.474) | (1.377) | (1.596) | (3.732) | (3.954) |
| Observations | 216 | 216 | 216 | 216 | 216 | 216 |
| Log Likelihood | -74.31 | -73.16 | -73.27 | -72.04 | -71.01 | -71.00 |

*Notes*: The sample excludes 8 subjects with less than 100% success on the Easy task, 6 choosing subjects in Treatment NCR, and 42 subjects who did not provide information on all of the specified control variables. Holt-Laury Switch is an incentivized measure of attitudes toward risk with values from 1 to 10, where a larger index is associated with greater risk aversion. Willingness to take risk is the subject's self-evaluation on a scale from 1 to 10. Financial literacy is the number of financial literacy questions answered correctly (0, 1 or 2); see Appendix D for specific questions. The loan variable measures whether the subject had ever received a student loan while at the University of Maryland. Standard errors in parentheses; *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

in Treatment C (70.8%), higher in Treatment NC (75.9%), and highest in Treatment NCR (87.8%). The deviation from the surplus-maximizing allocation is due mainly to subjects with success rates higher than 0.4 choosing the Easy task. Among subjects with a success rate in the Difficult task greater than 0.4, some 32.4% of those in Treatment C chose the Easy task. That share is smaller in Treatment NC (23.3%) and just 8.6% in Treatment NCR.

## 5 Behavioral Models

Taken as a whole, our findings are strongly inconsistent with the predictions of the standard theory. We turn now to a discussion of behavioral motives that could lead to changes in subjects' choices in response to changes in the menu of loan repayment plans they are offered and contribute to the treatment effects we observe in the data.

**Risk Aversion:**

Recall that Proposition 1 relied on the assumption that agents were risk neutral. Risk aversion is an additional factor that could affect the choice between the Easy and the Difficult tasks. Because performance on the Difficult task is uncertain, we would expect the Difficult task to be less desirable for agents who are more risk-averse. On its own, however, risk aversion should affect the expected utility of the Difficult task under IDR equally in all of the treatments.Although we would expect risk aversion to raise the cutoff probability of success required to induce an agent to switch to the Difficult task relative to that for a non-risk-averse agent, the effect of risk aversion should be the same across treatments. Hence, there is no reason to think that the relative position of the cutoffs for the different treatments should be affected.

As it can be seen in Table 4, the signs of the risk aversion coefficients are in line with the intuition that risk aversion should lower the value of choosing the difficult task, but none of these coefficients is statistically significant. Additionally, when included in the the regressions in Table 4, none of the interactions between the risk aversion variables and the treatment dummies is significant. Thus, the significant pattern of treatment differences we observe, i.e., the significant treatment variables in Table 4, cannot be explained by risk aversion.

**Procedural Fairness and Envy:**

Procedural fairness could be a behavioral concern relevant to our setup. A subject may ask herself whether she was treated fairly under the procedures in place and be envious when she realizes that she was not given the same opportunities that were provided to others.[27] In our setup, all agents in Treatments C and NC were given the same choices, meaning that all participants were treated equally under the procedures in these sessions. Only in Treatment NCR are there differences in how subjects were treated, as some are forced into IDR while knowing that others were given the option to choose FR. In this environment, an agent who chooses the Difficult task and performs it successfully could realize that an agent who completed the same task under FR would have received a higher payoff – an opportunity she was denied. This could lead the agent to envy those who were given the FR option. Such disutility due to the presence of the (choosing) reference group would diminish the utility of the Difficult task under IDR and push the switching cutoff to a higher skill level. Note that, because we picked the parameters to make the expected return to the Easy task the same under IDR and FR, an agent who chooses the Easy task will have no reason to be envious. Thus, an agent who is prone to envying the opportunities made available to others will be less likely to choose the Difficult task in Treatment NCR than in Treatments NC or C. Given that we find the opposite result, our findings do not support the predictions of behavior given procedural fairness concerns.

**Preferences for Flexibility:**

Preferring to choose from a larger rather than a smaller menu should affect only agents who would both choose to perform the Difficult task and choose FR when available. Such agents could be upset about having a smaller menu in Treatment NCR. Because we set the parameters so that an agent performing the Easy task would have the same expected payoff under IDR and FR, subjects choosing the Easy task should not be upset about being denied the FR option. The effect of a preference for flexibility thus should be to shift the expected utility of the Difficult task under IDR downwards, leading to a prediction of a higher threshold for the Difficult task in NCR. This is the opposite of what we observe in the data. Moreover, a model with preferences for flexibility cannot explain the difference in the percentage of subjects choosing the Difficult task between Treatments C and NC, since neither setting has any reference that would cause subjects to perceive

[27] The literature documents that an envious agent may be willing to pay in order to reduce the payoff to others (Zizzo and Oswald, 2001) and anticipation of envy may lead to sub-optimal behavior (Mui, 1995).

their flexibility as being restricted.

**Probability Weighting:**

The participants in our experiments were informed about their objective success rates before making their task choices. One could argue, however, that subjects might still overweight or underweight their probability of failure or success. A subject may underweight the probability of success and not attempt the Difficult task, but such weighting, if present, likely would have equal effects in both Treatment C and Treatment NC. Hence, agents systematically underweighting their probability of success cannot explain the observed differences between these two treatments. It is possible that the non-choosing subjects in Treatment NCR could have received a confidence boost about their likelihood of success and, as a result, chosen the Difficult task more often in this treatment, but the fact they were told their assignment to the non-choosing group had been random leads us to discount this possibility.

**Preference for Simplicity:**

The decision problem in Treatment C requires subjects to choose between four possible combinations of task and loan repayment plans. In contrast, Treatment NC requires only that the subject choose a task. Subjects who do not have to choose a repayment plan may find it easier to evaluate the outcome of their task choice and thus make better decisions.[28] Although it seems plausible that subjects might make more mistakes in the relatively more complex Treatment C environment, it is not clear which way the mistakes would go. In Treatment C, a subject with a relatively high success rate may mistakenly choose the Easy task, or a subject with a relatively low success rate may mistakenly choose the Difficult task. Hence, complexity by itself does not predict whether there will be more or fewer subjects choosing the Difficult task in Treatment C as compared to the other treatments.[29]

Complexity-averse subjects in Treatment NCR may appreciate that their decision problem was simplified. Gratitude for facing a simpler task could produce an upward shift in the utility of

[28] Having to make multiple decisions imposes a significant cognitive load. One strategy suggested for improving decision quality in a multiple-decision situation is to decompose the tasks (e.g., Raiffa, 1968; Armstrong et al., 1975). In a recent study, Ramachandran et al. (2018) show that task separation may not always improve decision quality.

[29] In Treatment C, the most common "mistake" occurred when subjects with relatively high skill levels chose the Easy task. This might be subjects' way of avoiding the plan choice problem in Treatment C, since choosing the Easy task makes the choice of repayment plan irrelevant.

choosing IDR for both the Easy and Difficult tasks. As long as the shift in the utility of choosing the Easy task does not exceed the shift in the utility of the Difficult task, consistent with what we found in the data, we would expect to see more subjects choosing the Difficult task in Treatment NCR than Treatment NC. Thus, aversion to complexity combined with gratitude from knowing a more complex choice was avoided could explain this feature of our findings.

**Regret:**

An agent who commits to a certain loan repayment plan and task choice may compare her realized outcome with the outcomes that her alternative options would have delivered. In the event of a discrepancy between her ex-post payoff and the best payoff associated with a forgone alternative in the realized state, an agent may suffer from the negative emotion of regret.If the agent is given more options from which to choose, there is more opportunity for her to feel regret over her decisions.

In the environment we have described, there are two potential sources of regret – regret over the repayment plan choice and regret over the task choice. Even holding the characteristics of an agent's chosen plan constant, having more plans in the market may reduce the agent's expected utility by increasing the likelihood she will regret her choice of plan. Simplifying the agent's decision problem by eliminating some choices could actually raise utility by shutting down potential sources of regret.

When an agent attempts the Easy task, unless her probability of success in the Difficult task is 100%, she does not know for sure what would have happened had she chosen the Difficult task.[30] Hence, she should not feel regret about not having chosen the Difficult task. If she attempts the Difficult task, however, she is able to compare the realized outcome with all of her possible foregone options because she knows what would have happened for sure if she had chosen the Easy task.

In Treatments NC and NCR, an agent who chooses the Difficult task may regret her choice of task, but she cannot regret her choice of repayment plan, as she has only one plan available to her. Hence, regret alone cannot predict any difference in behavior between Treatments NC and NCR. Under Treatment C, there are two potential sources of regret – regret about task choice and regret about plan choice. An agent who chooses the Difficult task and ends up with high earnings will make

[30] In our subject pool, only 1 out of 272 subjects was 100% successful at the Difficult task.

larger loan payments (and take home less income) under IDR than under FR. Therefore, when the agent chooses IDR, in addition to the potential regret associated with the task choice (which is present in NC and NCR as well), there is also the potential for regret due to not having chosen the FR plan. Therefore, a regretful agent's expected utility from choosing the Difficult task under IDR in Treatment C is lower than in Treatments NC and NCR. That means regret theory would predict the lowest percentage of subjects choosing the Difficult task in Treatment C, which is consistent with our data. We provide a theoretical model of regret in Appendix B.2 and formally state the predictions of regret in our treatments. Regret by itself cannot explain the difference between NC and NCR, however, as the same sources of regret are present in both of those treatments.

**Gratitude:**

Recall that we found the highest percentage of subjects choosing the Difficult task in Treatment NCR. This suggests that, in our particular contract/task choice problem, when it was made salient to subjects that some plans were not available for them to choose, they appreciated being in the non-choosing group. Their appreciation could stem from realizing they had been given a simpler choice problem than the choosing group (as we argued above in our consideration of preferences for simplicity), or from realizing a potential source of regret had been shut down by the elimination of the FR plan. In Appendix B.3, we provide a theoretical model of gratitude that predicts a larger share of subjects should choose the Difficult task in Treatment NCR than in the other two settings.

Among all the aforementioned behavioral motives, our data can be best explained by the presence of regret and/or preferences for simplicity together with the presence of gratitude. The first two motives are consistent with a higher percentage of subjects choosing the Difficult task in Treatment NC than in Treatment C; the third motive predicts that a higher percentage of subjects will choose the Difficult task in Treatment NCR than in Treatment NC.

## 6 Conclusion

We study how varying the menu of contracts presented to an agent as well as the (potentially more limited) menu of contracts in her choice set affects her preferences for more remunerative but riskier tasks relative to lower paying but less risky alternatives. To make our analyses more

concrete, we explore these issues in a context motivated by questions around how the loan repayment options available to U.S. student borrowers may affect their post-college career decisions. The experiments described in the body of the paper generated behavior that is inconsistent with the predictions of standard economic models in which each alternative in a choice set is evaluated independently. We discuss alternative behavioral motives that may play a role in this type of decision problem and consider whether and how these motives might explain the patterns observed in our data that cannot be explained by the standard model. The behavioral models of preference for simplicity and regret together with gratitude are most consistent with our empirical findings.

The idea that having choices may trigger negative reference dependent utility terms is well established in the literature. We add to the existing literature by providing evidence that, in the presence of potential negative emotions generated by facing a menu with a larger number of choices, removing options from a decision maker's choice set can produce positive reference dependent utility terms, reflecting gratitude over not having to make a choice that could lead to negative emotions.

Our findings imply that the set of available contracts in a market should be considered not only from an expected return perspective but also from a behavioral perspective. While it is difficult to measure the welfare consequences of alternative contract designs, the clear behavioral motives we have identified in the lab shed light on the expected changes in welfare associated with different menus. Whereas standard theory would suggest it is always better for an agent to have more choices, our findings add to the reasons to believe that limiting the choice set available to agents may be welfare enhancing.

While we focus on the elimination of the mortgage-style fixed student loan repayment (FR) plan, as that was the most relevant in the context of thinking about student loan repayment, one also could study how the elimination of income-driven repayment – making FR the only available plan – would change borrowers' behavior. Note that similar behavioral concerns (such as preference for simplicity, regret and gratitude) may play a role in that alternative context as well. Other contractual contexts also could be analyzed in a similar fashion. The business decisions of an entrepreneur launching a new venture, for example, could be influenced by the menu of financing options to which she has access as well as the menu of those she knows about but cannot access. We leave these as topics for future exploration.

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