

# **The Effect of Saving on Risk Attitudes and Intertemporal Choices**

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## **Abstract**

In this paper we investigate whether access to savings accounts affects risk attitudes and intertemporal choices. We exploit a field experiment that randomized access to savings accounts among a largely unbanked population of Nepalese villagers. One year after the accounts were introduced, we administered lottery-choice and intertemporal-choice tasks to the treatment and control groups. We find that the treatment is more willing to take risks in the lottery-choice task and is more responsive to changes in experimental interest rates in the intertemporal-choice task. The results on time discounting are less conclusive, but suggest that the treatment group is more willing to delay receiving money. These results suggest that access to formal savings devices has a positive feedback loop for poor families by increasing their willingness to take risks and to delay gratification.

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## **1. Introduction**

Providing access to savings accounts to poor households is becoming a priority in the development agenda (Karlan, Ratan, and Zinman 2014). Saving promotes asset accumulation, helping to create a buffer against shocks and to relax credit constraints, which may provide an important pathway out of poverty. A growing body of empirical literature shows that access to a formal savings account increases household welfare (Ashraf, Karlan, and Yin 2006; Brune, Giné, Goldberg, and Yang 2014; Dupas and Robinson 2013; Prina forthcoming). Gaining access to formal savings instruments may also alleviate poverty through its effects on intertemporal choices and attitudes toward risk. The accumulation of wealth through saving may facilitate consumption smoothing, which can lead households to be more willing to accept positive-expected-value risks and make profitable investments.

Work on endogenous preference formation (Becker and Mulligan 1997; Bowles 1998) also raises the possibility that the accumulation of assets may affect economic decisions not only through the direct effect of assets on consumption but also through an indirect effect of changing preferences. Indeed, a series of recent studies has debated whether the conditions of poverty may lead poor families to behave as if they have higher discount rates and lower self-control (Banerjee and Mullainathan 2010; Bernheim, Ray, and Yeltekin 2013; Carvalho, Meier and Wang 2014; Haushofer and Fehr 2014; Mani, Mullainathan, Shafir, and Zhao 2013; Shah, Mullainathan, and Shafir 2012; Spears 2011; Ubfal 2014). If savings reduces the feeling of scarcity it may have broader psychological effects that allow individuals to be less myopic (Mullainathan and Shafir 2013). Work in psychology has also suggested that behaviors like regularly saving may lead people to practice different mental processes, such as envisioning future outcomes, rationalizing delays in gratification, and setting consumption priorities,

that fundamentally alter their preferences (Strathman, Gleicher, Boninger, and Edwards 1994).

Determining whether saving affects attitudes toward risk and intertemporal choices is important but challenging. The overall effects of institutions and programs that influence saving will depend on how saving affects individuals' willingness to bear financial risks and tradeoff immediate consumption for future consumption. Endogeneity problems make it generally difficult to study this link, though, because the decision to save itself is clearly influenced by risk and time preferences.

In this study, we exploit a unique field experiment to investigate whether the act of saving affects attitudes toward risk and intertemporal choices. In earlier work, Prina (forthcoming) reports the results of a field experiment in Nepal in which 1,236 poor households were randomly assigned into a control group or a treatment group that gained access to formal savings accounts. For most of the sample households, this account represented their first access to a formal saving product. Prina (forthcoming) shows that the treatment group used these new accounts at very high rates, accumulating modest but meaningful account balances: one year after the introduction of the savings account, the median account balance was stable at 35-40% of a household's weekly income. Thus, this experiment generated the sort of exogenous variation in saving behavior that is useful for determining the effect of saving on attitudes toward risk and intertemporal choices.

We administered to these same control and treatment groups: a) an incentivized lottery-choice task, typically used to measure risk attitudes; b) survey questions about hypothetical intertemporal choices, typically used to measure time discounting; and c) an incentivized intertemporal-choice task adapted from the Convex Time Budget (CTB) methodology proposed by Andreoni and

Sprenger (2012).<sup>1</sup> The CTB task asks subjects to solve a standard two-period intertemporal allocation problem. Subjects were given four choices offering different combinations of delay times and experimental interest rates.

We find that access to savings accounts led to changes in risk attitudes (broadly defined). The treatment group was more willing to take risks in the lottery-choice task; those offered access to savings accounts were 4 percentage points (32%) less likely to choose the risk-free option. We also find that the treatment group was more responsive to changes in the experimental interest rate in the CTB task. These two results are consistent with the notion that those with access to savings accounts experienced less rapidly diminishing utility over the experimental rewards.

Our results on time discounting are less conclusive, but suggest that the treatment group was increasingly willing to delay gratification.<sup>2</sup> In the hypothetical choice task, the treatment group was more likely to choose a larger, more delayed payment rather than a smaller, more immediate payment. In the CTB task, the point estimates suggest that the treatment group is more patient; however, these differences have large standard errors.<sup>3</sup> Finally, neither the control nor the treatment group is present-biased in their CTB choices, which is consistent with the findings in Andreoni and Sprenger (2012) and Augenblick, Niederle and Sprenger (2013).

Having documented that access to savings accounts does affect risk attitudes and intertemporal choices, we explore the question of whether those differences are driven solely by asset accumulation or by a change in preferences. This is a

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<sup>1</sup> See Giné, Goldberg, Silverman, and Yang (2012) for an alternative but similar field adaptation of the CTB in a development setting.

<sup>2</sup>Ogaki and Atkeson (1997) document cross sectional patterns consistent with our findings that asset accumulation may affect the intertemporal elasticity of substitution more than time discounting.

<sup>3</sup> Wilcoxon rank-sum tests also show differences in the distribution of overall CTB allocations between groups that are marginally statistically significant with a p-value of 0.09.

challenging exercise because, as Dean and Sautmann (2014) discuss, inferring preferences from experimental choices depends crucially on the extent to which participants “narrowly bracket” their decisions in the experimental tasks. If participants consider the experimental choices in isolation from their background economic situation, then differences in experimental choices will reveal differences in preferences. On the other hand, if participants are not completely narrowly bracketing it is difficult to disentangle the effects of the economic circumstances from preferences. Even though we are not able to conclusively disentangle the “wealth effect” from the “preference effect” here, we present several pieces of evidence that are consistent with substantial narrow bracketing by our subjects. This is at least suggestive that gaining access to savings accounts may be having a broader impact on economic behavior through psychological factors and changes in underlying preferences.

To help us quantify the observed treatment-control differences in experimental choices, we use our choice data to estimate a structural utility model, similar to the approach in Andreoni and Sprenger (2012).<sup>4</sup> Following Andreoni, Kuhn, and Sprenger (2013), we assume that participants were “narrowly bracketing” when they made their experimental choices. We estimate that access to savings accounts is associated with a decline in relative risk aversion of 5% to 7% and an increase in the annual discount rate of 2 percentage points. However, these structural estimates have large standard errors and are not statistically significant. For the control group, estimates of preference parameters show relative risk aversion in line with previous experimental studies and an annual discount rate of 26.1%. That suggests substantial discounting, but is not

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<sup>4</sup> Significant papers in the development of structural utility modeling from experimental data include Harrison, Lau and Williams 2002; Andersen, Harrison, Lau and Ruström 2008; Tanaka, Camerer, and Nguyen 2010; and Andreoni and Sprenger 2012.

implausible because annual inflation rates in Nepal around this time were approximately 10%.

This study contributes to the growing literature on how economic circumstances and life experiences affect attitudes toward risk and intertemporal choices. In a study design similar to ours, Lührmann, Serra-Garcia, and Winter (2014) conduct the CTB task in conjunction with a field experiment that randomly assigned adolescents to financial education programs. They find that students who went through financial education are less time inconsistent than the control group. Other studies have documented that growing up during the Great Depression (Malmendier and Nagel 2011), experiences with civil war and violence (Callen, Long and Sprenger 2014), or experiencing a large natural disaster (Eckel, El-Gamal and Wilson 2009; Cameron and Shah forthcoming) affect attitudes toward financial risk.

The literature on responding to more moderate income and spending shocks is more mixed. Tanaka, Camerer and Nguyen (2010) find that plausibly exogenous income variation is associated with a degree of patience, but not risk aversion, in experimental tasks. Carvalho et al. (2014) conduct choice task experiments with individuals around payday and find, similarly, that people are more present-biased before payday. They find no variation in risk attitudes around paydays, though. Dean and Sautmann (2014) find that measured marginal rates of substitution in intertemporal choice tasks are affected by expenditure shocks. Still, a number of papers have failed to find significant correlations between changes in measured preferences and modest economic shocks (Meier and Sprenger, forthcoming; Giné et al. 2014; Chuang and Schechter 2014).<sup>5</sup> Our study of the causal effect of gaining access to savings accounts integrates well with this literature, as access to savings accounts has both a component of altering the economic circumstances

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<sup>5</sup> Brunnermeier and Nagel (2008) similarly find little effect of wealth shocks on investment allocations.

for individuals and also a life-experience component coming through the practice of saving.

This study also adds to the growing literature in development economics exploring how access to financial products shapes the lives of the poor (e.g., Bruhn and Love 2009; Burgess and Pande 2005; Dupas and Robinson 2013; Kaboski and Townsend 2005; Karlan and Zinman 2010a and 2010b; Prina forthcoming). Our work suggests that there are likely some feedback loops between access to effective financial products and risk attitudes and intertemporal choices.

The remainder of the paper is organized as follows. Section 2 describes the background of the savings accounts experiment conducted by Prina (forthcoming) and outlines the design of our choice tasks. Section 3 presents the reduced-form results. Section 4 discusses the potential mechanisms behind the effects and presents the structural utility estimates. Section 5 concludes.

## **2. Background and Experimental Design**

### **2.1 The Savings Accounts Field Experiment in Nepal**

Formal financial access in Nepal is very limited: only 20% of households have a bank account (Ferrari, Jaffrin, and Shreshta 2007). That access is concentrated in urban areas and among the wealthy. In the randomized field experiment run by Prina (forthcoming), GONESA bank made savings accounts available to a random sample of poor households in 19 slums surrounding Pokhara, Nepal's second largest city. In May 2010, a baseline survey of 1,236 female household heads was conducted.<sup>6</sup> Then, separate public lotteries were held in each slum to randomly assign these female household heads to treatment and control groups:

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<sup>6</sup>Here female household head is defined as the female member who is taking care of the household. Based on this definition, 99% of the households living in the 19 slums were surveyed by the enumerators.

626 randomly assigned to the treatment group were offered the option to open a savings account at the local bank-branch office; the rest, assigned to the control group, were not given this option. After the baseline survey was done, between the last two weeks of May and the first week of June 2010, GONESA bank progressively began operating in the slums.

These accounts have all the characteristics of any formal basic savings account offered by other commercial banks in Nepal at the time of the intervention. The bank does not charge any opening, maintenance, or withdrawal fees and it pays a 6% nominal yearly interest, similar to the average alternative available in the Nepalese market (Nepal Rastra Bank, 2011).<sup>7</sup> Nor do these savings accounts have a minimum balance requirement.<sup>8</sup> Customers can make transactions at their local bank-branch offices in the slums, open twice a week for three hours, or at the bank's main office, located in downtown Pokhara, during regular business hours.

Table 1 shows the summary statistics of baseline characteristics. The last column in the table shows the p-values on a test of equality of means between the treatment and control groups. It reveals that randomization led to balance along all background characteristics (Prina forthcoming). The women in the sample on average have two years of schooling, and they live in households with weekly income averaging 1,600 Nepalese rupees (henceforth, Rs.) (~\$20) and with Rs. 50,000 (~\$625) in assets. On average households have 4.5 members with 2 children. Only 15% of the households had a bank account at baseline. Most households save informally, via microfinance institutions (MFIs) and savings-and-credit cooperatives, storing cash at home, or participating in Rotating Savings

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<sup>7</sup>The International Monetary Fund Country Report for Nepal (2011) indicates a 10.5% rate of inflation during the study period.

<sup>8</sup>The money deposited in the savings account is fully liquid for withdrawal; the savings account requires no commitment to save a given amount or to save for a specific purpose.



and Credit Associations (ROSCAs).<sup>9</sup> Monetary assets account for 40% of their total assets while non-monetary assets, such as durables and livestock, account for the remaining 60%. Finally, 88% of households had at least one outstanding loan (most loans are taken from ROSCAs, MFIs, and family and friends).

As Prina (forthcoming) documents, this experiment generated exogenous variation in access to savings accounts and saving behavior. At baseline, roughly 15% of the control and treatment groups had a bank account. A year later, 82% of the treatment group had a savings account at the GONESA bank.<sup>10</sup>

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<sup>9</sup>A ROSCA is a savings group formed by individuals who decide to make regular cyclical contributions to a fund in order to build a pool of money, which then rotates among group members, being given as a lump sum to one group member in each cycle.

<sup>10</sup> The percentage of control households with a bank account remained at 15%.

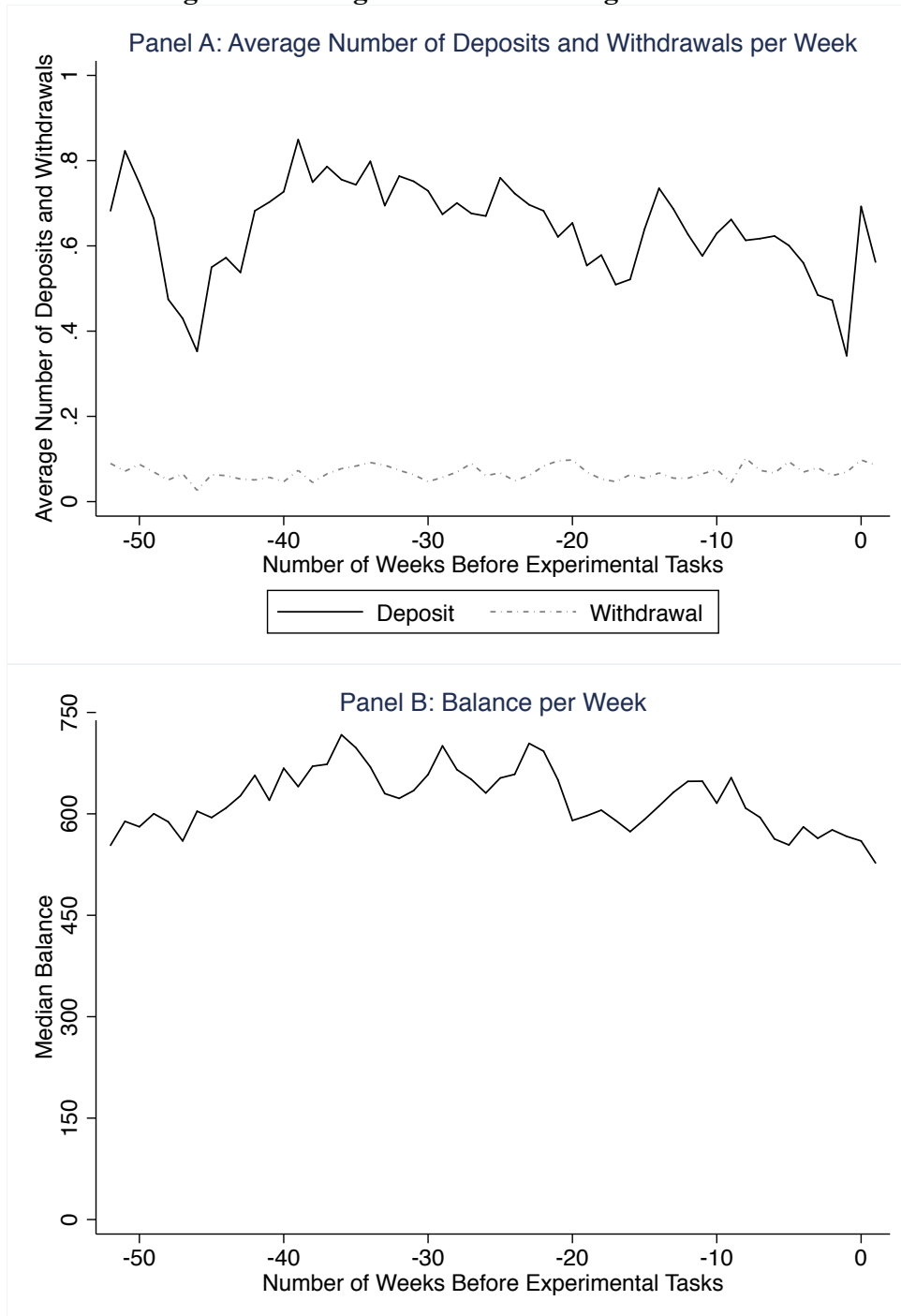
**Table 1: Descriptive Statistics by Treatment Status**

	Control		Coefficient on Treatment Dummy		Equality of Means
	Means	SD	Coefficient	SE	P-value
<i><u>Characteristics of the Female Head of Household</u></i>					
Age	36.5	11.70	0.1	0.66	0.82
Years of education	2.7	2.90	0.1	0.17	0.50
% married/living with partner	88%	0.33	1%	0.02	0.56
<i><u>Household Characteristics</u></i>					
Household size	4.5	1.65	0.0	0.09	0.72
Number of children	2.1	1.29	0.0	0.07	0.68
Total income last week	1.6	5.1	0.1	0.31	0.82
% of entrepreneurs	16%	0.37	1%	0.02	0.67
% owned house	82%	0.39	0%	0.02	0.83
% owned land on which house was built	76%	0.43	1%	0.02	0.55
Experienced negative income shock	41%	0.49	2%	0.03	0.43
<i><u>Assets</u></i>					
Total Assets	42.3	49.6	4.6	3.13	0.14
Total Monetary Assets	13.0	35.9	3.8	2.40	0.11
% with money in a bank	15%	0.36	2%	0.02	0.32
Total money in bank accounts	4.3	23.5	2.6	1.76	0.14
% with money in a ROSCA	18%	0.38	0%	0.02	0.79
Total money in ROSCA	2.1	8.5	1.1	0.76	0.16
% with money in an MFI	52%	0.50	-2%	0.03	0.53
Total money in MFIs	3.8	18.9	-0.1	0.92	0.91
Total amount of cash at home	1.9	4.2	0.3	0.28	0.28
Total Non-Monetary Assets	29.4	28.6	0.8	1.63	0.62
Consumer durables	24.8	24.9	0.7	1.40	0.62
Livestock	4.6	12.3	0.1	0.71	0.88
<i><u>Liabilities</u></i>					
Total amount owed	52.0	267.7	-5.1	11.50	0.66
% with outstanding loans	88%	0.33	2%	0.02	0.25

*Notes:* N = 1,236. Columns 1 and 2 report summary statistics for the control group. Columns 3 and 4 display the coefficient on the treatment dummy and its standard error from regressions of the variables listed in the rows on the treatment dummy and a constant. The last column reports the p-value of two-way tests of the equality of the means across the two groups. All monetary values are reported in 1,000 Nepalese Rupees. Marital status has been modified so that missing values are replaced by village averages.

The treatment group actively used the savings account. Figure 1 shows the average number of deposits and withdrawals in the 52 weeks prior to the administration of the experimental tasks. Over this period, accounts holders on average made 34.7 deposits and 3.7 withdrawals. These figures indicate that the

**Figure 1: Saving Behavior in Savings Accounts**



Notes: Panel A shows the average number of deposits (solid line) and the average number of withdrawals (dashed line) for the 52 weeks preceding the administration of the experimental tasks. Panel B shows the median balance in the savings account for the 52 weeks preceding the experimental tasks.

accounts were used with high frequency over this period: on average, account holders made 2 deposits every 3 weeks. Figure 1 also shows that the typical account holder accumulated and maintained a median balance of around 600 rupees over the 52 weeks prior to the administration of the experimental tasks.<sup>11</sup>

In Prina (forthcoming), the ITT estimate of the effect on monetary assets (in levels) is positive but not statistically significant. Measures of assets are inherently noisy; consequently, the standard errors are large. Nevertheless, Prina (forthcoming) shows that the ITT estimate of the effect on monetary assets calculated using survey data is similar in magnitude to the average balance that the treatment group had in the savings account (calculated using bank administrative data). Moreover, the Kolmogorov-Smirnov and Wilcoxon rank-sum tests for equality of distributions reject the null that the asset distributions of control and treatment groups are drawn from the same population distribution (with the treatment group having higher rankings).

## 2.2 Data

We use data from three household surveys: the baseline survey and two follow-up surveys conducted in June and September of 2011. The first follow-up survey, conducted one year after the beginning of the intervention, included the hypothetical intertemporal-choice task. It also repeated the modules that were part of the baseline survey and collected additional information on household expenditures.<sup>12</sup> In the second follow-up survey we administered the lottery-choice and the CTB tasks.

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<sup>11</sup>Even though the average number of deposits is larger than the average number of withdrawals, the balance stabilized around 600 rupees because most account holders deposited small amounts on a regular basis and made occasional withdrawals of larger sums.

<sup>12</sup>Of the 1,236 households interviewed at baseline, 91% (1,118) were found and surveyed in the first follow-up survey. Attrition for completing the follow-up survey is not correlated with observables or treatment status (see Prina forthcoming).

### **2.3 Risk Aversion and the Lottery-Choice Task**

In the lottery-choice task, subjects were asked to choose among five lotteries, which differed on how much they paid depending on whether a coin landed on heads or on tails. The lottery-choice task is similar to that used by Binswanger (1980), Eckel and Grossman (2002) and Garbarino, Slonim, and Sydnor (2011). Based on a coin flip, each lottery had a 50-50 chance of paying either a lower or higher reward. The five (lower; higher) pairings were (20; 20), (15; 30), (10; 40), (5; 50) and (0; 55). The choices in the lottery task allow one to rank subjects according to their risk aversion: subjects that are more risk averse will choose the lotteries with lower expected value and lower variance.<sup>13</sup> Given the low level of literacy of our sample, we opted for a visual presentation of the options, similar to Binswanger (1980). Each option was represented with pictures of rupees bills corresponding to the amount of money that would be paid if the coin landed on heads or tails (see Appendix Figure 1 for a reproduction of the images shown to subjects).

### **2.4 Hypothetical Intertemporal Choice Task**

In the first follow-up survey, we measured willingness to delay gratification by asking individuals to make hypothetical choices between a smaller, sooner monetary reward and a larger, later monetary reward (Tversky and Kahneman 1986; Benzion, Rapoport, and Yagil 1989). Study participants were asked to choose between receiving Rs. 200 today or Rs. 250 in 1 month. Those who chose the Rs. 200 today then were asked to make a second choice between Rs. 200 today or Rs. 330 in 1 month. Those who had chosen Rs. 250 in 1 month were asked to make a second choice between Rs. 200 today or Rs. 220 in 1 month.

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<sup>13</sup> The least risky lottery option involved a sure payout of Rs. 20, while the most risky option (0; 55) was a mean-preserving spread of the second-most risky, and thus should only be chosen by risk-loving individuals.

These hypothetical choices in the intertemporal choice task allow us to rank subjects according to their willingness to delay gratification: the more impatient subjects will be less willing to wait to receive a larger reward. We also asked a second set of questions varying the time frame (that is, in one or two months ahead choices) in order to investigate hyperbolic discounting (see Appendix Figures 2 & 3).

### **2.5 Incentivized Intertemporal Choice Task**

We adapted an experimental procedure developed by Andreoni and Sprenger (2012) called the “Convex Time Budget” method (henceforth, CTB) for our sample. In the CTB, subjects receive an experimental budget and must decide how much of this money they would like to receive sooner and how much they would like to receive later. The amount they choose to receive later accrues an experimental interest rate. In practice, subjects are solving a two-period intertemporal allocation problem, choosing an allocation along the intertemporal budget constraint determined by the experimental budget and the interest rate.<sup>14</sup>

In our adaptation of the task, participants were asked to choose among three options which corresponded to three (non-corner) allocations along an intertemporal budget constraint. The experimental endowment was Rs. 200 and the implicit experimental interest was either 10% or 20%. Subjects then were asked to make four of these choices (henceforth, games) in which we varied the time frame and the experimental interest rate. One of the four games was randomly selected for payment.

Table 2 lists the parameters of the four games and the three possible allocations in each game. In game 1, the interest rate was 10%, the earlier date was “today”, and the later date was “in 1 month”, so the time delay was one

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<sup>14</sup> Andreoni and Sprenger (2012) used a computer display that allowed for a quasi-continuous choice set.

month. Game 2 had the same interest rate and time delay as game 1, but the earlier date in game 2 was “in 1 month”. Comparing Game 1 and 2 outcomes allows us to explore the possibility of present bias. Games 2 and 3 had the same time frame, but the interest rate was 10% in game 2 and 20% in game 3. Finally, in games 3 and 4 the interest rate was 20% but the time delay was 1 month in game 3 and 5 months in game 4 (in both, the earlier date was “in 1 month”).

**Table 2: Choices for Adapted Convex Time Budget (CTB) Task**

Game	Interest Rate	Dates		Monetary Rewards (in Nepalese rupees)					
				Allocation A		Allocation B		Allocation C	
				sooner	later	sooner	later	sooner	later
1	10%	today	1 month	150	55	100	110	50	165
2	10%	1 month	2 months	150	55	100	110	50	165
3	20%	1 month	2 months	150	60	100	120	50	180
4	20%	1 month	6 months	150	60	100	120	50	180

*Notes:* This table shows the parameters of the intertemporal choice task. Each row corresponds to a different choice ("game") participants would make among three different allocations (A, B, and C). The allocations differed in how much they paid at a sooner and a later date. The sooner and later dates and the interest rate varied across games.

Limiting the decision in each game to a choice among three options greatly simplified the decisions subjects had to make and allowed for a visual presentation with pictures of rupee bills (see Appendix Figures 4-7 for a reproduction of the images shown to study participants). As with the lottery-choice task, visual presentation of the options was crucial because of the low level of literacy and limited familiarity with interest rates among our sample. In addition, the enumerators were instructed to follow a protocol to carefully explain the task to participants and to have subjects practice before making their choices.<sup>15</sup> It is also important to note that our setup mitigates the concern that the

<sup>15</sup>The protocol of the experiment is described in the Appendix. Giné et al. (2012) also adapted the CTB method into an experiment in the field with farmers in Malawi. Their procedure is closer to the original CTB; they asked subjects to allocate 20 tokens across a “sooner dish” and a “later

treatment and control groups might behave differently because the treatment group has a better understanding of interest or ability to make interest calculations. The visual presentation of choice options did not require individuals to understand interest; instead, it simply offered them choices between different sums of money at different dates. Hence, while the interest rate was manipulated across choice tasks, the individuals did not have to process the interest rate themselves.

One interesting feature of the CTB method is that it allows us to investigate whether treatment and control groups respond differently to changes in the experimental interest rate or the time frame. Moreover, as we explain in greater detail in Section 4, the variations in the time frame and the interest rate permit us to estimate utility-function parameters that better quantify the observed differences in behavior across the two groups.

For both the lottery-choice and the CTB tasks, payments were made using vouchers that the participant could redeem at GONESA's main office. Each voucher contained the earliest date the money could be received. Each participant received two vouchers from the CTB task, one for her "sooner" payment and one for her "later payment"; she received another for the lottery-choice task (which could be redeemed a month later). The earnings from the two tasks were determined – according to a coin toss and a roll of a dice – only at the end of the experiment, after the participants had completed both tasks.

Because the majority of the treatment group owned GONESA bank accounts, one may worry that the transaction costs to redeem the vouchers could have been lower for the treatment group. However, there are factors that mitigate such concerns. First, all bank accounts were opened in the local bank-branches that operated in the villages/slums, not in the bank's main office where the vouchers

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dish." Our population is less educated than the Malawi sample and thus required an even simpler design.



could be redeemed. 99% of the transactions (i.e., deposits and withdrawals) over the first year took place in the local bank-branches and fewer than 25% of account holders made any transaction at the main office. Finally, concerns about GONESA having a different reputation across treatment and control groups are mitigated by the fact that both control and treatment groups were very familiar with GONESA at baseline because the NGO provides free-of-charge kindergarten in the 19 slums that participated in the study.

## **2.6 Experimental Choices and Behavior outside the Experimental Task**

At this point it is worth discussing our decision to use choices elicited in experimental tasks to study the effects of gaining access to the savings accounts may have on attitudes toward risk and intertemporal choices. An alternative would be to look for real-world decisions where these attitudes are relevant. While there is clearly value in that type of analysis, real-world choices also come with identification problems because not all relevant variables are observed. Frederick, Loewenstein and O'Donoghue (2002), for example, argue that estimation of discount rates from real-world behaviors “*are subject to additional confounds due to the complexity of real-world decisions and the inability to control for some important factors.*” By contrast, the controlled environment of an experimental task enables the researcher to control the constraints and the incentives in order to isolate individual differences in preferences (there is of course a concern about how differences outside the experimental task affect experimental choices, an issue we discuss in Section 4.2). Moreover, manipulations in the experimental tasks are designed to disentangling differences in time discounting from differences in the curvature of the utility function. All experimental tasks that we administered are well-established in the experimental literature.

The existing evidence suggests that experimental choices in these types of tasks predict real-world behavior (see Jaminson, Karlan and Zinman 2012 for a review). Time preferences measures are associated with a wide-range of outcomes, such as cigarette smoking (Bickel, Odum, and Madden 1999), occupational choice (Burks, Carpenter, Goette, and Rustichini 2009), credit card borrowing (Meier and Sprenger 2010), BMI and physical exercise (Chabris, Laibson, Morris, Schuldt, and Taubinsky 2008), and demand for commitment (Ashraf et al. 2006). Measures of risk aversion are associated with the share of financial wealth in stocks (Kimbal, Sahm, and Shapiro 2008), stock participation (Hong, Kubik, and Stein 2004), and risky behaviors such as smoking, drinking, and not having insurance (Barsky, Juster, Thomas, Miles, and Shapiro 1997).

Finally, there is a concern that experimental choices may not reflect subjects' preferences if they do not understand what their experimental choices entails. The protocol of the CTB task was particularly designed to mitigate this concern. As discussed above, the enumerators were instructed to carefully explain the task to subjects, who were given the opportunity to practice before making their actual choices. Second, as we discuss in Section 3.2, the evidence suggests that participants understood the experimental task; on average they were more willing to delay gratification when the interest rate was increased and less willing to delay when the waiting time was increased. More importantly, we expect that any mistakes in identifying and implementing one's preferred experimental choice to be orthogonal to treatment status.

### **3. Reduced-Form Results**

In this section we present the reduced-form results that do not control for baseline covariates. As one would expect, controlling for baseline covariates does

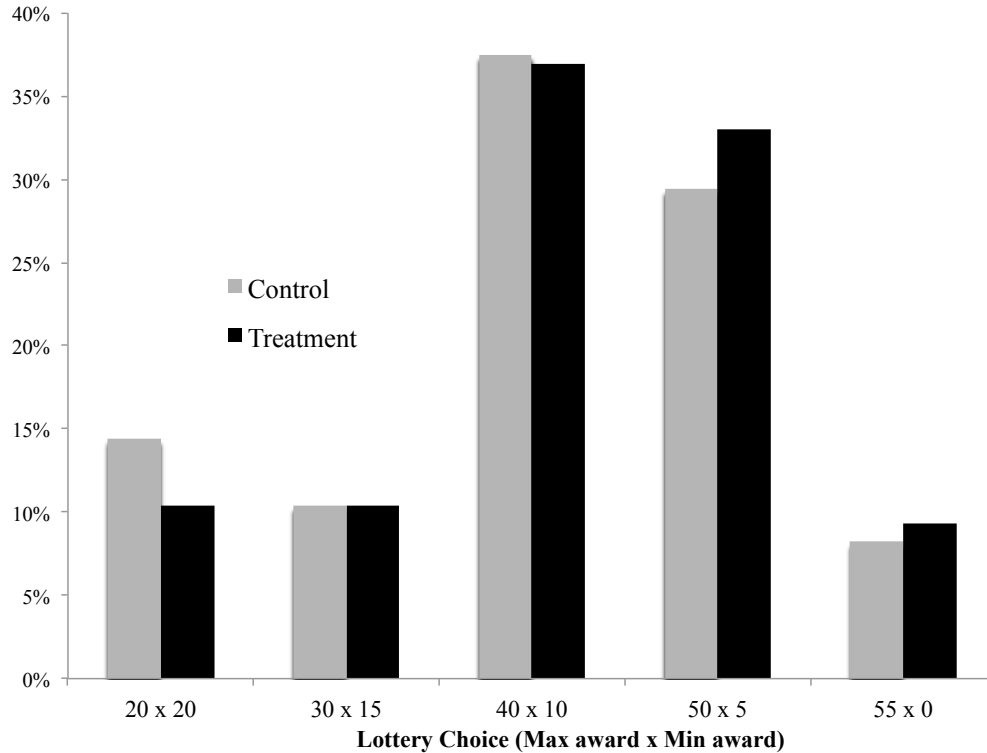
not change our point estimates much. We present the results that control for baseline covariates in Appendix Tables 1-3.

### **3.1. Incentivized Lottery Choices**

Figure 1 presents the distribution over the five possible choices in the lottery-choice task, separately for the control and treatment groups. The bars are indexed by the *lower x higher* amounts that subjects would be paid if a coin landed on *heads x tails*. For example, the first bar on the left shows the fraction of subjects who chose the risk-free option that paid Rs. 20 irrespective of the coin toss. Similarly, the second bar shows the fraction who chose the lottery that paid Rs. 30 if the coin landed on heads and Rs. 15 if it landed on tails. Thus, the bars further to the right correspond to the lotteries with higher expected value and higher variance.

Figure 1 shows that the treatment group was more willing to choose riskier lotteries. The distribution of the treatment group is shifted to the right relative to the distribution of the control group, that is, the treatment group was more likely than the control group to choose options with higher expected value and higher variance.

**Figure 1: Distribution of Choices in Lottery-Choice Task by Treatment Status**



*Notes:* This figure shows the distribution of choices in the lottery choice task by treatment status. The two values shown below each bar correspond to the amounts subjects would get if the coin landed on heads or tails.

Table 3 complements Figure 1 by showing cumulative choice frequencies for the treatment and control groups. The last column presents the p-values from two-sided tests for the differences between the groups being zero. To account for the small number of slum-level clusters in our experiment, we calculate p-values using the (nonparametric) randomization inference approach (Rosenbaum 2002).<sup>16</sup>

The results in Table 3 confirm that the treatment group was more willing to take risks than the control group: the treatment group was 4 percentage points less likely (p-value = .05) to choose the risk-free option that paid Rs. 20 irrespective

<sup>16</sup>Cohen and Dupas (2010) provide a recent example of this approach in the development literature.

of the coin toss.<sup>17</sup> We constructed the lottery choices so that “riskier” lotteries had higher coefficients of variation (standard deviation divided by expected value). The average coefficient of variation of the lottery choices for the treatment group was 0.03 (p-value: 0.03) higher than that of the control. A one-sided Wilcoxon rank-sum test – that the two groups have the same distribution of choices in the risk game – has a marginally significant randomization-inference p-value of 0.10 (see Table 6).

**Table 3: Treatment Effects on Risky Choices**

<b>Choices</b>		<b>Cumulative Distribution of Choices</b>			
Payment conditional on coin toss		Control Mean	Treatment Effect	Standard Error	P-value Random. Inf.
<i>Heads</i>	<i>Tails</i>				
20	20	14.4%	-3.9%	0.024	0.05
30	15	24.9%	-3.9%	0.033	0.12
40	10	62.3%	-4.6%	0.035	0.11
50	5	91.8%	-1.1%	0.017	0.52
55	0	100.0%			

*Notes:* This table reports the distribution of choices in a lottery-choice task in which subjects chose one of five lotteries that paid different amounts depending on a coin toss. The first set of columns show the contingent payments of each lottery. The standard errors are clustered at the village level and corrected for the small number of clusters (they are blown up by a factor of  $\sqrt{19/18}$ ) as recommended by Cameron, Gelbach and Miller 2008) while the reported p-values are calculated using (nonparametric) randomization inference (Rosenbaum 2002).

Later in the paper we turn to a formal structural estimation, but it is also possible to generate a rough calculation of the difference in risk-aversion parameters across the two groups. The risk choice implies bounds on the relative risk aversion from a CRRA model (that considers only experimental earnings);

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<sup>17</sup>We note that the stakes in the lottery choices task were small, roughly one-tenth of a day’s wage, which mitigates the concern that the treatment group may have chosen riskier lotteries because they had a safe place – the savings accounts – to keep the task’s rewards.

this can be regressed on a treatment dummy (and a constant) using an interval regression.

This estimation exercise yields a CRRA parameter of 0.58 for the treatment group and 0.68 for the control group. To put this difference in perspective, we can compare it to the well-documented gender differences in lottery-choice tasks of this type. Studies such as Garbarino et al. (2011) find that women tend to have CRRA parameters around 30% higher (on average) than men; we observe a 17% difference between the treatment and control groups. Thus, the effect of the savings accounts experiment is about half of the size of the observed gender differences often discussed in the experimental literature on risk preferences.

### **3.2. Hypothetical Intertemporal Binary Choices**

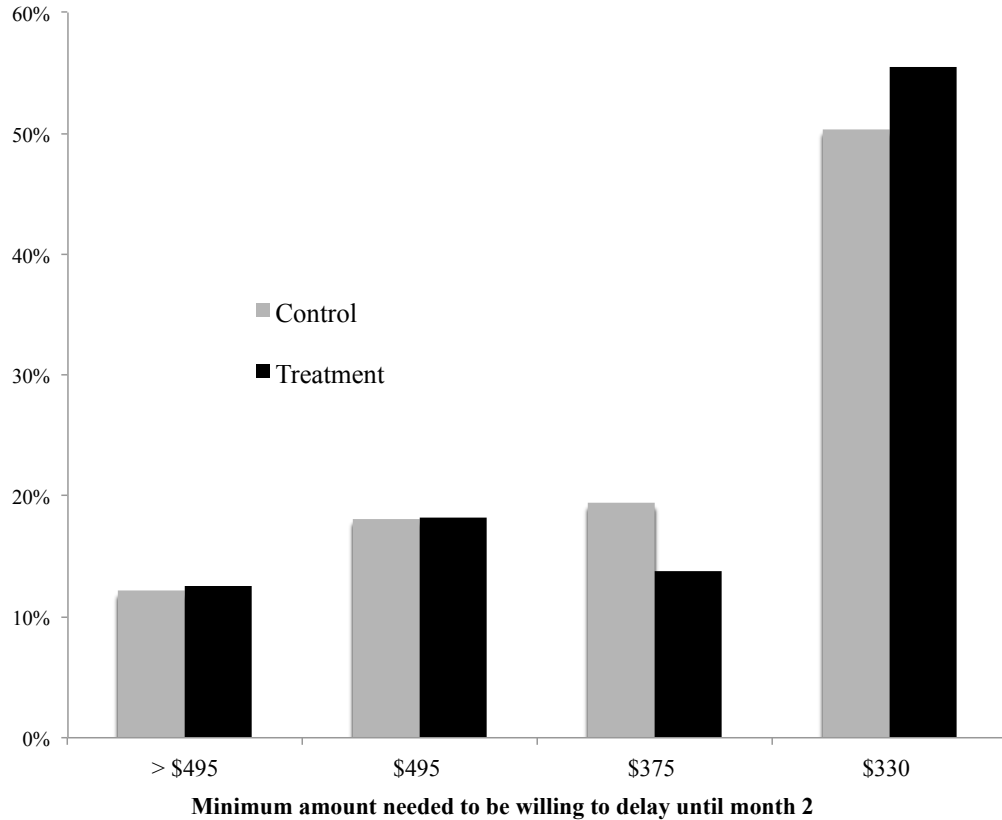
Figure 2 presents the distribution of the answers that subjects gave when asked to make hypothetical choices between Rs. 300 in 1 month and a larger amount in 2 months. It shows the fraction of participants who selected each of the 4 possible answers to the question. The bars are indexed by the delayed amount that subjects would require to be willing to wait. Thus, the bars further to the right correspond to responses of participants who were more willing to delay gratification.<sup>18</sup>

Figure 2 and Appendix Figure 8 (which shows the same patterns for the today vs. 1 month condition) show that the treatment group was more willing than the control group to accept delayed payments in the hypothetical intertemporal choice task. In both figures, the mass of distribution of the treatment group is shifted to the right relative to the distribution of the control group.

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<sup>18</sup> Appendix Figure 8 presents the distribution over the four possible choices when subjects had to choose between Rs. 200 today and a larger amount in 1 month.

**Figure 2: Distribution of Hypothetical Choices between 300 Rs in 1 Month and Larger Amount in 2 Months by Treatment Status**



*Notes:* This figure shows the distribution of choices in a task in which subjects hypothetically chose between 300 Rs in 1 month and a larger amount in 2 months. The horizontal axis shows the amount that was required for subjects to be willing to delay receiving 300 Rs.

Table 4 confirms these results. The treatment group is roughly 5 percentage points more likely than the control group to be willing to give up Rs. 300 in 1 month in exchange for Rs. 330 in 2 months (randomization-inference p-value = 0.06).<sup>19</sup> Testing the full distribution of choices in the two hypothetical tasks using a Wilcoxon rank-sum test, we find randomization inference p-values for one-sided tests of 0.10 and 0.04 respectively (see Table 6). Again, this suggests that

<sup>19</sup> We calculate p-values using the (nonparametric) randomization inference approach (Rosenbaum 2002) to account for the small number of slum-level clusters in our experiment.

the null – that the two groups have the same choice patterns – is marginally statistically significant.

Table 4: Treatment Effects on Hypothetical Intertemporal Choices

Choices	Cumulative Distribution of Choices			
	Control Mean	Treatment Effect	Standard Error	P-value Random. Inf.
<i>Panel A: Choice between 300 Rs in 1 Month (sooner) and Larger Amount in 2 Months (later)</i>				
Willing to delay for at least 330 Rs	50.3%	5.3%	0.023	0.06
Willing to delay for at least 375 Rs	69.7%	-0.5%	0.031	0.85
Willing to delay for at least 495 Rs	87.8%	-0.5%	0.020	0.78
Unwilling to delay for 495 Rs	100.0%			
<i>Panel B: Choice between 200 Rs Today (sooner) and Larger Amount in 1 Month (later)</i>				
Willing to delay for at least 220 Rs	50.1%	5.8%	0.031	0.03
Willing to delay for at least 250 Rs	73.3%	1.6%	0.029	0.51
Willing to delay for at least 330 Rs	86.6%	-0.7%	0.022	0.72
Unwilling to delay for 330 Rs	100.0%			

*Notes:* This table reports the distribution of choices in two hypothetical intertemporal choice tasks. Panel A reports the choices when subjects chose between receiving 300 rupees in 1 month and a larger amount in 2 months. Panel B reports the choices when subjects chose between receiving 200 rupees today and a larger amount in 1 month. The choices in this intertemporal task allow us to rank subjects according to their willingness to delay gratification. For example, in Panel A subjects who chose 300 in 1 month versus 495 in 2 months were the least willing to accept a delayed payment. Those who chose 330 in 2 months versus 300 in 1 month were the most willing to accept a delayed payment. The standard errors are clustered at the village level and corrected for the small number of clusters (they are blown up by a factor of  $\sqrt{(19/18)}$  as recommended by Cameron et al. 2008) while the reported p-values are calculated using (nonparametric) randomization inference (Rosenbaum 2002).

### 3.3. Incentivized CTB Choices

Figure 3 shows the distribution of choices in the CTB experimental task for each game, separately for the control and treatment groups. It presents four sets of two bars: each set corresponds to one of the four games. The left bar in each set corresponds to the distribution of choices among the control group while the right bar corresponds to the distribution of choices among the treatment group. Each



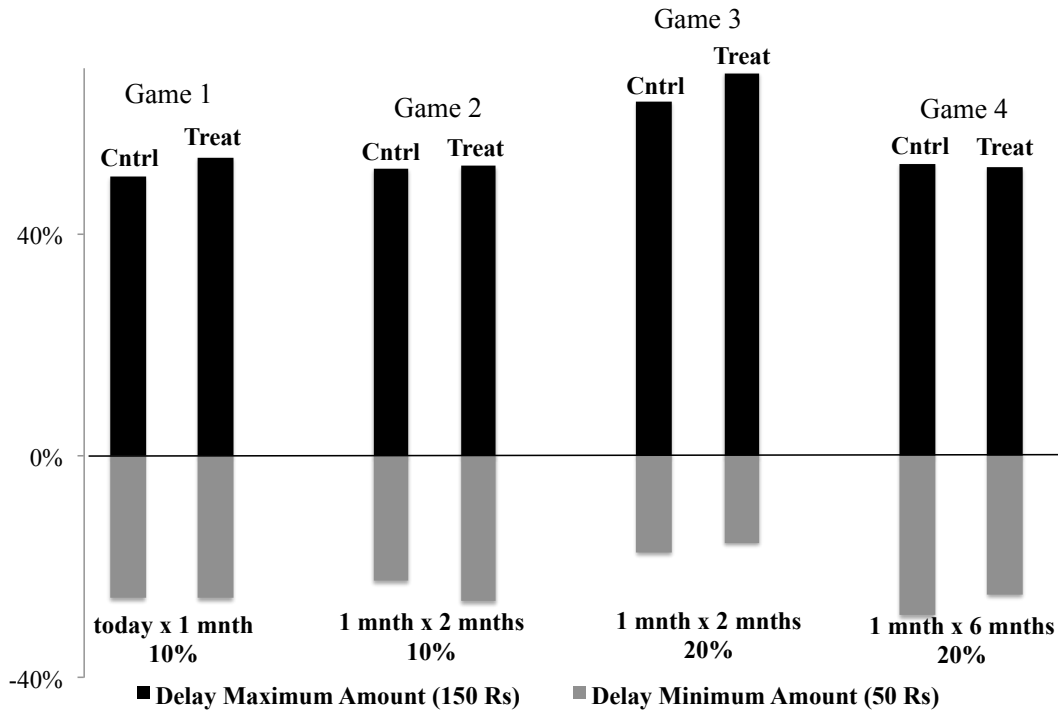
bar has two parts: a black part above the x-axis and a gray part below the x-axis. The black part corresponds to the fraction of participants who were most willing to delay gratification, choosing to delay the maximum amount of Rs. 150 (Rs. 50 sooner). The gray part corresponds to the fraction of participants who were least willing to delay gratification, delaying the minimum amount of Rs. 50 (Rs. 150 sooner).<sup>20</sup> Thus, an increase in the willingness to delay gratification corresponds to an increase in the black bar and/or a reduction in the gray bar.

The comparison of choices across games suggests that participants understood this more complicated task. For example, subjects re-allocated significantly more money to the later date when the experimental interest rate increased from game 2 to game 3. Subjects also reallocated more money to the sooner date when the delay time increased from game 3 to game 4. Interestingly, we find no evidence of present bias. The choices in games 1 and 2 are very similar, even though the sooner date is “today” in game 1 and “in 1 month” in game 2. Andreoni and Sprenger (2012) also find no evidence of present bias when they conduct the CTB task with undergraduate students. Augenblick et al. (2013) find that tasks involving choices over monetary rewards may be less suited to capturing present bias than tasks involving choices over real-effort-tasks.

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<sup>20</sup> The fraction choosing the middle allocation can be inferred from the other two fractions.

**Figure 3: Choices in the CTB Task by Treatment Status**



*Notes:* This figure shows the distribution of choices in the CTB experimental task, separately for the control and treatment groups. Four sets of two bars are presented, corresponding to the different games. The left bar in each set corresponds to the distribution of choices among the control while the right bar corresponds to the distribution of choices among the treatment. The black portion of each bar corresponds to the fraction of participants who were the most willing to delay gratification, choosing to delay the maximum amount of 150 rupees (50 rupees sooner). The gray area corresponds to the fraction of participants who were the least willing to delay gratification, delaying the minimum amount of 50 rupees (150 rupees sooner).

Figure 3 shows that while the choice patterns were broadly similar, the treatment group showed somewhat more willingness to delay gratification. The treatment group was more likely to delay the maximum amount possible of Rs. 150 and less likely to delay the minimum amount possible of Rs. 50 (with the exception of game 2). Though most of the point estimates go in the direction of more patience for the treatment group, only one of the differences in game 3 is statistically significant (see Appendix Table 4).

Next, we investigate whether the treatment and control groups respond differently to changes in the parameters of the CTB task. This may give us additional insight into any differences in the willingness to delay gratification

between the two groups. For this purpose, we combine the data from the four games and run a regression of the sooner reward on 1) a dummy for whether the sooner date is in 1 month; 2) a dummy for whether the experimental interest rate is 20%; 3) a dummy for whether the time delay between the sooner and later dates is 5 months; 4) a constant; and the interaction of these four variables with the treatment dummy. The results are shown in Table 5.

**Table 5: Do Treatment and Control Respond Differently to Changes in the Interest Rate and Time Frame?**

	Sooner Reward	
	Coefficient	Standard Error
{Sooner Date = in 1 Month} * Treatment	3.4	3.02
{Interest Rate = 20%} * Treatment	-5.1	2.80*
{Delay Time = 5 Months} * Treatment	1.9	3.03
Treatment	-1.7	2.53
{Sooner Date = In 1 Month}	-2.3	2.07
{Interest Rate = 20%}	-8.6	2.03***
{Delay Time = 5 Months}	11.2	2.15***
Constant	87.6	1.79***

*Notes:* This table investigates whether treatment and control groups respond differently to changes in the parameters of the intertemporal choice task, specifically the sooner date, the experimental interest rate, and the time interval between the sooner and later dates. It reports results from an OLS regression where the dependent variable is the sooner reward. The standard errors are clustered at the individual level. The omitted categories are {Sooner Date = Today}, {Interest Rate = 10%}, and {Delay Time = 1 Month}.

We find that the treatment group is more responsive than the control group to an increase in the experimental interest rate. When the experimental interest rate increases from 10% to 20%, the control group reduces the sooner reward by 8.6 Rs. and the treatment group reduces it in 13.7 Rs. This difference has a p-value of 0.068.

There is some weak evidence that the control group may have more of a present bias than the treatment group. In particular, the control group decreased the sooner reward in response to a change from immediate to delayed payments while the treatment group increased, but this difference is not statistically significant.<sup>21</sup>

Overall, these reduced-form results show that the treatment group is more responsive to an increase in the experimental interest rate. This suggests that the treatment group may be more willing to delay gratification because it has a higher intertemporal elasticity of substitution.<sup>22</sup> That is also consistent with the evidence that the treatment group is more likely to choose riskier options in the lottery choice task. In fact, in models with constant-relative-risk-aversion (CRRA) risk preferences, which are commonly used in the literature, a higher intertemporal elasticity of substitution corresponds to a less concave and more risk-neutral utility function.

### **3.4 Differences Combining Outcomes and Tasks**

In all three experimental tasks, the differences in the average choices of the treatment and control groups have the expected sign (with some exceptions in the CTB task) but often are only marginally statistically significant. These effects likely represent a combination of moderate effect sizes and rather large standard errors. The moderate effect sizes in this experiment, which randomized access to savings accounts, are not particularly surprising considering that there may well be a range of influences beyond saving that affect risk and intertemporal-choice attitudes. Also, the need for simplicity led us to keep the choice tasks to a

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<sup>21</sup> If we use an indicator for whether subjects chose a sooner reward in game 1 higher than in game 2 as our measure of present bias, we find that 24 percent of subjects displayed behavior consistent with present bias. However, the treatment-control difference in this measure is smaller than a tenth of a percentage point and is not statistically significant.

<sup>22</sup> To see this formally, we refer the reader to equation (6) in Andreoni and Sprenger (2012).

relatively limited set of discrete options that could be displayed visually; that may also affect our ability to detect average choice differences. It is also worth noting that the estimated treatment effects here are intent-to-treatment estimates; the difference in magnitudes would be even larger if one took into account that one-fifth of the treatment group declined the offer to open a savings account.

To address the broader question of whether access to savings accounts has *some effect* on attitudes toward risk and intertemporal tradeoffs, one can move from looking at differences in average choice frequencies to considering the distribution of choices more broadly. Imbens and Wooldridge (2009) argue that combining rank-sum tests with randomization-inference for the p-values (*à la* Rosenbaum 2002) is one important method for determining whether observed patterns in randomized experiments imply that the treatment had an effect on the

Table 6: P-values for Wilcoxon Rank-sum Tests

Tests of equality in single tasks		Tests of equality across multiple tasks	
<i>Experimental task</i>	<i>p-value</i>	<i>Combined tasks</i>	<i>p-value</i>
Risk game	0.10	Hypo. intertemporal 2 delays combined)	0.05
Hypo. intertemporal — today vs 1 month	0.04	CTB (all 4 games combined)	0.09
Hypo. intertemporal — 1 month vs 2 months	0.10	Risk + Hypothetical intertemporal	0.03
CTB game 1	0.30	Risk + CTB	0.07
CTB game 2	0.38	Hypothetical intertemporal + CTB	0.03
CTB game 3	0.01	All tasks combined	0.03
CTB game 4	0.32		

*Notes:* This table reports the p-values for one-sided Wilcoxon rank-sum tests (Wilcoxon 1945) computed using (nonparametric) randomization inference (Rosenbaum 2002). The left-hand columns show p-values for individual tasks. The right-hand columns show p-values for combined tasks. The sharp null hypothesis is that the outcomes of every study participant would have remained the same if the participant’s treatment status was switched. The null hypothesis is rejected with a confidence level of  $1-\alpha$  if the observed Wilcoxon statistic is in the  $\alpha\%$  upper tail of the distribution (variables in which the observed ranks of treatment were smaller than the observed ranks of control were multiplied by -1). The rank sum is calculated separately for each one of the 19 strata and then summed over strata. In the tests across multiple tasks, the rank-sum is calculated separately for each task and then aggregated over tasks (Rosenbaum 1997).

outcome of interest. In Table 6, we show the p-values from Wilcoxon rank-sum tests of differences between treatment and control for each task and for combinations of the different experimental tasks. Combining all the tasks, we see

a p-value of 0.03 on the test of equality between treatment and control. That provides clear evidence of differential overall choice patterns for those given access to savings accounts.

#### **4. Potential Mechanisms and Structural Estimation**

Section 3 documented that the treatment and control groups made different choices in the experimental tasks, but made no conclusion as to what may underlie these differences in behavior. In this section, we discuss two broad mechanisms through which access to savings accounts could affect risk-taking and intertemporal choice behavior.

One is the “wealth effect.” As discussed in Section 2.1, the savings account may have enabled the treatment group to accumulate more wealth than the control group; that may have changed their marginal utility of consumption in ways which could affect their choices in the experimental tasks. Alternatively, gaining access to savings accounts may have changed preferences *more broadly*. Such changes in preferences could reflect a shift in how one envisions the future, in one’s awareness of the broader impacts of immediate choices, or of the range of potential uses for money, or even different emotional responses to windfall income.

As Dean and Sautmann (2014) discuss in detail, it can be quite challenging to disentangle these mechanisms in choice data.<sup>23</sup> In particular, understanding these forces depends crucially on how subjects integrate their choices in the experimental tasks with their background economic situation, and further on how the background economic situation differed between the treatment and control groups. If participants narrowly bracket and do not consider their background consumption when making experimental choices, then choices in

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<sup>23</sup> See Andersen et al. (2008) and Andreoni and Sprenger (2012) for relevant discussions on these issues.

experiments can be considered to reflect preferences directly. However, if participants do integrate their choices with background consumption, then it is difficult to establish how those choices reflect preferences versus differential background economic situations.

In this section, we present evidence on these issues, but we note at the outset that we cannot conclusively disentangle these different mechanisms. In Section 4.1 we begin by discussing the nature of wealth accumulation for the treatment group and the extent to which it might have affected their choices if we assume that individuals were integrating those choices with their background consumption. In Section 4.2, we present some evidence that speaks to the question of whether the participants were “narrowly bracketing” their choices in the experiment. Finally, Section 4.3 presents structural utility estimates of preference parameters, assuming complete narrow bracketing, as one way of measuring the magnitude of the differences we observe in terms of preferences of interest.

#### **4.1. Differences in Consumption**

Given our finding that the treatment group is more willing to take risks than the control group, one may presume that those differences are simply driven by the treatment group having a higher level of background consumption. However, we find no evidence to support the hypothesis that the access to the savings account generated substantial treatment-control differences in background consumption.

Figure 4 shows the cumulative distribution of total household expenditure (in logs) at the time of the first follow-up survey.<sup>24</sup> The dashed line shows the

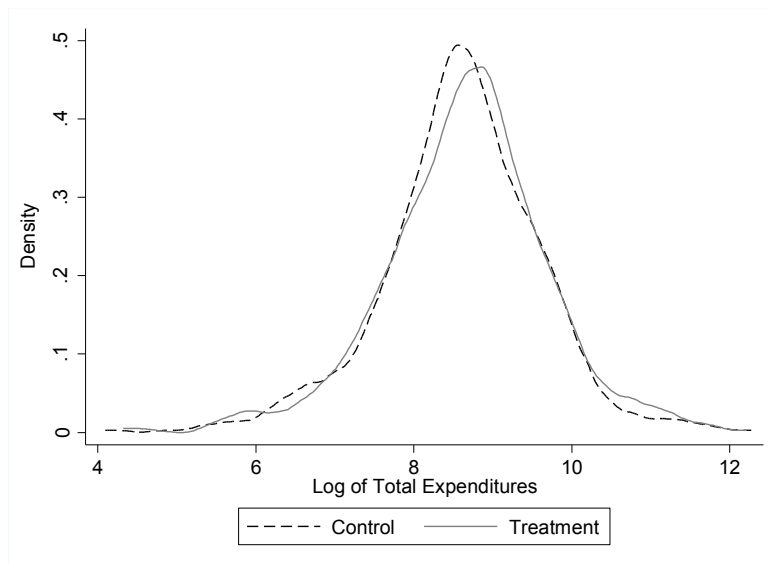
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<sup>24</sup> Data on expenditures were collected only in the first follow-up survey. The module with the experimental tasks included only a few questions about how many days of the previous week household members had eaten chicken or poultry, goat or lamb, beef or buffalo, fish, or pork.

cumulative distribution for the control group; the solid line shows the cumulative distribution for the treatment group. Although the mode of the distribution of the treatment group is shifted slightly to the right relative to the mode of the control group, the treatment-control difference in average (log) consumption is not statistically significant (p-value of 0.38).<sup>25</sup>

Accumulated savings still could have had an effect on experimental choices by providing a buffer stock of wealth that relaxed liquidity constraints, though. If the treatment group used their savings to better smooth consumption, then it may have been relatively more common for the control group to experience low consumption at the time of the choice tasks. That could have temporarily made them more risk averse than the treatment group.

Figure 4: Distribution of Total Expenditures



*Notes:* This figure shows the cumulative distribution of log total expenditures measured in the first follow-up survey, separately for the control and treatment groups.

<sup>25</sup> These findings are consistent with the results in Prina (forthcoming) showing that the savings accounts were used primarily to facilitate shifts in the composition of consumption (e.g., toward lumpy expenditures on school supplies) without changing total household expenditure.



However, we do not find evidence to support that hypothesis. We cannot reject the null, that the variance of consumption for the treatment group is equal to the variance of consumption for the control group (p-value of 0.48). More generally, we cannot reject the null of a Wilcoxon rank-sum test, or of a Kolmogorov-Smirnov test, that the samples are drawn from the same population distribution.<sup>26</sup> This discussion does not rule out a wealth effect, but together this evidence suggests that access to the savings account did not give rise to substantial differences in consumption between the two groups that could have led them to make different experimental choices.<sup>27</sup>

#### **4.2. Narrow Bracketing**

The potential effects of background consumption on experimental choices depend on whether subjects “narrowly bracket” – that is, whether they make these choices in isolation, ignoring their real-life financial circumstances. As Dean and Sautmann (2014) argue, if that is the case then there is no clear role for wealth to directly affect choices through the marginal utility of consumption. Hence, it would be natural to interpret differences as coming from broader effects on preferences.

In the behavioral economics literature, the role of “narrow bracketing” is discussed extensively and many observations of decisions in experimental tasks suggest that subjects are narrow bracketing (e.g., Tversky and Kahneman 1981; Rabin and Weizsacker, 2009). Carvalho, Meier, and Wang (2014), for example, randomly assign whether subjects are administered risk and intertemporal choices right before payday or right after payday. They find that subjects make similar

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<sup>26</sup> P-value on the Kolmogorov-Smirnov test is 0.26 and on the Wilcoxon rank-sum is 0.32.

<sup>27</sup> There is additional indirect evidence that consumption did not differ across treatment and control. Figure 1 Panel B shows that by the time our choice tasks were administered, the savings balances of the treatment group had leveled off and the group was neither accumulating nor consuming from their savings in aggregate. In addition, Prina (forthcoming) documents that the access to the savings accounts had no treatment effect on household income.

risk choices right before payday and right after payday, even though before payday subjects have substantially less cash and money in the bank. Their results also suggest that liquidity constraints may lead subjects to act as if they were more present biased before payday, but the magnitude of this effect is small and there are no differences if there are no immediate rewards at stake. More recently, Dean and Sautmann (2014) have provide some evidence against narrow bracketing, showing that repeated measures of the marginal rate of intertemporal substitution of subjects in an experiment in Mali systematically change with income, consumption, savings, and especially expenditure shocks. In what follows, we present different pieces of evidence suggesting that individuals in our experimental tasks mostly were narrowly bracketing when making their choices.

#### *Small-scale Risk Aversion in the Lottery-Choice Task*

The lottery-choice task presented subjects with a risky choice over stakes that were small relative to their income (around 3% of weekly income). If subjects were not narrow bracketing and were instead anticipating integrating the experiment earnings into a re-optimized consumption stream, then they would be expected to be essentially risk neutral over these small stakes (Rabin 2000; Schechter 2007). The fact that less than half of the subjects chose the two lotteries with the highest expected-value suggests that subjects had risk attitudes over the narrowly bracketed receipt of rewards from the lottery-choice task.

#### *Missing Out on an Arbitrage Opportunity*

Our subjects failed to take advantage of a simple arbitrage opportunity: the experimental interest rate was much higher than both the prevailing market interest rate and the rate of interest the treatment group earned on their savings accounts. If individuals were integrating their background consumption into their decisions, they should have allocated all money in the CTB to the future in order

to take advantage of the higher experimental interest rates. Because the CTB payout amounts were fairly modest compared to the level of household financial assets, households could always re-adjust their “background saving” to achieve whichever consumption pattern they desired. However, a substantial fraction of participants made less-than-perfectly-patient choices in the CTB, even those from the treatment group with substantial savings. This indicates that our subjects were not perfectly integrating.

### *Comparisons of Games 1 and 2*

If individuals were not narrowly bracketing, then any differences in liquidity constraints across the treatment and control groups should lead them to make different choices when immediate monetary rewards were at stake. In game 1 of the CTB, for example, the sooner reward could be redeemed right away. If the control group was more liquidity constrained than the treatment group, then we would expect them to be less willing to delay gratification in game 1. Instead, we observe that although the treatment group was more likely to delay the maximum amount possible in game 1, the differences were not statistically significant. Moreover, comparing choice patterns across games 1 and 2, which were exactly the same except that game 1 involved the potential for immediate rewards, we see very little difference in choice patterns for either the treatment or control groups.

### *Dashain: National Festivities and Liquidity Constraints*

There may also have been some natural variation in background circumstances for individuals depending on when they were administered the experimental tasks. In particular, our experimental tasks happened to fall around the *Dashain*, Nepal’s most important national holiday, which in 2011 was between October 3 and October 12. Because households incur major expenses in preparation for the *Dashain* festivities, we would expect the *Dashain* to generate

reductions in background consumption in the days leading up to the festivities, and to cause potential liquidity constraints for households without savings.<sup>28</sup> If subjects were integrating their background consumption, then we would expect those who played the experimental tasks closer to the *Dashain* to be less willing to delay gratification than subjects who participated farther from the *Dashain*.

In Figure 5A we show the relationship between average consumption of chicken and poultry (measured in number of days in the previous week) and the date at which the experimental tasks were administered. No interviews were conducted between October 3 and October 12, the *Dashain*. We observe a strong negative relationship between consumption and proximity to the *Dashain*: over a roughly 30-day period, households reduced their chicken and poultry consumption from approximately 2.5 days per week down to 0.5 days per week.<sup>29,30</sup>

However, we did not randomize when each participant was administered the experimental tasks, so there is a concern that the relationship in Figure 5A could reflect baseline differences between subjects who participated in the experimental tasks at different times. Figure 5B suggests that this is not the case. If we graph the consumption of chicken and poultry at the time of the first follow-up survey (which was into the field until approximately one month before the experimental tasks were administered) against the date of the experimental tasks, we observe no clear relationship.

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<sup>28</sup> A household would spend money for example on new clothes and on animals, like goats and chickens, to be slaughtered as religious sacrifices.

<sup>29</sup>In Appendix Figure 9 we show that there is a corresponding negative relationship between reported (average) savings at the time of the experimental tasks and proximity to the *Dashain* – even if we control for baseline reported savings. There is a similar negative relationship between the average consumption of goat and lamb (at the time of the experimental tasks) and the proximity to the *Dashain*.

<sup>30</sup> Notice that this evidence is not inconsistent with households having higher consumption *during the festivities*, a hypothesis that we cannot test directly because no households were surveyed during the *Dashain* and a small number of them were surveyed after the *Dashain*.



Notes: Figures 5A and 5B plot the average consumption of chicken and poultry at the time of the experimental tasks (5A) and at the time of the follow-up survey (5B). Figure 5C shows the fraction of participants who chose the largest today reward of Rs. 150. The balls' circumferences correspond to the mass of participants surveyed at that given day.

Together, Figures 5A and 5B suggest that the *Dashain* was a lean time and that the marginal utility of consumption was increasing as it got closer to the holiday. If individuals were integrating, one might expect less willingness to delay gratification as it got closer to the holiday and they became increasingly liquidity constrained. However, the data do not support this hypothesis. Figure 5C plots the fraction of participants who in game 1 chose to receive the largest sooner reward of Rs. 150, which they could redeem on the same day, against the interview date. There is no evidence that individuals were less willing to delay gratification as it got closer to the holiday.<sup>31</sup>

Table 7 confirms these patterns in simple regressions. The first 2 columns of the table show the estimates for consumption without controls for consumption levels at first follow up (analogous to Figure 5A) and with controls for consumption prior (analogous to Figure 5b). Columns 3 and 4 show that the fraction of individuals selecting the highest sooner reward clearly does not rise as the *Dashain* grows nearer, and in fact is estimated to have a slightly negative correlation if anything.

Table 7: Regressions of Consumption and CTB Choice by Proximity to *Dashain*

Dependent variable:	<i>IHS(Consumption)</i>		<i>{Sooner Reward = 150}</i>	
Proximity to <i>Dashain</i>	-0.023 [0.004]***	-0.021 [0.004]***	-0.002 [0.001]	-0.003 [0.001]**
IHS(Consumption at 1st Follow-up)		0.250 [0.029]***		0.011 [0.022]
Constant	0.303 [0.078]***	0.303 [0.078]***	0.209 [0.025]***	0.188 [0.030]***

<sup>31</sup> Our findings that background expenditure shocks from the *Dashain* do not affect choice patterns contrast somewhat with Dean and Sautmann (2014).

### 4.3 Magnitudes

In Table 8 we present the results from estimation of a structural model of preferences that help us to better quantify the economic magnitude of the reduced-form differences we observe. The derivation of the structural model follows the exposition in Andreoni and Sprenger (2012) with an adaptation to the discrete choice setting we use. This derivation is provided in the Appendix.

Panel A shows the estimates of the annual discount factor ( $\delta$ ), relative risk aversion ( $\rho$ ), and present bias ( $\beta$ ) based on choices in the CTB task. Panel B shows a separate estimate of relative risk aversion ( $\rho$ ) from the lottery-choice task. In each case, we show the parameter estimate obtained for the control group and the ratio of the treatment group's estimate to that of the control group.

**Table 8: Maximum Likelihood Estimation of Preference Parameters**

<i>Parameter Estimates</i>	Coefficient	Standard Error
<b>Panel A: Convex Time Budget Task</b> (n = 4,420)		
Annual Discount Factor Control ( $\delta$ )	0.79	0.022
Discount Factor Treatment / Discount Factor Control	1.02	0.037
Risk Aversion Control ( $\rho$ )	0.12	0.008
Risk Aversion Treatment / Risk Aversion Control	0.93	0.066
Present Bias Control ( $\beta$ )	1.00	0.009
Present Bias Treatment / Present Bias Control	1.01	0.013
<b>Panel B: Lottery Choice Task</b> (n = 1,105)		
Risk Aversion Control ( $\rho$ )	0.40	0.026
Risk Aversion Treatment / Risk Aversion Control	0.95	0.062

*Notes:* This table shows Maximum Likelihood estimates of preference parameters. Panel A reports results estimated using choices in the Convex Time Budget task while Panel B reports results estimated using the choices in the lottery-choice task. The estimates correspond to the "narrow bracketing" case and assume zero background consumption incorporated in the CTB and risk choices. Standard errors are clustered at the individual level in Panel A and clustered at the village level in Panel B.

Consistent with our discussion above, which at least suggests that our subjects were narrowly bracketing, we present estimates of preference parameters from the model where we define utility over experimental rewards not integrated with background consumption.

We estimate the control group to have an annual discount factor of 0.79 (and an annual discount rate of 26.1%). That suggests that this population strongly discounts the future but is not implausible, given that annual inflation in Nepal was above 10% during the study period (IMF 2011).<sup>32</sup> Interestingly, our estimates suggest less discounting of the future by the Nepalese villagers than Andreoni and Sprenger (2012) observed when they conducted the CTB with undergraduate students in the United States. We obtain a CRRA parameter for the control group in the narrow bracketing case of 0.12, which is similar to the estimates Andreoni and Sprenger (2012) provide for their sample. This corresponds almost exactly to the original curvature that Tversky and Kahneman (1992) estimated for the value function in gains for prospect theory.

On these structural parameter estimates the standard errors are sizeable; the treatment-control differences discussed below are not statistically significant. This likely reflects a combination of: the discrete choice set we used in the CTB task, which reduced the variation available for parameter estimation relative to the continuous version; moderate effects; and inherent noise in the experimental data.

Our point estimates indicate that the treatment group is more patient than the control group. The estimated discount factor for the treatment group is 2 percent higher than that of the control group. Alternatively, the treatment group has an annual discount rate that is 2 percentage points lower than the control group's.

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<sup>32</sup> It is important to notice that discount rates estimated using the Convex Time Budget method depend on how subjects respond to changes in the time interval between the two payment dates; that is why the estimated discount rates are effectively lower than the experimental interest rates.



There is no present bias for either group, which is consistent with the choice patterns.

Our point estimates also suggest that the treatment group is less risk averse than the control group. In the CTB task, the estimated (coefficient of) relative risk aversion for the treatment group is 7 percent lower than that of the control group. The estimates from the lottery-choice task imply similar treatment-control differences in percentage terms.<sup>33</sup> In the lottery-choice task, the estimated (coefficient of) relative risk aversion for the treatment group is 5 percent lower than that of the control group. Again, these results are consistent with the choice patterns that suggested more linear utility for the treatment group.

## 5. Conclusion

We exploited a field experiment that randomized access to savings accounts in order to investigate whether attitudes toward risk and intertemporal choice are affected by the act of saving. Because the majority of the sample had never had a savings account, the experiment generated random variation in saving behavior. A year later, we administered a lottery-choice and intertemporal-choice tasks. Our findings on lottery choices and the responsiveness to interest rates in the CTB task seem to indicate that the group offered savings accounts acts *as if* they have “more linear” utility over money. The results on intertemporal tradeoffs are less conclusive, but the patterns suggest that the treatment group is more patient than the control group.

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<sup>33</sup> However, the estimates of the level of risk-aversion are different across tasks. From the lottery-choice task, we estimate a coefficient of relative risk aversion of 0.40 for the control group, substantially higher than the estimate from the CTB task. This difference could reflect the challenges of fitting the simple CRRA functional form over varying stakes, because the CTB task had outcomes that were 5 to 10 times the size of the lottery task. Andreoni and Sprenger (2012) find the same pattern, with higher risk aversion measures, in a multiple price list lottery task than in the CTB. They posit that this may suggest that prospects with underlying risk are governed in part by an additional force beyond simple utility-of-outcome curvature.

Understanding the exact mechanisms behind these differences is difficult and, as Section 4 highlighted, we can only provide suggestive evidence about them. We suspect therefore that there may be some value in more closely marrying research in economics with work in psychology that has explored how the ability to “imagine the future” affects preferences (e.g., Taylor, Pham, Rivkin, and Armor 1998; Strathman et al. 1994). For example, it seems plausible to us that the act of saving regularly may change one’s frame of reference when making a whole range of choices. It may be that individuals who save regularly appear less risk averse in experimental tasks because they are more able to envision uses for larger sums of money. Hence, they experience less diminishing marginal utility over experimental earnings. Or, it could be that those with access to savings anticipate smoothing out experimental rewards over time in a way that those without savings do not.<sup>34</sup>

Ultimately, we hope that the results of this study will motivate future research focused on better understanding the economic and psychological links between asset accumulation and economic preferences. In particular, there may be important policy implications gained with a better understanding of the potential mechanisms at play in how saving affect risk attitudes and intertemporal choices. For example, if these effects derive principally from wealth effects, then they could be replicated with one-time exogenous shocks to wealth, or with wealth transfers from the rich to the poor. However, if the effects of saving come primarily through such mechanisms as an ability to imagine the future, then the *act of saving* may be important for changing attitudes toward risk and intertemporal tradeoffs.

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<sup>34</sup> This possibility could relate to the discussion in Andersen et al. (2008), where the authors attempt to model the degree of narrow bracketing with a parameter that captures the number of periods over which an individual smooths experimental rewards.

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# **Appendix not for publication**

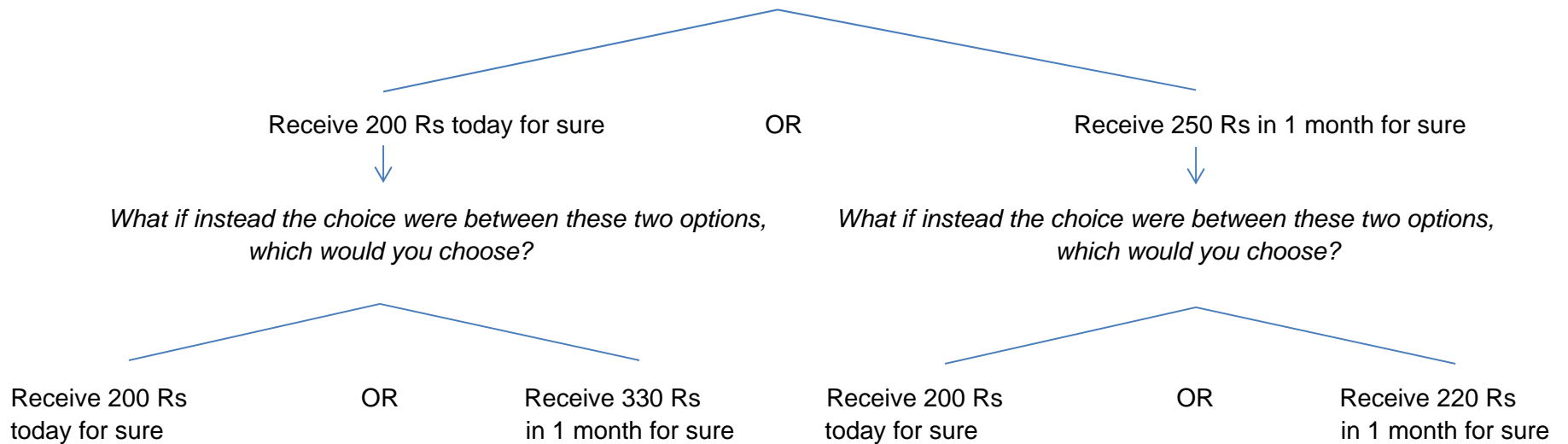
## Appendix: Frames Used in the Lottery-Choice Task



Appendix Figure 1: The five choices in the lottery-choice task

**Appendix Figure 2: Hypothetical Choice Between 200 Rs Today and Larger Amount in 1 Month**

*Imagine a reputable NGO is going to give you some money. You can choose between getting this money sooner or later. No matter what your choice is, you can trust that the NGO will give you this money for sure. If you choose to get it later, you have to wait to get the money but you get more money for sure. Which of these two options would you choose?*

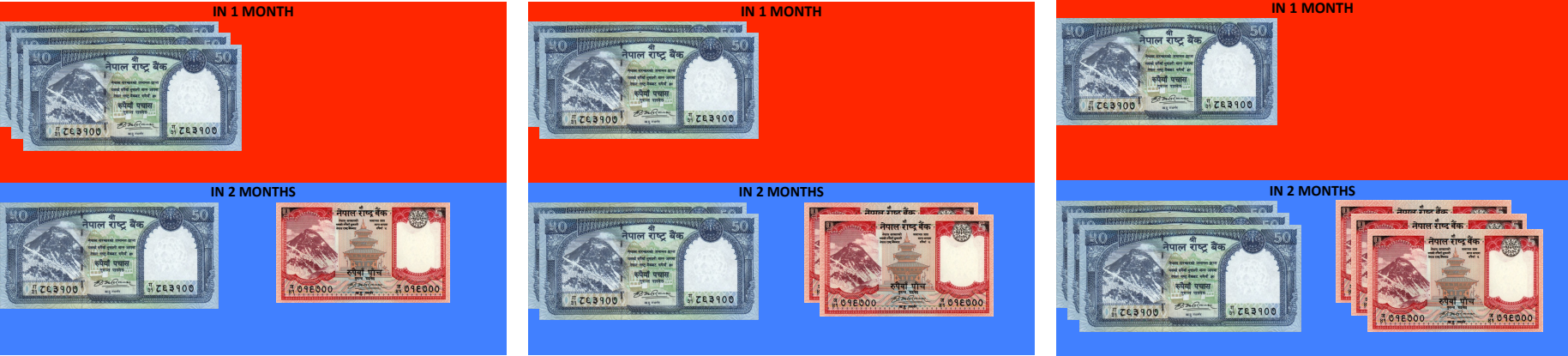




**Appendix: Frames Used in Adapted Convex Time Budget (CTB) Task**

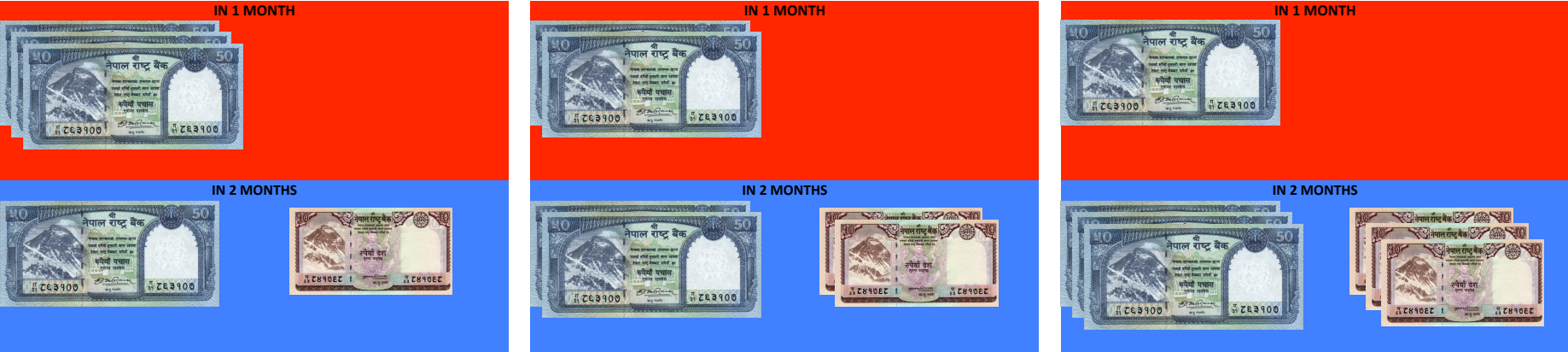


**Appendix Figure 4: CTB choice task, game 1 (allocations A, B, and C)**

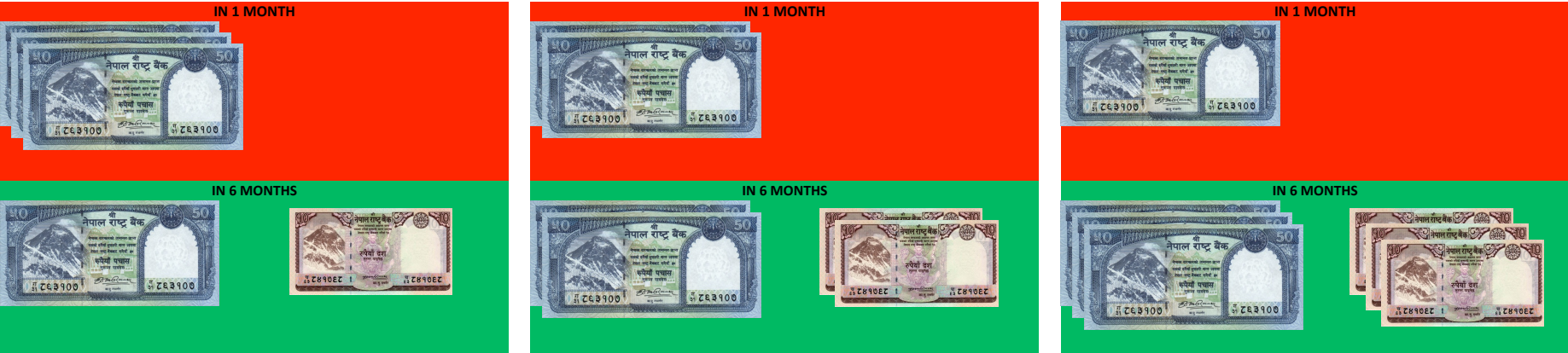


**Appendix Figure 5: CTB choice task, game 2 (allocations A, B, and C)**

**Appendix: Frames Used in Adapted Convex Time Budget (CTB) Task**

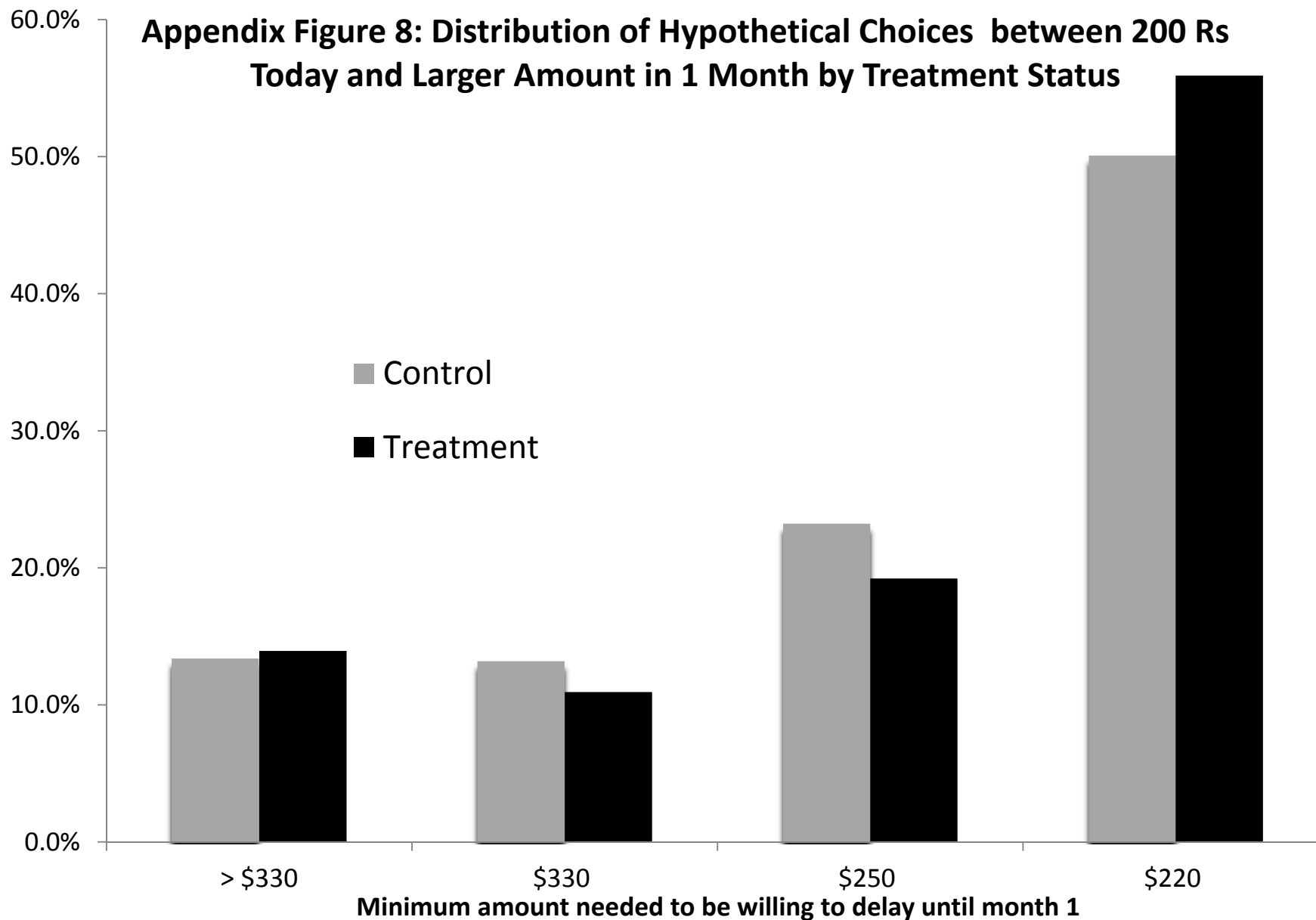


**Appendix Figure 6:** CTB choice task, game 3 (allocations A, B, and C)



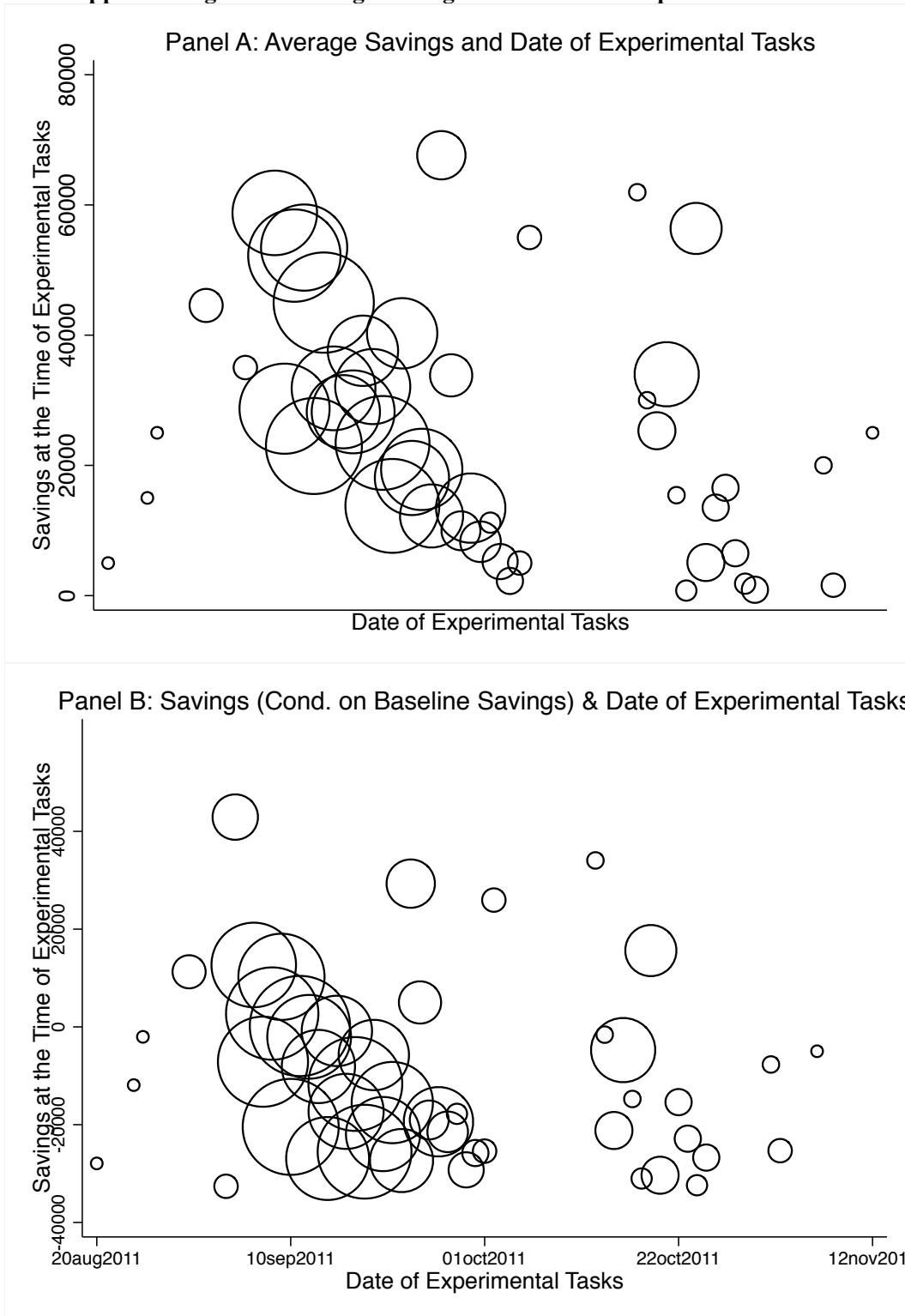
**Appendix Figure 7:** CTB choice task, game 4 (allocations A, B, and C)

**Appendix Figure 8: Distribution of Hypothetical Choices between 200 Rs Today and Larger Amount in 1 Month by Treatment Status**



*Note:* The figure shows the distribution of choices in a task in which subjects had to make hypothetical choices between 200 Rs today and a larger amount in 1 month. The horizontal axis shows the amount that was required for subjects to be willing to delay the 200 amount.

**Appendix Figure 9: Average Savings at the Time of Experimental Tasks**



Notes: Panel A plot the average savings at the time of the experimental tasks. Panel B plots the residuals from a regression of savings at the time of experimental tasks on baseline savings against date of experimental tasks. The balls' circumferences correspond to the mass of participants surveyed at that given day.



**Appendix Table 1: Treatment Effects on Risky Choices**

Choices		Cumulative Distribution of Choices			
Payment conditional on coin toss		Control Mean	Treatment Effect	Standard Error	P-value Random. Inf.
<i>Heads</i>	<i>Tails</i>				
20	20	14.4%	-3.9%	0.025	0.05
30	15	24.9%	-4.1%	0.033	0.11
40	10	62.3%	-4.5%	0.034	0.13
50	5	91.8%	-0.9%	0.015	0.61
55	0	100.0%			

*Notes:* This table reports the distribution of choices in a lottery-choice task in which subjects chose one of five lotteries that paid different amounts depending on a coin toss. The regressions control for the baseline variables shown in Table 1. The first set of columns show the contingent payments of each lottery. The standard errors are clustered at the village level and corrected for the small number of clusters (they are blown up by a factor of  $\sqrt{19/18}$  as recommended by Cameron, Gelbach and Miller 2008) while the reported p-values are calculated using (nonparametric) randomization inference (Rosenbaum 2002).

**Appendix Table 2: Treatment Effects on Hypothetical Intertemporal Choices**

Choices	Cumulative Distribution of Choices			
	Control Mean	Treatment Effect	Standard Error	P-value Random. Inf.
<i>Panel A: Choice between 300 Rs in 1 Month (sooner) and Larger Amount in 2 Months (later)</i>				
Willing to delay for at least 330 Rs	50.3%	4.6%	0.024	0.10
Willing to delay for at least 375 Rs	69.7%	-0.7%	0.032	0.80
Willing to delay for at least 495 Rs	87.8%	-0.4%	0.021	0.82
Unwilling to delay for 495 Rs	100.0%			
<i>Panel B: Choice between 200 Rs Today (sooner) and Larger Amount in 1 Month (later)</i>				
Willing to delay for at least 220 Rs	50.1%	5.6%	0.031	0.04
Willing to delay for at least 250 Rs	73.3%	1.7%	0.029	0.50
Willing to delay for at least 330 Rs	86.6%	-0.3%	0.022	0.90
Unwilling to delay for 330 Rs	100.0%			

*Note:* This table reports the distribution of choices in two hypothetical intertemporal choice tasks. The regressions control for the baseline variables shown in Table 1. Panel A reports the choices when subjects chose between receiving 300 rupees in 1 month and a larger amount in 2 months. Panel B reports the choices when subjects chose between receiving 200 rupees today and a larger amount in 1 month. The choices in this intertemporal task allow us to rank subjects according to their willingness to delay gratification. For example, in Panel A subjects who chose 300 in 1 month versus 495 in 2 months were the least willing to accept a delayed payment. Those who chose 330 in 2 months versus 300 in 1 month were the most willing to accept a delayed payment. The standard errors are clustered at the village level and corrected for the small number of clusters (they are blown up by a factor of  $\sqrt{19/18}$  as recommended by Cameron, Gelbach and Miller 2008) while the reported p-values are calculated using (nonparametric) randomization inference (Rosenbaum 2002).

**Appendix Table 3: Do Treatment and Control Respond Differently to Changes in the Parameters of the Convex Time Budget (CTB) Task?**

	Sooner Reward	
	Coefficient	Standard Error
{Sooner Date = in 1 Month} * Treatment	3.4	3.03
{Interest Rate = 20%} * Treatment	-5.1	2.81*
{Delay Time = 5 Months} * Treatment	1.9	3.04
Treatment	-1.8	2.53
{Sooner Date = In 1 Month}	-2.3	2.08
{Interest Rate = 20%}	-8.6	2.03***
{Delay Time = 5 Months}	11.2	2.16***

*Notes:* This table investigates whether treatment and control groups respond differently to changes in the parameters of the intertemporal choice task, namely the sooner date, the experimental interest rate, and the time interval between the sooner and later dates. It reports results from an OLS regression where the dependent variable is the sooner reward. The regression control for the baseline variables shown in Table 1. The standard errors are clustered at the individual level. The omitted categories are {Sooner Date = Today}, {Interest Rate = 10%}, and {Delay Time = 1 Month}.

**Appendix Table 4: Treatment Effects on Convex Time Budget Choices**

<b>Game</b>	<b>Control Mean</b>	<b>Treatment Effect</b>	<b>Standard Error</b>	<b>P-value Random. Inf.</b>
<i>Panel A: Fraction Choosing to Delay Maximum Amount Possible (Sooner Reward = 50)</i>				
Game 1	50.5%	3.6%	0.031	0.23
Game 2	51.9%	0.4%	0.032	0.89
Game 3	64.0%	5.2%	0.037	0.07
Game 4	52.8%	-0.6%	0.036	0.84
<i>Panel B: Fraction Choosing to Delay Minimum Amount Possible (Sooner Reward = 150)</i>				
Game 1	25.6%	0.0%	0.028	1.00
Game 2	22.5%	3.7%	0.029	0.16
Game 3	17.4%	-1.6%	0.024	0.46
Game 4	28.7%	-3.9%	0.024	0.15

*Notes:* This table reports the distribution of choices in the adapted Convex Time Budget (CTB) task. Panel A show the fraction of subjects most willing to accept a delayed payment; they chose a sooner reward of 50 rupees and delayed the maximum amount possible. Panel B reports the fraction of subjects least willing to accept a delayed payment; they chose a sooner reward of 150 rupees and delayed the minimum amount possible. The standard errors are clustered at the village level and corrected for small sample (they are blown up by a factor of  $\sqrt{19/18}$  as recommended by Cameron, Gelbach and Miller 2008) while the reported p-values are calculated using (nonparametric) randomization inference (Rosenbaum 2002).

## Model

We begin by outlining the structural utility model that can be fit to the CTB task, which allows us to jointly estimate present bias, exponential discount rates, and a risk-aversion coefficient under a single unified framework. We follow Andreoni and Sprenger (2012) in modeling the intertemporal choice of an agent with time separable utility and quasi-hyperbolic time preferences faces in the experimental task. In a given game  $g$  the agent must choose between receiving Rs. 150, 100 or 50 sooner. The later reward,  $LR_g$ , is given by:

$$LR_g = (200 - SR_g) * R_g, \quad (1)$$

where  $SR_g$  is the sooner reward, and  $R_g$  the gross experimental interest rate in game  $g$ . Assuming that the agent has constant-relative-risk-aversion (CRRA) risk preferences, the utility of a given allocation is given by:

$$U(SR_g, LR_g) = \left[ (SR_g + \omega_1)^{1-\rho} + \beta^{\tau_g} \delta^{k_g} (LR_g + \omega_2)^{1-\rho} \right] / [1 - \rho], \quad (2)$$

where the preference parameters are:  $\rho$ , the CRRA relative-risk-aversion coefficient;  $\beta$ , the present bias; and  $\delta$ , the monthly discount factor. The parameters of the game  $g$  intertemporal choice are:  $\tau_g$ , an indicator variable that is 1 if the sooner date in game  $g$  is today (and 0 otherwise);  $k_g$ , the time delay (in months) between the sooner and later dates; and  $R_g$  is the gross experimental interest rate. The parameter  $\omega_1$  is the background consumption in the period in which the agent receives the sooner reward and  $\omega_2$  is the background consumption in the period in which the agent receives the later reward. We follow Andersen et al. (2008) in defining this background consumption as “*the optimized consumption stream based on wealth and income that is [perfectly] anticipated before allowing for the effects of the money offered in the experimental tasks.*”<sup>1</sup> With these background consumption parameters in place, the model corresponds to the “integrated and immediately consumed” case discussed in the

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<sup>1</sup>Notice there is an assumption, which is the standard in the literature, that the agent chooses the optimal background consumption without taking the experimental rewards into account, such that the agent does not re-optimize if there is any reallocation of the experimental rewards.

preceding sessions. If these parameters are set to zero, the model corresponds to the “extreme narrow bracketing” case and the risk-aversion coefficient can be thought of as an estimate of the curvature of the prospect-theoretic value function over gains.

It is easy to show that the agent chooses to receive 150 sooner if condition (3) holds and chooses 50 sooner if condition (4) holds:

$$\ln \frac{(150 + \omega_1)^{1-\rho} - (100 + \omega_1)^{1-\rho}}{(100R_g + \omega_2)^{1-\rho} - (50R_g + \omega_2)^{1-\rho}} > Y_g^*, \quad (3)$$

$$\ln \frac{(100 + \omega_1)^{1-\rho} - (50 + \omega_1)^{1-\rho}}{(150R_g + \omega_2)^{1-\rho} - (100R_g + \omega_2)^{1-\rho}} < Y_g^*, \quad (4)$$

where  $Y_g^* = \tau_g \ln \beta + k_g \ln \delta$  is the effective discount factor in game  $g$  in logs. If neither condition (3) nor (4) holds, the agent chooses to receive 100 sooner.

In taking the model to the data, we assume an additive error structure:

$$Y_{i,g}^* = \tau_g \ln \beta + k_g \ln \delta + \varepsilon_{i,g}, \quad (5)$$

where  $\varepsilon_{i,g}$  is an error term that is specific to individual  $i$  and game  $g$  and is normally distributed with mean zero and variance  $\sigma^2$ —i.e.,  $\varepsilon_{i,g} \sim N(0, \sigma^2)$ . Under these assumptions, the likelihood of individual  $i$ 's choice in game  $g$  is given by:<sup>2</sup>

$$\mathcal{L}_{i,g} = \begin{cases} 1 - \Phi \left( \frac{1}{\sigma} \ln \frac{(100 + \omega_1)^{1-\rho} - (50 + \omega_1)^{1-\rho}}{(150R_g + \omega_2)^{1-\rho} - (100R_g + \omega_2)^{1-\rho}} - \frac{\ln \beta}{\sigma} \tau_g - \frac{\ln \delta}{\sigma} k_g \right) & \text{if } SR_{i,g} = 50, \\ \Phi \left( \frac{1}{\sigma} \ln \frac{(100 + \omega_1)^{1-\rho} - (50 + \omega_1)^{1-\rho}}{(150R_g + \omega_2)^{1-\rho} - (100R_g + \omega_2)^{1-\rho}} - \frac{\ln \beta}{\sigma} \tau_g - \frac{\ln \delta}{\sigma} k_g \right) - \\ - \Phi \left( \frac{1}{\sigma} \ln \frac{(150 + \omega_1)^{1-\rho} - (100 + \omega_1)^{1-\rho}}{(100R_g + \omega_2)^{1-\rho} - (50R_g + \omega_2)^{1-\rho}} - \frac{\ln \beta}{\sigma} \tau_g - \frac{\ln \delta}{\sigma} k_g \right) & \text{if } SR_{i,g} = 100, \\ \Phi \left( \frac{1}{\sigma} \ln \frac{(150 + \omega_1)^{1-\rho} - (100 + \omega_1)^{1-\rho}}{(100R_g + \omega_2)^{1-\rho} - (50R_g + \omega_2)^{1-\rho}} - \frac{\ln \beta}{\sigma} \tau_g - \frac{\ln \delta}{\sigma} k_g \right) & \text{if } SR_{i,g} = 150. \end{cases} \quad (6)$$

Using (6) we estimate the variance of the error term  $\sigma^2$  and separate preference parameters  $(\delta, \beta, \rho)$  for the control and treatment groups via maximum likelihood. The variance of the error term is assumed to be the same for the two groups.

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<sup>2</sup>Andreoni et al. (2012) adopt an alternative approach and use interval-censored Tobit to estimate preference parameters when the Convex Time Budget task involves a choice between few options.

We follow an analogous approach to map the lottery-choice data into an estimate of risk aversion. Specifically, we assume that an agent with constant-relative-risk-aversion risk preferences must choose among five lotteries with payouts dependent on a coin toss. We use  $l$  to index a lottery  $\mathfrak{L}_l = (h_l, t_l)$  that paid  $h_l$  if the coin landed on heads and  $t_l$  if it landed on tails:

$$\mathfrak{L}_1 = (20,20), \mathfrak{L}_2 = (30,15), \mathfrak{L}_3 = (40,10), \mathfrak{L}_4 = (50,5), \mathfrak{L}_5 = (55,0).$$

The utility of a lottery  $\mathfrak{L}_l$  is given by:

$$U(\mathfrak{L}_l) = \frac{1}{2} \frac{(h_l + \omega)^{1-\rho}}{1-\rho} + \frac{1}{2} \frac{(t_l + \omega)^{1-\rho}}{1-\rho}, \quad (7)$$

where  $\rho$  is the CRRA risk aversion parameter and  $\omega$  is the background consumption in the period in which the agent receives the experimental reward.

It is easy to show that the agent chooses lottery  $l = 1$  if (8) holds and  $l = 5$  if (9) holds. The agent chooses  $l = 2,3,$  or  $4$  if both (8) and (9) hold:

$$\ln \frac{(h_l + \omega)^{1-\rho} - (h_{l-1} + \omega)^{1-\rho}}{(t_{l-1} + \omega)^{1-\rho} - (t_l + \omega)^{1-\rho}} > Z^* \quad (8)$$

$$Z^* > \ln \frac{(h_{l+1} + \omega)^{1-\rho} - (h_l + \omega)^{1-\rho}}{(t_l + \omega)^{1-\rho} - (t_{l+1} + \omega)^{1-\rho}}, \quad (9)$$

where  $Z^* = 0$ .

In taking the model to the data, we assume an additive error structure:

$$Z_i^* = \xi_i, \quad (10)$$

where  $\xi_i$  is an error term that is specific to individual  $i$  and is normally distributed with mean zero and variance  $\eta^2$ —i.e.,  $\xi_i \sim N(0, \eta^2)$ . Under these assumptions, the likelihood of individual  $i$ 's choice is given by:

$$\mathcal{L}_i = \begin{cases} 1 - \Phi\left(\frac{1}{\eta} \ln \frac{(h_{l+1}+\omega)^{1-\rho} - (h_l+\omega)^{1-\rho}}{(t_l+\omega)^{1-\rho} - (t_{l+1}+\omega)^{1-\rho}}\right) & \text{if } l = 1, \\ \Phi\left(\frac{1}{\eta} \ln \frac{(h_l+\omega)^{1-\rho} - (h_{l-1}+\omega)^{1-\rho}}{(t_{l-1}+\omega)^{1-\rho} - (t_l+\omega)^{1-\rho}}\right) - \\ \quad - \Phi\left(\frac{1}{\sigma} \ln \frac{(h_{l+1}+\omega)^{1-\rho} - (h_l+\omega)^{1-\rho}}{(t_l+\omega)^{1-\rho} - (t_{l+1}+\omega)^{1-\rho}}\right) & \text{if } l = \{2,3,4\}, \\ \Phi\left(\frac{1}{\eta} \ln \frac{(h_l+\omega)^{1-\rho} - (h_{l-1}+\omega)^{1-\rho}}{(t_{l-1}+\omega)^{1-\rho} - (t_l+\omega)^{1-\rho}}\right) & \text{if } l = 5. \end{cases} \quad (11)$$



# Instructions for Adapted Convex Time Budget Task

[Before starting to play the game, make sure IN THE CHECKLIST ALL ITEMS ARE CHECKED.

Also make sure that sets 1-2-3-4 lay on top of each other, with set 1 on top. The sets are the following:

- Set 1 which displays "today - in 1 month" with low reward for waiting
- Set 2 which displays "in 1 month - in 2 months" with low reward for waiting
- Set 3 which displays "in 1 month - in 2 months" with high reward for waiting
- Set 4 which displays "in 1 month - in 6 months" with high reward for waiting

Before meeting with a new respondent make sure that sets are in the correct order.]

## [Opening Instructions]

*Good morning, my name is \_\_\_\_\_*

*Today we are going to play a game. For participating in this game you will receive some money for sure. You are going to be paid with vouchers that you can redeem at GONESA's main office.*

*There is no right or wrong answer in this game. We will first practice together, then we will play for real. I will tell you when we will start playing for real.*

## [Practice #1: Making the Respondent Familiar with the Game's Material]

### [1. Take out the Example Frame displaying the 150 today and 165 in 1 month option

Say: ]

*In this game you will have to choose among 3 different options.*

*Let me first show you an example of what these options look like.*

*An option pays money in two dates: some money **today** and some money **in 1 month**.*

*In this game when could you get some money?*

(Correct answer: **today and in 1 month**)

*The amount of money below the **yellow** label shows how much money you get paid **today**. The amount of money below the **red** label shows how much money you get paid **in 1 month**.*

*When do you get paid the amount of money shown below the **yellow** label?*

(Correct answer: **today**.)

*When do you get paid the amount of money shown below the **red** label?*

(Correct answer: **in 1 month**.)

*The option shown here as an example pays 150 Rs **today** and 165 Rs **in 1 month**.*

*I'll show you now the options you can choose from.*

### [1. Take out

**Set 1 displaying the 3 possible choices for "today - in 1 month"**

**The example index card**

Say: ]

*In this game you have 3 options and you have to choose one.*

*How many options do you have in this game?*

(Correct answer: **3**)

*You have to choose among the following options:*

- 250 Rs **today** and 55 Rs **in 1 month**
- 150 Rs **today** and 165 Rs **in 1 month**
- 50 Rs **today** and 275 Rs **in 1 month**

*So if you choose to wait **1 month** to get 100 Rs you will get **10 Rupees** more, but you will have to wait **1 month**.*

*And if you choose to wait **1 month** to get 200 Rs you will get **20 Rupees** more, but you will have to wait **1 month**.*

*If you choose to wait **1 month** to get **100** Rs how many Rs more will you get?*

(Correct answer: **10 Rupees**)

**[If the respondent does not answer correctly, repeat the phrases above and ask again.]**

*If you choose to wait **1 month** to get **200** Rs how many Rs more will you get?*

(Correct answer: **20 Rupees**)

**[If the respondent does not answer correctly, repeat the phrases above and ask again.]**

Now let's make sure that you know what your options are.

If you choose option 1 how many Rs will you get *today*?

(Correct answer: 250 Rupees)

If you choose option 1 how many Rs will you get *in 1 month*?

(Correct answer: 55 Rupees)

If you choose option 2 how many Rs will you get *today*?

(Correct answer: 150 Rupees)

If you choose option 2 how many Rs will you get *in 1 month*?

(Correct answer: 165 Rupees)

If you choose option 3 how many Rs will you get *today*?

(Correct answer: 50 Rupees)

If you choose option 3 how many Rs will you get *in 1 month*?

(Correct answer: 275 Rupees)

**[If the respondent does not answer correctly, explain the game again.]**

*Ok. Now, make a choice pointing at the option you prefer among the 3.*

**[Let the respondent choose. Point at the option she chose, then ask:]**

*According to your choice, how much money would you get **today**?*

*According to your choice, how much money would you get **in 1 month**?*

**[Point at the amount of money they would get **today** according to her choice, then ask:]**

*According to you choice, when would get \_\_\_\_ Rupees?*

**[Point at the amount of money they would get **in 1 month** according to her choice, then ask:]**

*According to you choice, when would get \_\_\_\_ Rupees?*

**[If the respondent does not answer correctly, explain the game again.]**

**[If the respondent answers correctly, write down her choice in the example index card.]**

*I will write down your answer to this practice decision. See this card? I will write your answer on this.*

*Here **[Point at the top part of the index card]** I will write \_\_\_\_ Rupees **today** and here **[Point at the bottom part of the index card]** I will write \_\_\_\_ Rupees **in 1 month**.*

## [Explaining Which Choice They Get Paid For]

- [1] Record the answer from Practice #1 in the questionnaire (in the line "Practice #1")
- 2) Keep displaying set 1 showing the 3 possible choices for "today - in 1 month" with high interest rate.
- 3) Put away:
  - the example index card
- 4) Take out all 4 index cards to show to the respondent that there are numbers written on the back of each card.]

*We will play the game for real in a moment.*

*We will play the game 4 times. In each game you will have to choose between 3 options. One of the 4 games will be selected to be paid and you will be paid the option you chose in the selected game. Now I will explain to you how we will determine which choice you are paid for.*

*When you make the real decisions, we will record your answers on cards like these.*

- [1] Turn over all index cards to show to the respondent that there are numbers written on the back of each card.
- 2) Take out the dice.]

*Then, we will use this dice to decide which card is selected. See the numbers on the back of these cards? We will roll this dice, and then whichever card has the number that comes up on the dice is the card that we will use for your vouchers.*

- [Give the respondent the dice, and let her roll.  
Point at the number on the selected card and say:]

*Since the number on the dice is \_\_\_\_, that matches this card.*

- [Turn the selected card over and say:]

*This was just for practice, but if it had been the real decision, since this card won, you would get paid \_\_\_\_ Rupees (time in the top part of the selected card) and \_\_\_\_ Rupees (time in the bottom part of the selected card). You would get two vouchers.*

- [Show her 2 example vouchers and say:]

*You would receive one voucher that you could redeem starting (time in the top part of the selected card) for \_\_\_\_ Rupees and a second voucher that you could redeem starting (time in bottom part of the selected card) for \_\_\_\_ Rupees.*

*The important thing to remember when playing the game is that any of the choices you make could end up being the one you get paid for. So it is important to always make careful decisions and think about which option you really prefer.*

## Actual Game

- [1] Put away all index cards and the dice
- 2) Keep displaying Set 1
- 3) Take out index card #1
- 4) Say:]

\*\*\*\*\*

### GAME 1

*Let's play the real game for real now for the **first** time.  
As before you have 3 options and you have to choose one.*

*In this game you can get paid some money **today** and some money **in 1 month**.*

*In this game when could you get some money?  
(Correct answer: **today AND in 1 month**)*

*The amount of money below the **yellow** label shows how much money you get paid **today**. The amount of money below the **red** label shows how much money you get paid **in 1 month**.*

*When do you get paid the amount of money shown below the **yellow** label?  
(Correct answer: **today**.)*

*When do you get paid the amount of money shown below the **red** label?  
(Correct answer: **in 1 month**.)*

*You have to choose among the following options:*

- 250 Rs **today** and 55 Rs **in 1 month**
- 150 Rs **today** and 165 Rs **in 1 month**
- 50 Rs **today** and 275 Rs **in 1 month**

*So if you choose to wait **1 month** to get 100 Rs you will get **10 Rupees** more, but you will have to wait **1 month**.*

*And if you choose to wait **1 month** to get 200 Rs you will get **20 Rupees** more, but you will have to wait **1 month**.*

*Ok. Now, make a choice pointing at the option you prefer among the 3. When you have decided, I will write down your answers on this card. Remember that later, we will roll a dice, and this card could end up being the one that wins and you get paid for. So please think very carefully about the money you want **today** and the money you want **in 1 month**.*

**[Let the respondent choose then point at the amount of money she would get **today**, according to her choice, then ask:]**

*According to your choice, how much money would you get **today**?*

**[Point at the amount of money she would get today, according to her choice, then ask:]**

*According to your choice, how much money would you get **in 1 month**?*

*The way you have chosen, you could get \_\_\_\_ **Rupees today**, and \_\_\_\_ **Rupees in 1 month**. Do you like this choice, or do you want to try again?*

- [1] Let the respondent think as much as she wants and let her ask questions.
- 2) Once she is satisfied, write the Rupees amount on index card #1
- 3) Record the answer from Game #1 in the questionnaire (in the line "Game #1")
- 4) Put index card #1 on the right hand side of the respondent with the card number in display.
- 5) Put away Set 1 so that Set 2 shows.
- 6) Then, take out index card #2
- 7) Say:]

## GAME 2

Now let's play the game for real for a *second* time.  
As before you have 3 options and you have to choose one.  
However, now you can get paid some money in *1 month* and some money in *2 months*.

In this game when could you get some money?  
(Correct answer: *in 1 month AND in 2 months*)

The amount of money below the *red* label shows how much money you get paid *in 1 month*.  
The amount of money below the *blue* label shows how much money you get paid *in 2 months*.

When do you get paid the amount of money shown below the *red* label?  
(Correct answer: *in 1 month*.)  
When do you get paid the amount of money shown below the *blue* label?  
(Correct answer: *in 2 months*.)

You have to choose among the following options:

- 250 Rs *in 1 month* and 55 Rs *in 2 months*
- 150 Rs *in 1 month* and 165 Rs *in 2 months*
- 50 Rs *in 1 month* and 275 Rs *in 2 months*

So if you choose to wait *2 months* instead of 1 month to get 100 Rs you will get *10 Rupees* more, but you will have to wait *2 months* instead of 1 month.  
And if you choose to wait *2 months* instead of 1 month to get 200 Rs you will get *20 Rupees* more, but you will have to wait *2 months* instead of 1 month.

Ok. Now, make a choice pointing at the option you prefer among the 3. When you have decided, I will write down your answers on this card. Remember that later, we will roll a dice, and this card could end up being the one that wins and you get paid for. So please think very carefully about the money you want *in 1 month* and the money you want *in 2 months*.

**[Point at the amount of money they would get today according to her choice, then ask:]**

According to your choice, how much money would you get in *in 1 month*?

**[Point at the amount of money they would get today according to her choice, then ask:]**

According to your choice, how much money would you get *in 2 months*?

The way you have chosen, you could get \_\_\_\_ *Rupees in 1 month*, and \_\_\_\_ *Rupees in 2 months*.  
Do you like this choice, or do you want to try again?

**[1] Let the respondent think as much as she wants and let her ask questions.**

**2) Once she is satisfied, write the Rupees amount on index card #2**

**3) Record the answer from Game #2 in the questionnaire (in the line "Game #2")**

**4) Put index card #2 on the right hand side of the respondent with the card number in display.**

**5) Put away Set 2 so that Set 3 shows.**

**6) Then, say:]**

## [Practice #2: The Respondent Practices Playing the Game once again]

[1] Take away:

- Set 2 displaying the 3 possible choices for “in 1 month – in 2 months” with low interest rate

2) Take out:

- Set 3 displaying the 3 possible choices for “in 1 month – in 2 months” with high interest rate]

*Now let's practice playing the game one more time, before you get to play again. The difference is that now you get even more money if you decide to wait.*

*Now if you choose to wait 2 months instead of 1 month to get 100 Rs you will get 40 Rupees more, but you will have to wait 2 months instead of 1 month.*

*And if you choose to wait 2 months instead of 1 month to get 200 Rs you will get 80 Rupees more, but you will have to wait 2 months instead of 1 month.*

*If you choose to wait 2 months to get 100 Rs how many Rs more will you get?*

(Correct answer: 40 Rupees)

**[If the respondent does not answer correctly, repeat the phrases above and ask again.]**

*If you choose to wait 2 months to get 200 Rs how many Rs more will you get?*

(Correct answer: 80 Rupees)

**[If the respondent does not answer correctly, repeat the phrases above and ask again.]**

*As before, the amount of money below the red label shows how much money you get paid in 1 month. The amount of money below the blue label shows how much money you get paid in 2 months.*

*You have to choose among the following options:*

- 250 Rs in 1 month and 70 Rs in 2 months
- 150 Rs in 1 month and 210 Rs in 2 months
- 50 Rs in 1 month and 350 Rs in 2 months

*Ok. Now, make a choice pointing at the option you prefer among the 3.*

**[Let the respondent choose then say:]**

*According to your choice, how much money would you get in 1 month?*

*According to your choice, how much money would you get in 2 months?*

**[Point at the amount of money they would get in 1 month according to her choice, then ask:]**

*According to you choice, when would get \_\_\_\_ Rupees?*

**[Point at the amount of money they would get in 2 months according to her choice, then ask:]**

*According to you choice, when would get \_\_\_\_ Rupees?*

**[1] Record the answer from Practice #2 in the questionnaire (in the line “Practice #2”)**

**2) KEEP DISPLAYING set 3 showing the 3 possible choices for “in 1 month – in 2 months” with high interest rate.]**

### GAME 3

Now let's play the game for real for a *third* time.

As before you have 3 options and you have to choose one.

In this game you can get paid some money in *1 month* and some money in *2 months*.

In this game when could you get some money?

(Correct answer: *in 1 month AND in 2 months*)

The amount of money below the *red* label shows how much money you get paid *in 1 month*.

The amount of money below the *blue* label shows how much money you get paid *in 2 months*.

When do you get paid the amount of money shown below the *red* label?

(Correct answer: *in 1 month*.)

When do you get paid the amount of money shown below the *blue* label?

(Correct answer: *in 2 months*.)

You have to choose among the following options:

- 250 Rs *in 1 month* and 70 Rs *in 2 months*
- 150 Rs *in 1 month* and 210 Rs *in 2 months*
- 50 Rs *in 1 month* and 350 Rs *in 2 months*

So if you choose to wait *2 months* instead of 1 month to get 100 Rs you will get *40 Rupees* more, but you will have to wait *2 months* instead of 1 month.

And if you choose to wait *2 months* instead of 1 month to get 200 Rs you will get *80 Rupees* more, but you will have to wait *2 months* instead of 1 month.

Ok. Now, make a choice pointing at the option you prefer among the 3. When you have decided, I will write down your answers on this card. Remember that later, we will roll a dice, and this card could end up being the one that wins and you get paid for. So please think very carefully about the money you want *in 1 month* and the money you want *in 2 months*.

**[Point at the amount of money they would get today according to her choice, then ask:]**

According to your choice, how much money would you get in *in 1 month*?

**[Point at the amount of money they would get today according to her choice, then ask:]**

According to your choice, how much money would you get *in 2 months*?

The way you have chosen, you could get \_\_\_\_ *Rupees in 1 month*, and \_\_\_\_ *Rupees in 2 months*.  
Do you like this choice, or do you want to try again?

**[1] Let the respondent think as much as she wants and let her ask questions.**

**2) Once she is satisfied, write the Rupees amount on index card #3**

**3) Record the answer from Game #3 in the questionnaire (in the line "Game #3")**

**4) Put index card #3 on the right hand side of the respondent with the card number in display.**

**5) Put away Set 3 so that Set 4 shows.**

**6) Then, take out index card #4**

**7) Say:]**



**GAME 4**

Now let's play the game for real for a *fourth* time.  
As before you have 3 options and you have to pick one.  
However, now you can get paid some money in *1 month* and some money in *6 months*.

In this game when could you get some money?  
(Correct answer: *in 1 month AND in 6 months*)

Notice that now you have to wait even more if you want to get paid more!!!  
Now to get more Rs you have to wait *6 months*, not *2 months*!

Now, how many months do you have to wait to get more Rupees?  
(Correct answer: *6 months*)  
**[If the respondent does not answer correctly, repeat the phrase above and ask again.]**

The amount of money below the *red* label shows how much money you get paid *in 1 month*.  
The amount of money below the *green* label shows how much money you get paid *in 6 months*.

When do you get paid the amount of money shown below the *red* label?  
(Correct answer: *in 1 month*.)  
When do you get paid the amount of money shown below the *green* label?  
(Correct answer: *in 6 months*.)

You have to choose among the following options:

- 250 Rs *in 1 month* and 70 Rs *in 6 months*
- 150 Rs *in 1 month* and 210 Rs *in 6 months*
- 50 Rs *in 1 month* and 350 Rs *in 6 months*

So if you choose to wait *6 months* instead of 2 months to get 100 Rs you will get *40 Rupees* more, but you will have to wait *6 months* instead of 2 months.  
And if you choose to wait *6 months* instead of 2 months to get 200 Rs you will get *80 Rupees* more, but you will have to wait *6 months* instead of 2 months.

If you choose to wait *6 months* to get *100* Rs how many Rs more will you get?  
(Correct answer: *40 Rupees*)  
**[If the respondent does not answer correctly, repeat the phrases above and ask again.]**

If you choose to wait *6 months* to get *200* Rs how many Rs more will you get?  
(Correct answer: *80 Rupees*)  
**[If the respondent does not answer correctly, repeat the phrases above and ask again.]**

Ok. Now, make a choice pointing at the option you prefer among the 3. When you have decided, I will write down your answers on this card. Remember that later, we will roll a dice, and this card could end up being the one that wins and you get paid for. So please think very carefully about the money you want *in 1 month* and the money you want *in 6 months*.

**[Point at the amount of money they would get today according to her choice, then ask:]**  
According to your choice, how much money would you get in *in 1 month*?  
**[Point at the amount of money they would get today according to her choice, then ask:]**  
According to your choice, how much money would you get *in 6 months*?

The way you have chosen, you could get \_\_\_\_ *Rupees in 1 month*, and \_\_\_\_ *Rupees in 6 months*.  
Do you like this choice, or do you want to try again?

- [1] Let the respondent think as much as she wants and let her ask questions.
- 2) Once she is satisfied, write the Rupees amount on index card #4
- 3) Record the answer from Game #4 in the questionnaire (in the line "Game #4")
- 4) Put index card #4 on the right hand side of the respondent with the card number in display.
- 5) Put away all the material except the 4 index cards and the questionnaire.
- 6) Say:]

Before we roll the dice to determine which of the choices you just made will be the one you get paid, we would like to ask you a few questions

### FILL IN QUESTIONS A1-A6 BEFORE GOING AHEAD WITH THE PROTOCOL

I would like to ask some detailed questions about your savings.

Please let me remind you that any information that you will provide will be kept strictly confidential. This means that no one inside or outside your community will know about it.

<b>A1</b>	<b>How much savings do you and your household have right now?</b> <b>Please include cash at home, savings in a bank, in a savings organization, in a DHUKUTI, etc.</b> (Prompt answer)	Rupees <table style="display: inline-table; border: 1px solid black; width: 100px; height: 20px; vertical-align: middle;"></table> If none, write 0 If the respondent does not know write 99. If the respondent does not want to answer write 88.
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Now I would like to ask some detailed questions about your income.

Please let me remind you that any information that you will provide will be kept strictly confidential. This means that no one inside or outside your community will know about it.

**Control Variable: NO. OF SOURCE OF INCOME(only for data entry purpose): \_\_\_\_\_**

	<b>A2</b>	<b>A3</b>
List the different sources of household cash income starting with the most relevant.	<b>Source of household cash income.</b> (Use the codes listed below)	<b>Please give me your best estimate of your household cash income LAST WEEK.</b> Amount in Rupees
<b>1<sup>st</sup> source of income</b>		
<b>2<sup>nd</sup> source of income</b>		
<b>3<sup>rd</sup> source of income</b>		
<b>4<sup>th</sup> source of income</b>		
<b>5<sup>th</sup> source of income</b>		

**CODE for G1 (Source of household income):**

- |  |                                    |                                |   |
|--|------------------------------------|--------------------------------|---|
| 1. Income from sales of agr.production   | 5. Income from constr. and masonry | 11. Jewelry income             | 17. Other_____  |
| 2. Income from agricultural labor        | 6. Driver                          | 12. Government job (full time) | 18. Alcohol making  |
| 3. Income from livestock and poultry     | 7. Bus fare collector              | 13. Teacher                    | 19. Private Job (full time)   |
| 4. Income from sand and stone collection | 8. Helper                          | 14. Pension                    | 20. Parttime/temporary job not listed in the previous sources of income |
|  | 9. Income from a small shop        | 15. Rent                       |   |
|  | 10. Garment and wool spinning      | 16. Remittances                |   |

Now I would like to ask some detailed questions about your loans.

Please let me remind you that any information that you will provide will be kept strictly confidential. This means that no one in the community or outside the community will know about it.

<b>A4</b>	<b>How much money do you and your household currently owe?</b> (Prompt answer)	Rupees <table style="display: inline-table; border: 1px solid black; width: 100px; height: 20px; vertical-align: middle;"></table> If the respondent does not know write 99. If the respondent does not want to answer write 88. (If household don't have any loan, Write "0" and skip to BLOCK D, but please make sure the household did not borrow any money asking all the options mentioned in H2 below)
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I will now ask about all the purchases made for your household in the LAST WEEK, regardless of which person made them.

INSTRUCTIONS: Write the answer or the code corresponding to the answer given by the respondent in the appropriate space below.

	<b>A5</b>	<b>A6</b>
	<b>How many days did your household eat .....</b> ? DNK ... 99. DNA ...88.	<b>How many days in a typical week during the next month do you think your household will eat .....</b> ? DNK ... 99. DNA ...88
<b>Item</b>	<b>Days</b>	<b>Days</b>
<b>1. Goat/Lamb</b>		
<b>2. Chicken/Poultry</b>		
<b>3. Buffalo/Beef</b>		
<b>4. Pork</b>		
<b>5. Fish</b>		

## Instructions for Lottery-Choice Task

[1] Before starting to play the Head-Tail game, make sure you have put next to the respondent, but not visible, the 4 index cards.

2) Take out:

- The Head Tail Example Frame displaying **40 Rs** if the coin lands on **heads** and **10 Rs** if the coin lands on **tails**.
- The coin for the Head-Tail Game

Say:]

*Before we roll the dice to decide which card is selected, we will play one last game.*

*For participating in this game you will receive some money for sure. You are going to be paid with a third voucher that you can redeem at GONESA's main office starting in 1 month.*

*There is no right or wrong answer in this game. Let me explain you first how we play this game.*

*How much money you win in this game will depend on what comes up when you toss this coin here. **[Hand the subject the coin and let them look at it]***

*In this game you have to choose among five different options.*

*Here is an example of how an option in this game looks like.*

**[Point at the Head Tail Example Frame]**

*An option pays one amount if the coin lands on "heads" and a different amount if the coin lands on "tails".*

*The amount of money above the coin landing **heads** up shows how much money you get paid if the coin lands on **heads**. The amount of money above the coin landing **tails** up shows how much money you get paid if the coin lands on **tails**.*

*When do you get paid the amount of money shown above the coin landing **heads**?*

**[Point at the coin landing heads]**

*(Correct answer: If the coin lands on **heads**.)*

*How much do you get paid if the coin lands **heads**?*

*(Correct answer: **40**.)*

*When do you get paid the amount of money shown above the coin landing **tails** up?*

**[Point at the coin landing tails]**

*(Correct answer: If the coin lands on **tails**.)*

*How much do you get paid if the coin lands **tails**?*

*(Correct answer: **10**.)*

*The option shown here as an example pays **40 Rs** if the coin lands on **heads** and **10 Rs** if the coin lands on **tails**.*

*This was only an example. Let me show you now the options you can choose from.*

[1] Record the answer from this Practice in the questionnaire (in the line "Practice Head Tail").

2) Put away the Head Tail Example Frame.

3) Take out the Head-Tail set made of 5 laminated colored papers representing the 5 possible choices.

4) Point to the first option and say:]

You have to choose among the following options:

- 20 Rs if the coin lands on *heads* and 20 Rs if the coin lands on *tails*
- 30 Rs if the coin lands on *heads* and 15 Rs if the coin lands on *tails*
- 40 Rs if the coin lands on *heads* and 10 Rs if the coin lands on *tails*
- 50 Rs if the coin lands on *heads* and 5 Rs if the coin lands on *tails*
- 55 Rs if the coin lands on *heads* and 0 Rs if the coin lands on *tails*

If you choose one of the options where you get more money when the coin lands on *heads*, then you get less money if the coin lands instead on *tails*.

Now let's make sure that you know what your options are.

If you choose *yellow* how many Rs will you get if the coin lands on *heads*?

(Correct answer: 20 Rupees)

If you choose *yellow* how many Rs will you get if the coin lands on *tails*?

(Correct answer: 20 Rupees)

If you choose *blue* how many Rs will you get if the coin lands on *heads*?

(Correct answer: 30 Rupees)

If you choose *blue* how many Rs will you get if the coin lands on *tails*?

(Correct answer: 15 Rupees)

If you choose *red* how many Rs will you get if the coin lands on *heads*?

(Correct answer: 40 Rupees)

If you choose *red* how many Rs will you get if the coin lands on *tails*?

(Correct answer: 10 Rupees)

If you choose *green* how many Rs will you get if the coin lands on *heads*?

(Correct answer: 50 Rupees)

If you choose *green* how many Rs will you get if the coin lands on *tails*?

(Correct answer: 5 Rupees)

If you choose *pink* how many Rs will you get if the coin lands on *heads*?

(Correct answer: 55 Rupees)

If you choose *pink* how many Rs will you get if the coin lands on *tails*?

(Correct answer: 0 Rupees)

**[If the respondent does not answer correctly, explain the game again.]**

Ok. Now, make a choice pointing at the option you prefer among the 5.

**[Let the respondent choose.**

You have selected the [*say the color*] option.

**Point at the option she chose, then ask:]**

According to your choice, how much money will you get if the coin lands on *heads*?

According to your choice, how much money will you get if the coin lands on *tails*?

**[If the respondent does not answer correctly, explain the game again.**

**[1) Allow the participant to change her choice if she wants and then repeat the question.**

**2) Continue until she is sure of her choice.**

**3) Record the answer from the Head-Tail Game in the questionnaire (in the line "Head-Tail Game").]**

*Thank you for being patient with this game. Now, toss the coin to see how much you will get paid.*

- [1. Give the coin to the respondent to toss.**
- 2. Show her how much she gets.]**

*Since the coin landed on \_\_\_\_, this is the money you will get.  
I will now fill out the vouchers for this amount.*

- [1. Fill out the voucher and let the respondent clearly see that you are writing out the voucher to match her choice.**
- 2. Record the voucher amount in the ledger.**
- 3. Sign the voucher**
- 4. Give the voucher to the respondent.]**

## **Choosing an allocation (Card selection) for Game 1**

- [1. Put away the questionnaire**
- 2. Take the dice**
- 3. Put all 4 index cards in front of the respondent and display their numbers.**
- 4. Say:]**

*Thank you for being patient with all of these decisions and questions. Now, roll the dice to find out which of your choices, for the game we played at the beginning, you will be paid for.*

- [1. Give the dice to the respondent to roll.**
- 2. Show her which card wins.]**

*Since you rolled a \_\_\_\_, this is the card that matches.  
I will now fill out the vouchers for this card.*

- [1. Let the respondent hold the index card that was chosen.**
- 2. Fill out the vouchers and let the respondent clearly see that you are writing out the vouchers to match her choice.**
- 3. Record the voucher amounts in the ledger.**
- 4. Sign the vouchers**
- 5. Give the vouchers to the respondent**
- 6. Get the index card back and erase the content.]**