Putting Preference for Randomization to Work

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This study presents the first randomized field experiment of using a randomization device—coin-flipping—to help resolve choice difficulty. In a setting of charity giving, potential donors choose between two similarly favorable charities. We find when a coin-flipping option is included to decide between the two charities, the donation rate increases by 20 percent. Consistent with the notion of preference for randomization, results from two subsequent laboratory experiments show that participants are more likely to choose the coin-flipping option when the decision takes more time to make, when the two charities are similarly attractive, or when participants exhibit stochastic choice.

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I. Introduction

Imagine that an equally hungry and thirsty ass is placed exactly midway between a stack of hay and a pail of water, and it will go to whichever is closer. Since it cannot choose between hay and water, it dies of both hunger and thirst. This thought experiment, known as Buridan's Ass Paradox, is often used to illustrate the paradoxical consequence resulting from facing a difficult choice. Choice difficulty is experienced not only for important decisions, such as which career path to take and whom to marry, but also for small decisions, such as which clothes to wear or what to have for dinner. It is commonly observed that the difficult choice leads decision makers to be overly cautious in making choices, excessively seek new alternatives, to choose the default option, or to procrastinate when making the decision (Tversky and Shafir 1992; Madrian and Shea 2001; Iyengar and Kamenica 2010; Levitt 2016).

In this study we investigated the use of randomization as a nudge to resolve choice difficulty. Throughout human history (e.g., in the writings of the I Ching or the Bible), random devices have been widely adopted as a means of making decisions, resolving disputes and discerning divine guidance. In modern times, random selection is commonly used in politics, sports, and public policy. Moreover, some smartphone Apps are designed as randomization devices, which allow users to put the options being considered on a virtual spinner wheel and randomly select an option. Some users commented that such Apps are "*the cure for indecisiveness*" and "*fast, easy, and perfect decision maker*".[1]

Preference for randomization has also intrigued economists for a long time, and theories have provided various rationales. In social decision making, people use

[1] For example, an app named *Decide Now!* describes itself as "*Can't decide? Or afraid of making the wrong choice? The original Decide Now! app is here to help you!*" This app has an average rating of 4.1 from 3,296 customers in Google Play and 4.7 from 503 customers in Apple Store.

randomization to allocate resources, assign tasks, and resolve disputes, as randomization reflects the notion of *ex ante* or procedural fairness (e.g., Fudenberg and Levine 2012; Saito 2013; Brock, Lange, and Ozbay 2013; Ray and Robson, 2018).[2] In a well-known example of preference for randomization (Diamond 1967; Machina 1989), a mother is to allocate an indivisible good between two equally favorable children. Despite being indifferent between allocating the good to either child, she strictly prefers randomizing her choice by flipping a coin to choosing a specific child to receive the good. In individual decision making, people may also prefer randomization between two equally attractive lotteries over either lotteries (Machina 1985; Chew, Epstein, and Segal 1991; Cerreia-Vioglio et al. 2019), when they are to minimize regret, achieve multiple goals, hedge across uncertain tastes. It has also been suggested that randomization can be used to eliminate ambiguity (Raiffa 1961; Gilboa and Schmeidler 1989; Saito 2015; Ke and Zhang 2020).

While use of a randomization device to make decisions is widely observed in practices and well-grounded in theories, it remains unclear how to put it to work and when it will work in the applied setting. We present several experiments on using coin flipping in the setting of charity giving and hypothesize that the inclusion of a coin-flipping option increases donation when the choice is hard, but not when it is relatively easy.

The first experiment is a randomized controlled field experiment with 1,464 street survey respondents. Each respondent receives $5 as compensation for completing a short survey and is asked whether she would like to keep the $5 or to donate the money to a charity, either the Alzheimer's Disease Association of Singapore

[2] Ray and Robson (2018) provide a theoretical model for randomized order for authorship. The authors of an online textbook entitled *The Economy* (CORE Team 2017) explained why they named the calculus supplements *Leibniz*: "*Modern historians accept that Newton and Leibniz invented calculus independently, at about the same time. Therefore, to decide whom to name the calculus supplements after, we tossed a coin. Leibniz won*."

(ADAS) or the Diabetic Society of Singapore (DSS). In the “hard” treatment, if they are to donate the $5, they must choose between two charities. In the “easy” treatment, to reduce choice difficulty, one charity is endowed with a 100 percent matching donation (an additional $5) if they choose to donate to that charity, and the other charity is not. In the “no-coin” treatment, participants have three options: keeping the money, donating the money to ADAS, and donating the money to DSS. In the “coin” treatment, they are given an additional option of coin flipping: if the coin lands on heads (tails), the donation will be given to ADAS (DSS). In summary, we adopt a 2 × 2 design comprising the four conditions hard/no-coin, hard/coin, easy/no-coin, and easy/coin.

We observe that inclusion of a coin-flipping option significantly increases the donation rate from 52.7 percent in the hard/no-coin condition to 63.5 percent in the hard/coin condition. In contrast, the donation rates are not significantly different between easy/no-coin condition (63.9 percent) and easy/coin condition (63.0 percent). Moreover, participants are significantly more likely to choose coin flipping in the hard/coin condition (24.3 percent) compared to the easy/coin condition (14.4 percent). These results support the hypothesis that coin flipping increases donation when the choice is hard but not when it is easy.

As a complementary approach to the field experiment (Czibor, Jimenez-Gomez, and List 2019), two laboratory experiments are conducted to examine the replicability of the results and to identify the underlying mechanism. In the first laboratory experiment, we use a within-subject design with 2 (hard vs. easy) × 2 (coin vs. no-coin) conditions. In each condition, participants undergo a number of similar decisions. We replicate the observations in the field experiment that participants are significantly more likely to donate and to choose the coin-flipping option when the choice is hard but not when it is easy. We further explore the underlying mechanism with the following observations. First, participants who switch between the two charities across decisions in hard/no-coin condition—an indication of stochastic choice—are more likely to choose coin flipping in the hard/coin condition. Second, the response time in the hard/no-coin condition—a measure of choice difficulty—is positively correlated with the likelihood of choosing the coin-flipping option in the hard/coin condition; such a relationship was not observed in the easy conditions. Third, participants are asked a hypothetical question about their preferred proportion of one million dollars to allocate between the two charities, and those who allocate more equally are more likely to choose the coin-flipping option when the choice is hard but not when the choice is easy. Finally, when asked the reason for using coin flipping in the post-experiment questionnaire, 58.7 percent state reasons in terms of choice difficulty, such as "It is hard to determine." These results suggest that choice difficulty underpins preference for randomization.

The second laboratory experiment aims to examine the role of commitment underlying preference for randomization (Machina 1989). More specifically, if a decision maker prefers flipping a coin over choosing either of the two charities, after the charity option is realized by coin flipping, she might continue to prefer coin flipping rather than the realized option. That is, she cannot commit to the realized charity through randomization. In this sense, participants may find that the coin-flipping option in the first two experiments has a commitment value, as we clearly specify as follows: if the coin lands on heads (tails), the donation will be given to ADAS (DSS). In a second laboratory experiment, we examine whether commitment value is critical for coin flipping to work. In a within-subject design, we include an additional condition of hard/coin-no-commitment with the two earlier conditions of hard/no-coin and hard/coin. More specifically, in the hard/coin-no-commitment condition, participants can toss the coin as many times as they want and are free to specify the correspondence between heads or tails of the coin flip and the two charities. We observe that participants are significantly more likely to choose coin flipping in the hard/coin condition than in the hard/coin-no-commitment condition. While the donation rate significantly increases in both the hard/coin and the hard/coin-no-commitment conditions, there is no significant difference in donation between the two conditions. This suggests that participants prefer to use a randomization device with commitment value, but their increased donation may not be solely motivated by the commitment value. [3]

Our study sheds light on the literature of preference for randomization. Models have been proposed to account for preference for randomization through *ex ante* fairness (Karni and Safra 2002; Trautmann 2009; Trautmann and Wakker 2010; Fudenberg and Levine 2012; Saito 2013). Laboratory experiments have shown that participants exhibit a preference for randomization. For example, Sandroni, Ludwig, and Kircher (2013) observe that 30 percent of the participants choose a randomization option over each of two deterministic allocations between oneself and the other participant in the laboratory.[4] In our setting, the coin-flipping option provides a way to achieve *ex ante* fairness between the two charities and thus increase the amount of donation in the hard condition. In contrast, the coin-flipping option in the easy condition does not completely lead to *ex ante* fairness and it also reduces social efficiency as it is possible that the money will be donated to the charity without matching.

While our experiments do not explicitly involve risks, there may be implicit risks associated with incomplete information about charities. In this respect, decision makers may regard the donations to charities as lotteries. Preference for

[3] Andreoni et al. (2020) examine dynamic consistency in social preference in which a substantial proportion of subjects choose ex-ante fair allocation ex-ante and switch to ex-post fair allocation ex-post. They further show that while 40% subjects exhibit a preference for commitment, they are actually those subjects who are least likely to switch. They interpret the observed preference for commitment as to avoid submitting their preferences twice rather than to avoid revisions.

[4] Studies about *ex ante* fairness and the trade-off with *ex post* fairness include Karni, Salmon and Sopher (2008), Sandroni, Ludwig, and Kircher (2013), Bolton and Ockenfels (2010), Cappelen et al. (2013), Krawczyk and Le Lec (2010), Rohde and Rohde (2011), Brock, Andreas, and Ozbay (2013) and Andreoni et al. (2020). See also Miao and Zhong (2017) and Qiu and Ong (2017) on preference for randomization across social allocation.

randomization over lotteries is incompatible with models satisfying the betweenness axiom (a weakened form of the independence axiom in expected utility), and can be accounted for by models with convex preference in the probabilistic mixture (Quiggin 1982; Chew, Epstein, and Segal 1991; Cerreia-Vioglio, Dillenberger, and Ortoleva 2015).[5] Closely related to convex preference is the notion of deliberate randomization in which stochastic choice may arise when preference is deterministic and convex (Machina 1985; Cerreia-Vioglio et al. 2019). In our setting, the randomization option may be preferred in the hard condition when donating to each of the two lotteries are more or less in the same indifference curve, but it may not be favorable in the easy condition as donating to the charity with matching will likely to be preferred to donating to the charity without matching. Moreover, when the qualities of the two charities are ambiguous, randomization may be used as a way to hedge ambiguity (Raiffa 1961; Gilboa and Schmeidler 1989; Saito 2015; Ke and Zhang 2020).

Our study is related to recent investigations in support of preference for randomization. Agranov and Ortoleva (2017) show that participants switch their choices when choosing between a pair of lotteries knowing that the same pair is presented thrice in a row. In particular, the switching behavior is observed when the choice is hard but not when choice is easy. Dwenger, Kübler, and Weizsäcker (2018) observe a similar switching pattern when students choose a university. These results are consistent with the notion of deliberate randomization: the decision maker consciously randomizes the options in her mind according to some probability distribution for each of the choices, and the randomization gives rise to the observed switching pattern.[6] Some experiments further suggest that decision

[5] A number of laboratory experiments have provided support for convex preference (See Camerer and Ho, 1994; Feldman and Rehbeck, 2018, and references therein).

[6] Chew et al. (2019) show that preference for randomization may provide a partial account for multiple switching behavior in the price list elicitation of risk preference. Agranov and Ortoleva

makers may have demand for using external randomization device. Levitt (2016) reports that participants are willing to follow the advice of coin flipping on whether to maintain the status quo regarding major life decisions in a sizable randomized field experiment. Compared to those who were told by the coin to maintain the status quo, participants are told by the coin toss to make a change are much more likely to make a change and are happier six months later. Agranov and Ortoleva (2017) report that 29 percent of participants are willing to pay a small cost to flip a coin to make decisions. Cettolin and Riedl (2019) observe that about one-third of participants are willing to pay a small cost to randomize their choices, and half of these participants are unwilling to do so.

Our study points out a possibility to use randomization as a nudge to help resolve choice difficulty. In the setting of charity giving, our proposed method is particularly relevant given that the number of charities has increased over time. For example, based on the National Center for Charitable Statistics in the United States, the number of public charities increased from 597,236 in 1998 to 1,097,689 in 2016. While this surge in the number of charities may serve diverse needs of potential donors, it may also lead to choice difficulty as a result of choice overload[7]. In this regard, our study also contributes to recent field experiments on charitable giving and prosocial behavior (List and Lucking-Reiley 2002; Levitt and List 2007; List 2011; Gneezy et al., 2012; Andreoni and Payne, 2013; Gneezy, Keenan, and Gneezy 2014; Ai et al. 2016; Andreoni, Rao, and Trachtman 2017).

(2017) capture ranges of preferences for which agents prefer neither of two options, but rather to randomize between them. Agranov, Healy, and Nielsen (2020) show that preference for randomization is correlated across risk lotteries, probability matching setting and strategic setting, and examine some underlying mechanisms.

[7] Earlier studies have documented the choice overload phenomenon that when decision makers are confronted with large choice set, they tend to avoid choosing, to choose the default option, or to choose the simple option (Tversky and Shafir 1992; Iyengar and Lepper 2000; Iyengar and Kamenica 2010). This phenomenon can be characterized as fear of making "wrong" choice (Iyengar and Lepper 2000), decision avoidance (Dean 2008), and thinking aversion (Ortoleva 2013).

The rest of the paper is organized as follows. We present theoretical frameworks in Section 2 and report design and results of the three experiments in Sections 3 to 5. Section 6 concludes.

II. Theoretical Framework

This section provides some theoretical background of our experimental design. Participant has to decide whether to keep a fixed sum of money $5 or to donate the money to a charity. We consider two factors: whether there is an option of coin flipping and whether the choice is difficult to make. In the no-coin condition, participants are given three options: keeping the money for oneself, donating the money to charity A (the Alzheimer's Disease Association of Singapore), or donating the money to charity B (the Diabetic Society of Singapore). In the coin condition, participants are explicitly given a fourth option—flipping a coin to randomize between charities A and B, and we denote this as $0.5A + 0.5B$. In the hard condition, the amount of the money is fixed at $5 for both charities. In the easy condition, 100 percent matching fund is provided to one of the charities to increase the attractiveness of the option and to reduce choice difficulty.

Providing a coin-flipping option may increase donation for hard choice when preference is convex; that is, a decision maker deems two options A and B indifferent and prefers the probabilistic mixture of option A and B (i.e., $0.5A + 0.5B$) to either one option. By contrast, the coin-flipping option is less effective when choice is easy with 100 percent matching. In the first subsection, we discuss preference for randomization over social allocations. While there is no explicit risk associated with the amount of donation to the charities, there may be implicit risks, such as the uncertainty about the charities. Under this perspective, donation to charities may be regarded as a lottery. In the second subsection, we discuss preference for randomization over lotteries.

A. Preference for randomization in social decisions

From the perspective of social preference, our setting concerns preference $f(x_i, x_A, x_B)$, in which x_i, x_A, x_B represent the payoff for a decision maker i, charity A, and charity B, respectively. $f(x_i, x_A, x_B)$ can admit various forms of social preference such as altruism, equity, or efficiency concerns (e.g., Fehr and Schmidt 1999; Bolton and Ockenfels 2000; Charness and Rabin 2002). When there is no risk, the decision maker chooses to keep the money if the self-interest motive dominates others social motives, namely, if $f(5,0,0) > f(0,5,0)$ and $f(5,0,0) > f(0,0,5)$ in the hard condition and if $f(5,0,0) > f(0,10,0)$ and $f(5,0,0) > f(0,0,5)$ in the easy condition. When the coin-flipping option is involved, the question is how the decision maker evaluates social allocation under risk. Below, we discuss two approaches (Fudenberg and Levine 2012; Saito 2013).

The first approach is to evaluate contingent allocation in each state with social preference and then aggregate the social preference across states with risk preference. The utility $U_{ex-post}$ for a coin-flipping option between (x_i, x_A, x_B) and (y_i, y_A, y_B) is given by

(1) $$U_{ex-post} = \Theta(f(x_i, x_A, x_B), 0.5; f(y_i, y_A, y_B), 0.5),$$

where $f(\cdot)$ represents social preference over the two contingent allocations, and $\Theta(\cdot)$ represents risk preference to aggregate the social preference f in each state. $U_{ex-post}$ captures preference for *ex post* fairness since the social preference utility is applied for evaluating *ex post* allocations. Expected utility specification is incompatible with preference for randomization, as the utility of a 50 percent chance of (x_i, x_A, x_B) and a 50 percent chance of (y_i, y_A, y_B) is between the utilities of the two alternative allocations (x_i, x_A, x_B) and (y_i, y_A, y_B). That is, if $\Theta(f(5,0,0)) > \Theta(f(0,5,0))$ and $\Theta(f(5,0,0)) > \Theta(f(0,0,5))$, then $\Theta\big(f(5,0,0)\big) > \Theta(f(0,5,0), 0.5; f(0,0,5), 0.5)$. The incompatibility remains valid for a wide set of utility specifications with the risk aggregator function respecting first-order stochastic dominance. In our setting, if the decision maker with *ex post* fairness preference chooses to keep the money in no-coin conditions, she will continue to do so in coin conditions.

An alternative approach is to first evaluate the lotteries for each player using risk preference and then assess the overall utility using social preference. The utility $U_{ex-ante}$ of a coin flipping between (x_i, x_A, x_B) and (y_i, y_A, y_B) is given by

$$(2)\quad U_{ex-ante} = f\big(\Theta(x_i, 0.5; y_i, 0.5), \Theta(x_A, 0.5; y_A, 0.5), \Theta(x_B, 0.5; y_B, 0.5)\big)$$

where Θ represents risk preference for the lottery each individual receives, and f represents the social preference to aggregate the utility Θ across individuals. $U_{ex-ante}$ captures preference for *ex ante* fairness since the social preference is applied for evaluating *ex ante* allocation. While Θ can be of general risk preference, let's consider the simple case of risk neutrality, in which $U_{ex-ante} = f(05x_i + 0.5y_i, 0.5x_A + 0.5y_A, 0.5x_B + 0.5y_B)$. In the hard/coin condition, randomization delivers an *ex ante* allocation of $(0, 2.5, 2.5)$, which may be preferred to both $(0, 5, 0)$ and $(0, 0, 5)$ when the decision maker is averse to the inequity between the two charities. In the easy/coin condition, when the decision maker prefers $(0, 10, 0)$ to $(0, 0, 5)$ based on efficiency concern, she may not prefer randomization which delivers an *ex ante* allocation $(0, 5, 2.5)$. In summary, if the decision maker chooses to keep the money in no-coin conditions, she may choose the coin-flipping option in the hard-coin condition when she has *ex ante* preference toward inequity between the two charities, and may choose not to do so in the easy-coin condition when her efficiency concern dominates inequity concern.

Finally, one may consider a combinational preference $U_c(U_{ex-ante}, U_{ex-post})$, which incorporates both *ex ante* preference and *ex post* preference with an overall aggregate function U_c. For example, Saito (2013) provides axiomatization for a combinational preference in which social preference is of Fehr and Schmidt (1999), and risk preference is of expected utility. As a general combinational preference nests both *ex ante* and *ex post* fairness concerns, it can also capture preference for randomization when sufficient weight is given to *ex ante* fairness concern.

B. Preference for randomization in decision making under risk and uncertainty

As donating to charities may be seen as a lottery, we consider models of decision making under risk. We assume that donating to charity A (B) generates an uncertain payoff for the participants, denoted by F_A (F_B). Note that the coin-flipping option delivers a mixture lottery $\frac{1}{2}F_A + \frac{1}{2}F_B$. Under the expected utility model, the value of the coin-flip option is equal to the weighted average (with weights 0.5:0.5) of the values of F_A and F_B. Therefore, if participants prefer not to donate to either charity A or B, they will also prefer not to donate by choosing the coin-flipping option. The same prediction holds for a more general class of models satisfying the betweenness axiom (Chew 1989; Dekel 1986), which states that $F \succcurlyeq G$ implies $F \succcurlyeq \alpha F + (1-\alpha)G \succcurlyeq G$ for $\alpha \in [0,1]$.

For non-betweenness models, it is possible to have $\alpha F + (1-\alpha)G \succcurlyeq F\ or\ G$. That is, the decision makers may strictly prefer to randomize between two lotteries to either lottery. In the probability space, preference for randomization implies convex indifference curves. While randomization may be strictly preferred given F∼G under convex preference, it cannot provide extra value if one lottery is much better than the other. In our setting, it is conceivable for participants with convex preference to have the following preference ranking in the hard condition: $\frac{1}{2}F_A + \frac{1}{2}F_B \succcurlyeq K \succcurlyeq F_A \succcurlyeq F_B$, where K denotes keeping the money. This means that these participants will choose not to donate without the coin-flipping option but may choose the randomization option whenever available. In contrast, the participants may still rank the coin-flipping option in between the two deterministic options under easy conditions and hence are less likely to choose the randomization option when available.

Models of non-expected utility with convex preference include the rank-dependent utility of Quiggin (1982);[8] the quadratic utility of Chew, Epstein, and Segal (1991);[9] and the cautious expected utility of Cerreia-Vioglio, Dillenberger, and Ortoleva (2015).[10]

Participants may also consider donating to charities as ambiguous lotteries. For example, suppose charity A is better in an ambiguous state, and charity B is better in a complementary and equally likely state. It is possible that the decision maker chooses not to donate to either charity because of ambiguity aversion. In response to the Ellsberg paradox (Ellsberg 1961), Raiffa (1961) suggests that randomization can eliminate the effects of ambiguity. In our setting, the intuition is that, by tossing a coin to decide to which charity to donate (A if heads and B if tails), a decision maker obtains an unambiguous half-half lottery regardless of which is the better charity. Here, preference for randomization is due to ambiguity aversion, which

[8] For a lottery F with finite support $x_1 < x_2 < \cdots < x_n$ with corresponding probability $\{p_1, \cdots, p_n\}$, rank-dependent utility is: $U_{RDU}(F) = u(x_n)f(p_n) + \sum_{i=1}^{n-1} u(x_i)(f(\sum_{j=i}^{n} p_j - \sum_{j=i+1}^{n} p_j)$, where f is a strictly increasing probability weighting function and onto. It can exhibit preference for randomization when probability weighting function f is concave.

[9] For a lottery F with finite support $\{x_1, \cdots, x_n\}$ with corresponding probability $\{p_1, \cdots, p_n\}$, the quadratic utility is $U_{QU}(F) = \sum_{i=1}^{n} \sum_{j=1}^{n} \varphi(x_i, x_j)\, p_i p_j$, where $\varphi(x_i, x_j)$ is a symmetric function increasing in its first argument. One example is to have the product of two expected utility functionals, namely, $\varphi(x_i, x_j) = u(x_i)v(x_j)$.

[10] Consider the cautious expected utility for a lottery F: $U_{CEU}(F) = inf_{u \in U} c(F, u)$, where $c(F, u)$ is the certainty equivalent of lottery F calculated using the utility function u, and U is a set of vNM utility indices. One interpretation of this is that the DM are unsure about which vNM utility indices to use to evaluate the lottery, so she cautiously evaluates it with the lowest possible certainty equivalent. Cautious expected utility builds on the Negative Certainty Independence Axiom: for any two lotteries F and G, α in [0,1] and degenerate lottery δ_c, if $F \succcurlyeq \delta_c$, then $\alpha F + (1-\alpha)G \succcurlyeq \alpha\delta_c + (1-\alpha)G$, which implies preference for randomization.

states that an uncertainty-averse agent would strictly prefer to randomize between two equally desirable ambiguous acts (Gilboa and Schmeidler 1989).[11]

C. Additional considerations

Machina (1985) coins the notion that a decision maker can exhibit stochastic choice when preference is deterministic. For simplicity, when the decision maker is to choose between two lotteries F_A and F_B on the same indifference curve, the aforementioned models with convex preference will allow a preference for randomization by mixing the two lotteries. To have stochasticity when choosing between F_A and F_B, Machina (1985) assumes that the decision maker implicitly chooses a probability $p \in [0,1]$ that maximizes the utility of the probabilistic mixture $pF_A + (1-p)F_B$. In the deliberate stochastic choice model of Cerreia-Vioglio et al. (2019), decision maker is allowed to achieve the maximal element from the convex hull according to underlying preferences over lotteries. Two assumptions need further discussion in analysis of deliberate randomization. First, the decision makers satisfy reduction of the compound lottery axiom and evaluate the reduced lotteries derived from the probabilistic mixtures of the lotteries. This implies that, instead of valuing randomization as a procedure *per se*, the decision maker sees randomization as purely instrumental to obtain the desired distribution over outcomes. Second, when the decision maker is explicitly given a set of lotteries from which to choose, she implicitly considers the convex hull of the set of lotteries.

The second point is of particular relevance to our experiment. As inclusion of any option within the convex hull would not provide a new way to hedge, it should not change the final distribution of the outcomes. Thus, if the decision maker can rely on internal randomization devices to choose from the convex hull, inclusion of an

[11] See Saito (2015) and Ke and Zhang (2019) for detailed theoretical analysis on randomization under ambiguity. Bade (2015) and Baillon, Halevy, and Li (2014) discuss the validity of using the random incentive mechanism to elicit ambiguity attitude in experiments.

external randomization device such as coin-flipping option will not change the proportion of participants keeping the money. Overall, models with deliberate randomization make the explicit assumption of the convex hull as the choice set and thus predict no difference between conditions with and without coins. By contrast, the aforementioned models with convex preference is silent about this assumption, so they allow a preference for a coin-flipping option.

Cerreia-Vioglio et al. (2019) further discuss an important feature of the deliberate stochastic choice model, namely, violation of regularity. Regularity states that, if some lotteries are removed from the choice set, each of the remaining lotteries will be chosen with weakly larger probability. For deliberate stochastic choice model, removal of a lottery from the choice set may make the randomization between this lottery and remaining lotteries infeasible, and hence strictly reduce the probability of choosing some remaining lotteries. By contrast, regularity is an important feature of models of random utility.[12] For example, a widely used random utility model directly associates the utility of a lottery with a noise term $U(F) = U(F) + \varepsilon_F$. Random utility would lead to stochastic choice. For example, when ε_F is *i.i.d*. with double exponential distribution, random utility gives rise to the well-known logit probability, in which the probability of choosing F in the choice set *{F, G}* is $e^{U(F)}/(e^{U(F)} + e^{U(G)})$. In our setting, the probability of keeping money is $e^{U(K)}/(e^{U(K)} + e^{U(F_A)} + e^{U(F_B)})$ without the coin-flipping option and $e^{U(K)}/\left(e^{U(K)} + e^{U(F_A)} + e^{U(F_B)} + e^{U(0.5F_A+0.5F_B)}\right)$ with the coin-flipping option. In this regard, while adding a coin-flipping option to the choice set would reduce the probability of keeping the money, this prediction would be similarly applied for the hard condition and the easy condition.

[12] Gul and Pesendorfer (2006) axiomatize random expected utility with regularity (monotonicity) assumption. Apesteguia and Ballester (2018) compare random expected utility with the general random utility model and discuss the monotonicity property of stochastic choice functions.

III. Field Experiment

A. Experimental Design

The field experiment was conducted with street survey respondents. Participants were invited to complete a 5- to 10-minute survey in exchange for 5 Singapore dollars (S$) (≈ 3.7 US dollars). The survey contained questions on fertility intention, economic behavior, and demographic information in a two-page and double-sided format. The questions on fertility intentions and economic behavior were included for another unrelated study. After participants completed the survey, they were asked whether they would like to keep the S$5 or donate it to a charity. One purpose of presenting the donation choice after a paid survey is to induce a sense of entitlement: the option of keeping the S$5 as compensation would likely be perceived as the default option by participants. The survey was carried out by 16 undergraduate research assistants at a number of sites, including subway stations, residential areas, and shopping malls. The research assistants were unaware of the hypotheses of the study when conducting the survey. The experiment was conducted in Singapore from June to August 2017, and 1,464 street survey respondents (53 percent female, mean age = 27.7) completed the survey.[13]

Participants were randomly assigned into one of the following six experimental conditions. The first four conditions are based on a factorial design with two factors: whether the choice is difficult to make (hard vs. easy) and whether an option of coin flipping is included (no-coin vs. coin). More specifically, in the "hard/no-coin" condition, participants must choose one of three options: (1) keep the $5, (2) donate the $5 to the Alzheimer's Disease Association of Singapore (ADAS), or (3) donate the $5 to the Diabetic Society of Singapore (DSS). In the

[13] 1,480 respondents initially agreed to participate in the study. Of these, 16 were excluded because either they quit the study without completing the survey or gave incomplete responses.

“hard/coin” condition, participants are given a fourth option of coin flipping to donate $5 to “one of two organizations above randomly by tossing a coin (heads for ADAS; tails for DSS)”.[14] In the “easy/no-coin” condition, to reduce choice difficulty, a 100 percent matching donation is provided to ADAS to make this option more appealing. Correspondingly, in the “easy/coin” condition, the additional option of coin flipping is included. In addition to the four conditions, we include two conditions in which there is only one charity in the choice set. That is, they only have to make a binary choice, whether to keep the S$5 or donate it to one charity: ADAS in the “ADAS” condition or DSS in the “DSS” condition (see the Experimental Instructions in the Online Appendix B).

B. Experimental Results

First, we observe that there is no significant difference across conditions for the basic demographic characteristics such as age ($F = 1.07$, $p > 0.37$) and gender ($F = 0.14$, $p > 0.98$) (Table 1). This supports the validity of our random assignment.

TABLE 1. DEMOGRAPHICS BY CONDITION IN THE FIELD EXPERIMENT

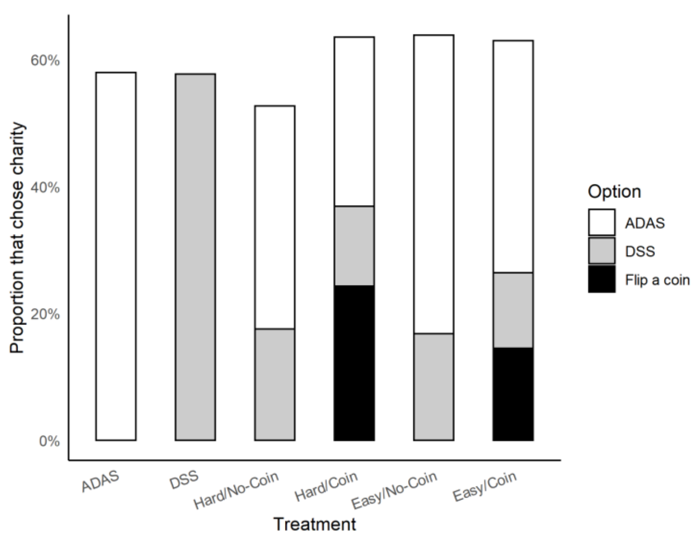
Condition	Average Age (SD)	Percent of Female	*N*
ADAS	28.7 (12.2)	53%	257
DSS	27.7 (12)	56%	234
Hard/No-Coin	26.8 (9.6)	52%	245
Hard/Coin	27.4 (10.2)	53%	255
Easy/No-Coin	28.5 (12.5)	54%	238
Easy/Coin	27.3 (10.8)	54%	235

Note: In ADAS condition participants made binary choice: keep the S$5 or donate it to the Alzheimer’s Disease Association of Singapore. In DSS condition, participants chose either to keep the S$5 or donate it to Diabetic Society of Singapore. N represents number of participants.

[14] We mainly focus on the choice difficulty between two active choice options, to donate to ADAS and to donate to DSS. Keeping the money is considered as the default option. We do not implement the randomization between whether to donate or not, as the threshold for individuals to find this decision difficult can be highly heterogeneous.

The choice proportion of each option by condition is presented in Figure 1. In the two conditions with "keep the S$5" and only one charity in the choice set, 58.0 percent and 57.7 percent of participants chose to donate to ADAS and DSS, respectively. The proportions do not differ significantly (z = 0.004, p = 0.95), which indicates that one charity is not clearly more attractive than the other. We examine donation when both charities are presented in the hard/no-coin condition. On the one hand, inclusion of both charities may increase donation as some participants may have preference for one charity over the other. On the other hand, inclusion of both charities may lead to choice difficulty and decrease the donation. We observe that the donation rate decreased from 58.0 percent in ADAS (and 57.7 percent in DSS) to 52.7 percent. While the difference in donation rate is not statistically significant between the two conditions with one charity and the hard/no-coin condition with two charities (z = 1.33, p = 0.18), this result suggests that increasing the number of charities may not result in a higher donation rate.

FIGURE 1. CHOICE PROPORTION BY CONDITIONS IN THE FIELD EXPERIMENT



In the hard/coin condition in which the coin-flipping option is introduced, 63.5 percent of participants chose to donate, which is significantly higher than that of the hard/no-coin condition (z = 2.46, p = 0.01). That is, compared to 52.7 percent, the donation rate in the hard/no-coin condition, the donation rate is increased by 20 percent when a coin-flipping option is provided. This magnitude is comparable to the impact of providing matching funds in the easy condition. More specifically, the proportion of participants choosing to donate is 63.9 percent for the easy/no-coin condition and 63.0 percent for the easy/coin condition. The difference is not significant (z = 0.2, p = 0.84). This supports our hypothesis that coin flipping increases donation when the choice is hard but not when the choice is easy.

We further conduct regression analysis to examine the results by controlling for covariates. The dependent variable of interest is a binary variable—donation decision (= 1 if participants chose to donate; otherwise = 0). We focus on two independent variables based on the 2 × 2 factorial design, Coin-flip (= 1 if in the hard/coin or easy/coin condition where a coin-flipping option was present; otherwise = 0) and Hard (= 1 if in the hard/no-coin or hard/coin condition; otherwise = 0). In the regression, we control for participant age and gender, as well as data collector fixed effects and date fixed effects. Standard errors are clustered at data collector and date levels to account for potential serial correlations within data collectors and dates. The significance level of the results is robust to exclude the fixed effects. The regression table reports the results of linear probability models and the results are robust for using probit models.

Table 2 presents regression results. Column (1) of the table shows that the main effect of Coin-flip is positive but not statistically significant at the 0.05 level. The coefficient on Hard is −0.063, which is significantly negative. This indicates that offering matching funds increases the tendency to donate by 6.3 percentage points. The magnitude of the effect of matching funds is consistent with prior studies (Karlan and List 2007). We hypothesize that offering a coin-flipping option will increase the likelihood of choosing a charity when the choice is difficult. As can be seen in Column (2), there is a significant, positive interaction effect between coin flip and Hard on the decision to donate. Since the interactions between Coin-flip and Hard are significant and positive, this suggests that offering a coin-flipping option is more likely to increase donation under conditions in which no matching funds are provided (i.e., the hard/no-coin condition).

We further analyze the data separately by hard and easy conditions, i.e., whether matching fund is offered to ADAS. In Column (3) of Table 2, we observe that the coefficient on Coin-flip is 0.098 ($p < 0.01$). That is, compared to the hard/no-coin condition, participants were 9.8 percentage points more likely to choose to donate in the hard/coin condition, which translates to a 20 percent increase from the 52.7 percent donation rate in the hard/no-coin condition. There is no significant difference between the easy/no-coin condition and easy/coin condition (Column (4)). Overall, these results suggest that coin flipping increases donation when the choice is hard but not when the choice is easy.

TABLE 2. REGRESSION RESULTS FOR DONATION DECISION IN THE FIELD EXPERIMENT

	(1) Full Sample	(2) Full Sample	(3) Hard Condition	(4) Easy Condition
Coin-flip	0.049	-0.005	0.098***	-0.028
	(0.032)	(0.043)	(0.024)	(0.047)
Hard	−0.063**	−0.116***		
	(0.032)	(0.034)		
Coin-flip × Hard		0.106***		
		(0.040)		
Age	0.003*	0.003	0.001	0.004*
	(0.002)	(0.002)	(0.003)	(0.002)
Female	0.031	0.031	0.046	0.031
	(0.032)	(0.032)	(0.049)	(0.047)
Num. obs.	972	972	500	472
R^2	0.191	0.194	0.246	0.262

Note: We include fixed effects of data collector and date of the experiment. Standard errors are clustered at data collector and date levels. Significance level: ***1%, **5%, *10%.

We further examine whether participants are more likely to choose the coin-flipping option in the hard/coin condition than the easy/coin condition. As shown in Figure 1, 24.3 percent choose the coin-flipping option in the hard/coin condition. In contrast, 14.5 percent choose to flip a coin in the easy/coin condition. The difference is statistically significant ($z = 7.53$, $p < 0.01$). Table 3 presents regression results with the coin-flipping decision as a dependent variable (= 1 if choosing to flip a coin; otherwise = 0). We find that the significant and positive effect of choice difficulty on the decision to flip a coin is both unconditional on donating (Column (1)) and conditional on donating (Column (2)). These results suggest that participants are more likely to choose coin flipping when the choice is hard but not when it is easy.

TABLE 3. REGRESSION RESULTS FOR COIN FLIPPING IN THE FIELD EXPERIMENT

	(1) Unconditional on Donation	(2) Conditional on Donation
Hard	0.084**	0.133**
	(0.042)	(0.067)
Age	−0.005**	−0.009***
	(0.003)	(0.003)
Female	−0.038	−0.040
	(0.032)	(0.048)
Observations	489	309
R^2	0.176	0.285

Note: We include fixed effects of data collector and date of the experiment. Standard errors are clustered at data collector and date levels. Significance level: ***1%, **5%, *10%.

IV. Laboratory Experiment 1

A. Experimental Design

To examine the replicability of the field experiment and shed light on the underlying psychological mechanisms of coin flipping, we conduct Laboratory Experiment 1 with 106 university students (36 percent female, mean age = 22.6). Lab Experiment 1 differs from the field experiment in several ways (see the Experimental Instructions in the Online Appendix B). First, we do not include the upfront survey in the experiment. Hence, participants are no longer entitled to keep the money other than the S$8 show-up fee. This partially enables us to examine generalizability with respect to entitlement. Second, we use a within-subject design with participants undergoing four treatment conditions (hard/no-coin, hard/coin, easy/no-coin, and easy/coin). Using a within-subject design, we are able to examine the potential link between participant response in one condition and that in the other conditions, which allows us to investigate the underlying psychological mechanisms at the individual level.

Third, in each choice situation, participants were asked whether to keep S$X, donate it to ADAS, or donate it to DSS, similar to the field experiment. In the hard conditions, they made five decisions corresponding to five amounts of S$X being considered to donate to the charity (S$X = S$2, S$4, S$6, S$8, and S$10). In the easy condition, they made 10 decisions: in five of the choice situations, matching funds were provided to ADAS, and in the other five choice situations matching funds were provided to DSS. As a result, participants in total made 30 choices in different choice situations (five in the hard/no-coin condition, five in the hard/coin condition, 10 in the easy/no-coin condition, 10 in the easy/coin condition), and the 30 choice tasks were presented in random order for each individual subject. The choice situations with the same condition allow us to investigate the relationship between choice of coin flipping in the coin condition and switching behavior between the two charities in the no-coin conditions—an indication of stochastic choice.

To provide an incentive for the tasks, one of the 30 choices is randomly chosen to be implemented based on the choice of the participant. The validity of using the random incentive system to elicit preference has given rise to concerns from the perspectives of both theory and experiment (see Wakker (2007) for a general discussion), and it can be more problematic given that the experiment is conducted to study preference for randomization. However, should participants consider the random incentive system itself as a randomization device, they will be less likely to choose the coin-flipping option. In this regard, random incentives would produce a downward bias and a more conservative estimation of the impact of coin flipping.

To further reduce concerns about the validity of random incentive, we use the prior incentive system proposed by Johnson et al. (2019) as follows. Before starting the decision-making tasks, we asked participants to randomly pick one of 30 envelopes, corresponding to all 30 choices they would encounter in the choice tasks. That is, they made their 30 choices after having picked the choice situation that would be implemented. We informed participants that we would open the envelope and reveal the actual choice situation only after they completed the tasks. Since all decisions are equally likely to be chosen, they were reminded that they should make each decision as if it would be the decision that counts.

Fourth, we measure the response time of each decision for each participant. The experiment was conducted on a web portal using Qualtrics.com on a computer. The Qualtrics application allows us to record the response time for each decision when participants make their choices. Response time can serve as a measure of the difficulty participants face when making the charity choice (e.g., Krajbich, Armel, and Rangel 2010; Diederich 2003). We hypothesize that, when response time is longer in the hard/no-coin condition, participants are more likely to choose the coin-flipping option in the hard/coin condition.

Lastly, after the decision-making tasks, we asked participants a hypothetical question: "*Suppose someone has $1,000,000, and this person would like to donate to the two charity organizations (ADAS and DSS). How would you like this person to allocate money to these two organizations*?" The allocation options given to the participants were 0%, 20%, 40%, 50%, 60%, 80%, and 100% to DSS (correspondingly, the remainder will go to ADAS). If participants decide that the two charities are equally deserving of the donation, they are more likely to equally allocate the budget. We hypothesized that a more even budget allocation will increase the likelihood of participants choosing coin flipping.

B. Experimental Results

Figure 2 plots the proportion of each option that participants chose in the four conditions. The rate of donation increases from 22.1 percent in the hard/no-coin condition to 30.4 percent in the hard/coin condition (z = 3.07, p < 0.01). In contrast, when 100 percent matching funds are provided, the rate of donation increases slightly, from 42.0 percent in the easy/no-coin condition to 45.7 percent in the easy/coin condition (z = 1.71, p = 0.09). Moreover, participants are significantly more likely to choose the coin-flipping option in the hard/coin condition (17.4 percent) than in the easy/coin condition (6.6 percent) (z = 6.68, p < 0.01). These results replicate the observations in the field experiment.

We further conduct regression analysis to control for participant's age, gender, family history of diseases, and the fixed effect of the experimental sessions. Table 4 presents the regression results. In Column (1), we observe a significant and positive effect of coin flipping on decision to donate, indicating that offering a coin-flipping option increases the tendency to donate by 5.2 percentage points. In Column (2), we include an interaction term between Coin-flip and Hard. Similar to the results in the field experiment reported in Table 2, the positive coefficient suggests that the coin-flipping option is more likely to increase donation when no matching funds are provided, i.e., the hard/coin condition. We further analyze the data separately based on whether we offered matching funds for the donation. As can be seen in Columns (3) and (4), Coin-flip increases donation by 8.3 percentage points in the hard conditions and 3.7 percentage points in the easy conditions. The difference in magnitude suggests that coin flipping results in a lower increase in donation in the easy condition than in the hard condition. Similar to results in the field experiment, the coefficient on Hard is negative and significant, i.e., providing matching funds increases donation. In the lab experiment, we varied the amount of money that could be kept or donated to charity and found a negative effect—the larger is the amount, the less likely is the participant to donate.

FIGURE 2. CHOICE PROPORTION BY CONDITIONS IN LAB EXPERIMENT 1

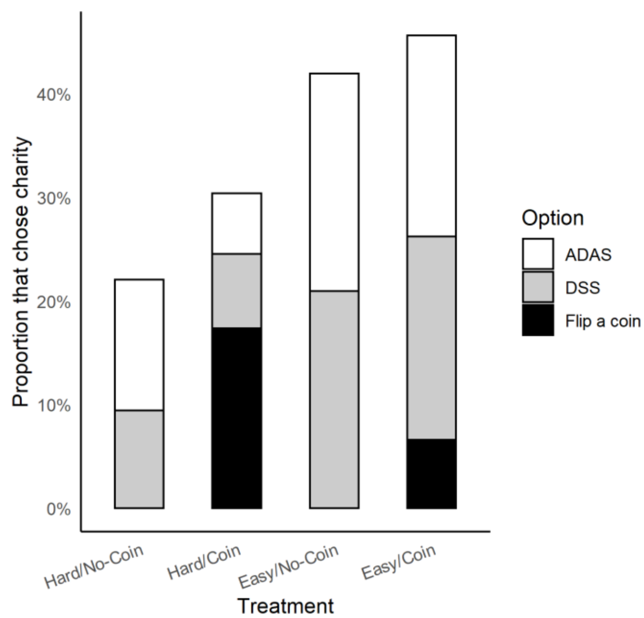


TABLE 4. REGRESSION RESULTS FOR DONATION DECISION IN LAB EXPERIMENT 1

	(1) Full Sample	(2) Full Sample	(3) Hard Condition	(4) Easy Condition
Coin-flip	0.052***	0.037**	0.083***	0.037**
	(0.015)	(0.016)	(0.025)	(0.016)
Hard	−0.176***	−0.199***		
	(0.031)	(0.034)		
Coin-flip × Hard		0.046*		
		(0.025)		
Amount to Keep	−0.041***	−0.041***	−0.035***	−0.044***
	(0.005)	(0.005)	(0.005)	(0.006)
Age	−0.030***	−0.030***	−0.008	−0.041***
	(0.010)	(0.010)	(0.012)	(0.011)
Female	−0.147**	−0.147**	−0.024	−0.208***
	(0.062)	(0.062)	(0.066)	(0.073)
Num. obs.	3180	3180	1060	2120
R^2	0.161	0.162	0.087	0.179

Note: We control for whether participants were aware of the national campaign, whether there is family history of diabetes or Alzheimer's disease, and experimental session fixed effects. Standard errors are adjusted for clustering at the individual level. Significance level: ***1%, **5%, *10%.

Correlates of Coin flipping. In the remaining of this subsection, we investigate the psychological mechanisms underlying the coin-flipping behavior. We examine the correlates of coin flipping from four perspectives: individual switching behavior, response time (RT), attractiveness of each charity, and self-reported reasons.

First, since participants make five choices in the hard/no-coin, their choices may reflect individual preferences for each option. When participants choose to donate in each of the five choices but always choose the same charity (we label them as "No-Switch" type), they have a strong preference for one charity over the other. By contrast, when participants exhibit stochastic choice by switching between the two charities (we label them as "Switch" type), they probably find it difficult to choose one charity over the other. [15] Hence, we hypothesize that the “Switch” type is more likely to choose coin flipping when available.

To test this hypothesis, we categorize the 106 participants based on their decisions in the hard/no coin condition and particularly focus on the “Switch” and “No-Switch” types (for more details, see Figure A1 in the Online Appendix A). We found that participants of Switch type are significantly more likely to choose the coin-flipping option (43.3 percent of the time) than participants of No-Switch type (22.2 percent of the time) ($z = 6.59$, $p < 0.05$). The difference is unlikely to be due to the difference in willingness to donate, because when the coin-flipping option is absent, the No-Switch and Switch types chose to donate 65.6 percent and 63.3 percent of the time, respectively ($z = 0.01$, $p > 0.9$).

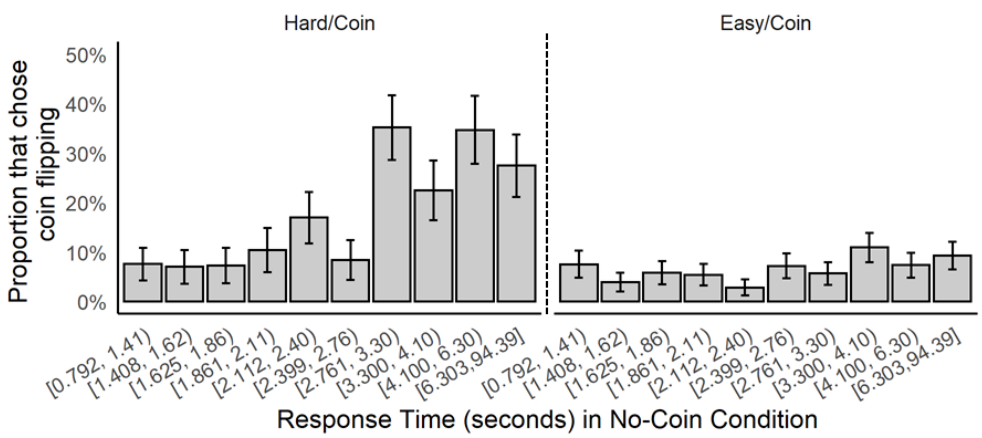
Second, we include participants’ response time (RT), an indicator of choice difficulty, in the analysis and investigate how RT is related to the tendency to choose coin flipping. We compare the difference of the logged RT conditional on donation across conditions. Participants took longer to reach a donation decision in the hard/no-coin conditions (*Mean* = 1.31) than the easy/no-coin conditions (*Mean* = 1.17) ($t = 2.1$, $p < 0.05$). The results provide additional justification for our experimental design, namely, that it is more difficult for participants to reach a donation decision without matching funds than with matching funds.

Next, we examine whether response time in the no-coin conditions predicts the tendency to flip a coin in the coin conditions. Figure 3 presents the relationship between response time in the no-coin condition and the proportion choosing coin flipping in the coin condition. The x-axis represents the response time (in seconds) in the hard/no-coin and easy/no-coin condition, namely, the no-coin condition. For ease of presentation, we split the response time in no-coin condition into 10

[15] While the pattern of switching behavior may reflect a form of random utility, it is also consistent with deliberate randomization, as in Agranov and Ortoleva (2017).

categories, within which the number of observations is the same. As Figure 3 (left panel) shows, a longer response time in the hard/no-coin condition is associated with higher likelihood of flipping a coin in the hard/coin condition. For instance, when the participants took less than 1.41 seconds to decide in the hard/no-coin condition, in the choice situation where a coin-flipping option is provided, they chose coin flipping 7.5 percent of the time. However, when the participants took more than 6.3 seconds to decide in the hard/no-coin condition, they chose coin flipping 27 percent of the time when the coin-flipping option is provided. This relationship only holds when it is in the hard/coin condition, but not in the easy/coin condition (Figure 3 right panel).

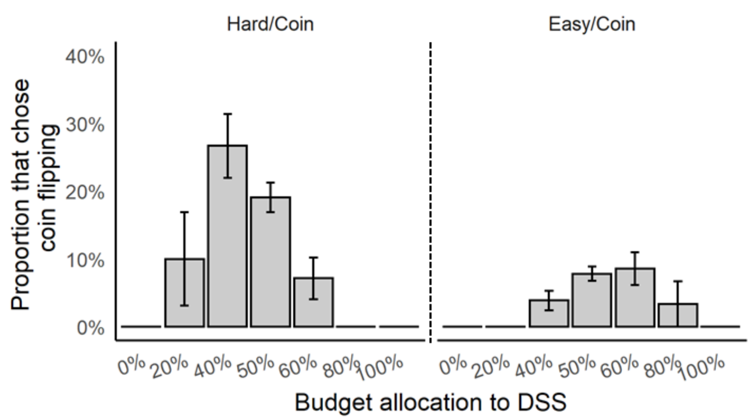
FIGURE 3. RESPONSE TIME AND COIN FLIPPING BY CONDITION IN LAB EXPERIMENT 1



Note: For the decisions in the hard/no-coin and easy/no-coin conditions, i.e., no-coin condition, we divide the response time into 10 intervals with equal numbers of observations. The left (right) panel presents the proportion choosing the coin flip in the hard/coin (easy/coin) condition. Error bars are ±1 SEM.

Third, we examine the relationship between budget allocation in the hypothetical question and tendency to choose coin flipping. In Figure 4, we plot the budget allocation to DSS and the percentage of time that coin flipping is chosen. As can be seen from the figure, the more equally participants allocated the budget, the more likely they were to flip a coin when the choice is hard, but it is less so when the choice is easy. For instance, when the participants allocated 0 percent to DSS (therefore 100 percent to ADAS) or 100 percent to DSS (therefore 0 percent to ADAS), which indicates strong preference for ADAS or DSS, the percentage of choosing coin flipping is zero. By contrast, the percentage of choosing coin flipping is higher when the participants allocated more evenly to the two charities. [16]

FIGURE 4. BUDGET ALLOCATION AND COIN FLIPPING BY CONDITION IN LAB EXPERIMENT 1



Note: The x-axis is the budget allocation to DSS in the post-experiment question. The left (right) panel presents the proportion choosing the coin flip in the hard/coin (easy/coin) condition. Error bars are ±1 SEM.

[16] The relationship between the budget allocation question and likelihood of donation is plotted in Figure A2 in the Online Appendix A and further formally tested using regression analysis, as in Table A1. The results suggest that the participants who equally allocate the budget would be less likely to choose to donate to a charity, indicating a choice conflict between two equally attractive options (Tversky and Shafir, 1992). Regression analysis confirmed a U-shaped relationship.

We conduct regression analysis with the coin-flipping decision as the dependent variable (presented Table 5). As shown in Column (1), the coefficient on Hard is positive and significant ($\beta = 0.109$, $p < 0.01$), which indicates that participants were 10.9 percentage points more likely to choose coin flipping when there was no matching funding provided. Moreover, the coefficient on the Logged RT in the no-coin condition is significant and positive ($\beta = 0.046$, $p < 0.05$), which confirms our hypothesis that participants are more likely to choose coin flipping when presented with hard choices (as reflected in longer response time). The results remain robust if we further control for Logged RT in the coin condition (Column 2). We also include the quadratic terms of budget allocated to DSS. The coefficient of the quadratic term is significantly negative ($\beta = -0.012$, $p < 0.01$), supporting the inverted U-shaped relationship between budget allocation and tendency to coin flip. To verify the relationship is indeed an inverted-U shape, we also use a two-line test (Simonsohn 2018) (Table A2 in the Online Appendix A). When we separate the analysis for Hard and Easy conditions (Columns 3 and 4), the effect is stronger for the Hard condition, compared to the Easy conditions.

Last, in the post-experiment questionnaire, we ask participants to write their reasons for coin flipping and then categorize the reasons into groups based on theme (see Table A3 in the Online Appendix A for details). If the participants mention "hard to determine," "cannot decide," or related terms, we categorize the reasons as indecisiveness. Of the 47 participants who gave reasons, 58.7 percent motivated by indecisiveness-related terms. "equal chance" or related terms were mentioned by 26.1 percent of participants, and we categorize these as equity concerns. The remaining 15.2 percent of participants gave other reasons, such as "just to try a different option" or "misunderstanding the instructions." The reasons given by participants further support our hypothesis that the coin-flipping option is mostly chosen to resolve choice difficulty.

TABLE 5. REGRESSION RESULTS FOR COIN FLIPPING IN LAB EXPERIMENT 1

	(1) Full	(2) Full	(3) Hard	(4) Easy
Hard	0.109***	0.109***		
	(0.025)	(0.025)		
Log RT in No-Coin	0.046**	0.042**	0.082**	0.025
	(0.020)	(0.021)	(0.038)	(0.018)
Log RT in Coin		0.017	0.048*	-0.001
		(0.015)	(0.026)	(0.015)
Budget Squared	-0.006***	-0.006***	-0.012***	-0.004**
	(0.002)	(0.002)	(0.005)	(0.002)
Budget	0.069***	0.070***	0.115**	0.050**
	(0.024)	(0.023)	(0.046)	(0.022)
Amount to Keep	-0.011***	-0.011***	-0.018***	-0.007**
	(0.003)	(0.003)	(0.005)	(0.003)
Age	-0.004	-0.004	-0.013	0.001
	(0.006)	(0.006)	(0.012)	(0.005)
Female	0.000	0.003	-0.055	0.032
	(0.042)	(0.042)	(0.061)	(0.041)
Num. obs.	1590	1590	530	1060
R^2	0.073	0.074	0.116	0.043

Note: We control for factors such as whether participants are aware of the national campaign, whether there is family history of diabetes or Alzheimer's disease, and experimental session fixed effects. Standard errors are adjusted for clustering at the individual level. Significance level: ***1%, **5%, *10%.

V. Laboratory Experiment 2

A. Experimental Design

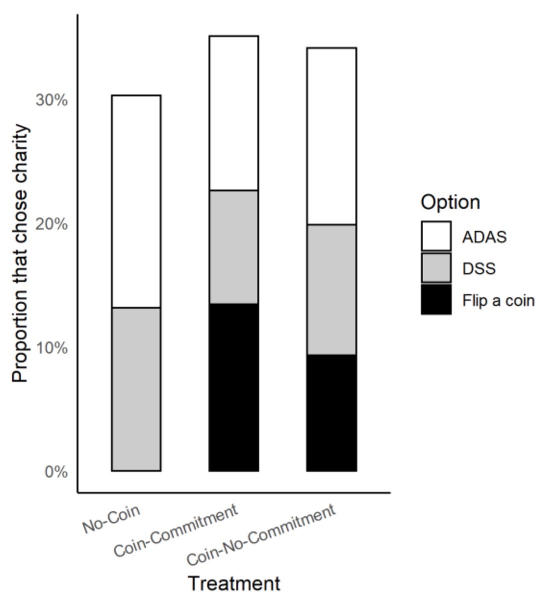
Laboratory Experiment 2 examines the role of commitment in relation to preference for randomization (Machina (1989) for detailed discussions). Suppose a decision maker prefers randomizing between charity A and charity B to choosing either A or B. If heads appear when flipping a coin in her mind, she donates to A. However, she might still prefer randomizing between A and B to donating to A and fail to commit to any realized option by randomizing. In this regard, the coin-flipping option in the last two experiments possess a commitment value, as the outcome of coin flipping is clearly stated as Heads for ADAS and Tails for DSS.

In Laboratory Experiment 2, we examine whether commitment is critical for the coin-flipping option to work. We introduce a condition referred to as the coin-no-commitment condition (see the Experimental Instructions in the Online Appendix B). More specifically, if participants choose to flip a coin, they could flip as many times as they wanted, and the correspondence between the outcomes of the coin flip (heads or tails) and the charity organization (ADAS or DSS) was not specified. We compare this new condition with the hard/no-coin as well as hard/coin conditions in a within-subject design. Participants make 15 choices in different choice situations: five choices (five different amounts: $2, $4, $6, $8, and $10, participants could choose to donate) under the hard/no-coin condition, five choices under the hard/coin condition, and five choices under hard/coin-no-commitment. One of 15 choices is randomly implemented based on participant's choice using the prior incentive system. Participants completed the decision tasks on a web portal designed using Qualtrics.com on a computer in a computer-based laboratory. The experiment was conducted with 146 university students (60.3 percent female, mean age = 22.5) at the National University of Singapore on April 11, 2018. Participants received an S$8 show-up fee in addition to the earnings they made through their decisions.

B. Experimental Results

The choice proportion for each option by condition is presented in Figure 5. The proportions of donation in the coin-commitment is 35 percent which is marginally significantly higher than the proportion of donation in the no-coin condition—30 percent ($z = 3.6$, $p = 0.06$). In the coin-no-commitment condition, subjects chose to donate 34 percent of the time, which is not significantly different from the proportion in the no-coin condition ($z = 2.29$, $p = 0.13$). There is no difference in proportion of donation in the coin-commitment condition and coin-no-commitment condition (z = 0.11, p = 0.74). In addition, the proportion of participants choosing coin flipping in the coin-commitment condition (13 percent) is significantly higher than in the hard/coin-no-commitment condition (9 percent) (z = 5.72, p < 0.05). Overall, this result suggests that decision makers in general prefer a randomization device by which they can commit to the realized outcome.

FIGURE 5. CHOICE PROPORTION BY CONDITIONS IN LAB EXPERIMENT 2



We conduct regression analysis to test statistical significance (Table 6). Donation decision is the dependent variable (= 1 if participants chose to donate; otherwise = 0). We tested whether Coin-Commitment (= 1 if in the coin-commitment condition; otherwise = 0) and Coin-No-Commitment (= 1 if in the coin-no-commitment condition; otherwise = 0) affect the decision to donate. We again replicate the results in the field experiment that coin flipping significantly increases donation (Column (1)). The donation was significantly increased by 5 percentage points in the coin-commitment condition and 4 percentage points in the coin-no-commitment condition. In Column (2), we compare the difference in donation between the coin-no-commitment and coin-commitment conditions and observe that the coefficient is not significant. In Column (3), we examine the difference in coin flipping between the coin-no-commitment and coin-commitment conditions. The coefficient on 'Coin-No-Commitment' is significantly negative ($\beta = -0.04$, $p < 0.05$), indicating that the decision makers are more likely to use a randomization device more in the coin-commitment condition than in the coin-no-commitment condition.

TABLE 6. REGRESSION RESULTS IN LAB EXPERIMENT 2

	(1) Donation	(2) Donation	(3) Coin flipping
Coin-Commitment	0.05^{**}		
	(0.02)		
Coin-No-Commitment	0.04^{**}	−0.01	-0.04^{**}
	(0.01)	(0.01)	(0.01)
Amount to Keep	-0.05^{***}	-0.05^{***}	-0.02^{***}
	(0.01)	(0.01)	(0.00)
Age	-0.05^{***}	-0.06^{***}	-0.02^{*}
	(0.02)	(0.02)	(0.01)
Female	-0.18^{**}	-0.18^{**}	−0.06
	(0.06)	(0.06)	(0.04)
Num. obs.	2190	1460	1460
R^2	0.17	0.17	0.07

Note: We control for factors such as whether participants are aware of the national campaign, whether there is family history of diabetes or Alzheimer's disease, and experimental session fixed effects. Standard errors are adjusted for clustering at the individual level. Significance level: ***1%, **5%, *10%.

In summary, we show that, while participants prefer to use coin flipping with commitment over coin flipping without commitment, they increase donation regardless of the commitment value of the coin. One possible explanation is that the presence of coin flipping without commitment increases the tendency for participants to randomize internally, as choosing randomly becomes more salience.

We found that the proportion of subjects switching their choices between the two charities is 12 percent in the coin-commitment condition, and 16 percent in coin-no-commitment condition. Although the difference is not statistically significant (p = 0.13), it suggests that participants were more likely to switch their choices—a way of internally randomizing their choices, in the coin-no-commitment condition.

VI. Concluding Remarks

In both field and laboratory experiments, we find that preference for randomization can be applied as a nudge when people face difficult choice in the setting of charity giving. While our study is more application-oriented rather than to test various theories of preference for randomization, it remains worthwhile to discuss the implications for models of stochastic choice. First, regularity assumption in a number of random utility models would predict that adding a coin-flipping option to the choice set would reduce the probability of keeping the money for both hard condition and easy condition. While we observe that the proportion of donation in the easy/coin condition does increase with marginal significance in the Laboratory Experiment 1, it does not increase in the field experiment. Moreover, coin-flipping significantly increases the proportion of donation in the hard condition, compared to the easy condition, in both experiments. Second, one important development of convex preference is the notation of deliberate randomization, in which a decision maker implicitly considers the convex hull of the explicit choice set and randomizes internally. In our setting, the coin-flipping option, which specifies a special probability distribution (50-50 chance of realizing each charity), is already in the convex hull. As a result, inclusion of the coin-flipping option—an external randomization device—would not change the likelihood to donate. Our result shows that while individuals may deliberately randomize in their mind, they are responsive to the inclusion of external randomization device (Agranov and

Ortoleva 2017; Cettolin and Riedl 2019; Levitt 2016). To sum, our results provide support for models with convex preference.

While we show that preference for randomization is linked to choice difficulty, it remains a question why using a randomization device could increase the donation rate. Randomization can be used to obtain an *ex ante* fair allocation, to hedge across the preference uncertainty, to reduce individual responsibility (Li, 2011), or to eliminate the excuse not to donate (Exley 2016). Moreover, using external randomization device enjoys some additional advantages as it is observable to others and convenient to implement. In the end of the Laboratory Experiment 2, we asked the subjects the following question: "*There is another $5 which will be either donated to the Alzheimer's Disease Association of Singapore (ADAS) or the Diabetic Society of Singapore (DSS). Which is your preferred way of selecting the organization to be donated to?*" We observe that more subjects chose coin flipping instead of delegating the decision to the experimenter or the majority of others.[17] While the observations from self-report data are less consistent with the explanations of observability, convenience and responsibility, it remains unclear how to disentangle the remaining interpretations of procedure fairness and preference uncertainty. We leave these questions for future investigations.

[17] Among the 146 subjects, 60% chose "I select the organization myself", 12% chose "Let the experimenter decide, 1% chose "randomly select a participant in the room, and let him/her decide", 3% chose "Follow the majority. If majority of the participants chose ADAS, I will select ADAS; otherwise I select DSS", and 25% chose "Toss a coin (Head for ADAS; Tail for DSS)".

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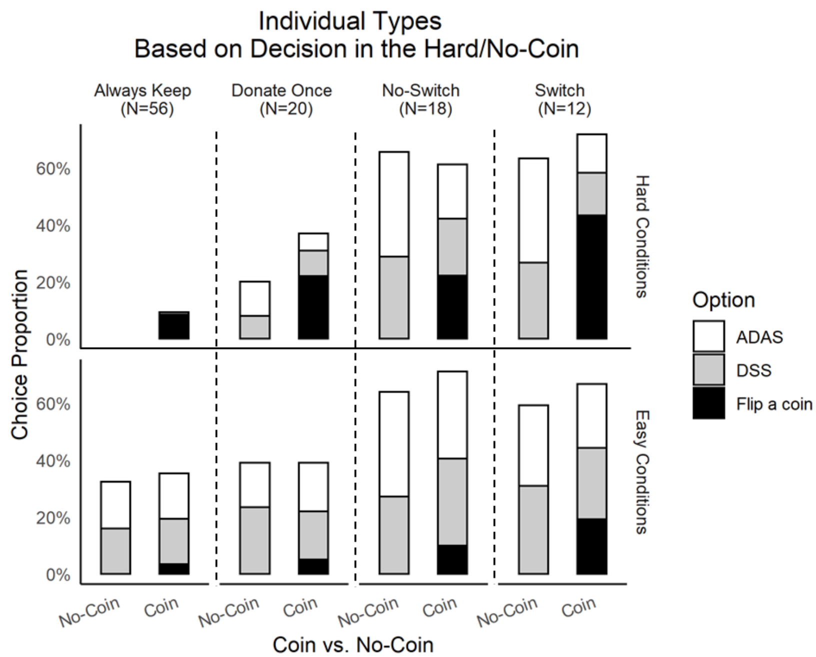
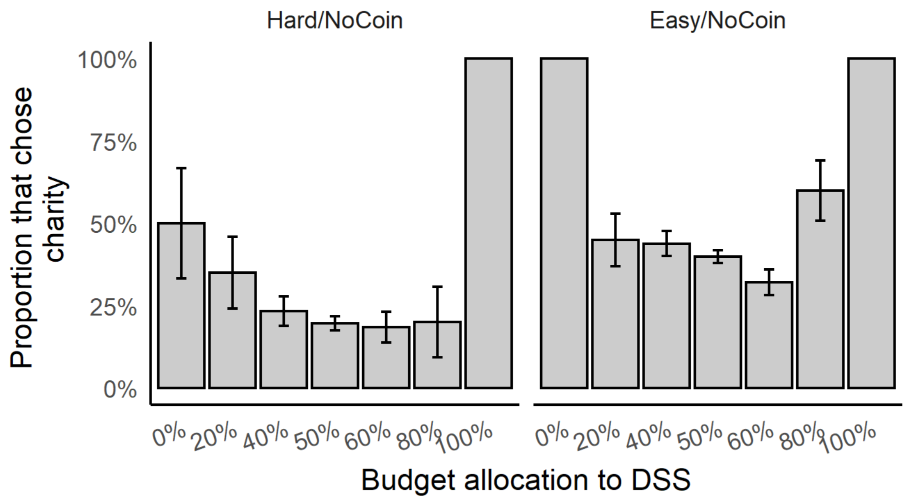
ONLINE APPENDIX A: ADDITIONAL FIGURES AND TABLES.

FIGURE A1. SWITCHING BEHAVIOR AND COIN FLIPPING



Note. Participants are classified into four types based on decision in the hard/no-coin condition: 1) Keep (who always choose to keep the money), 2) Donate Once, 3) No-Switch (who donate more than once but did not switch between the charities), and 4) Switch (who donate more than once but switched between charities at least once). For each type, we plot the choice proportion across treatment conditions. The upper panel and lower panel correspond to hard (no-coin and coin) and easy (no-coin and coin) conditions, respectively. The horizontal axis represents the coin and no-coin conditions.

FIGURE A2. BUDGET ALLOCATION AND PROPORTION CHOOSING DONATION.



Note: The figure plots the relationship between the budget allocation question and likelihood of donation when the coin flipping option is absent. Because we ask participants the percentage of the hypothetical $1,000,000 to be allocated to DSS (with the remaining percentage allocated to ADAS), we contend that the more equally participants allocate the budget, the more equally attractive they perceive the two charities, and the less likely they are to choose a charity. Error bars are ±1 SEM. Number of observations is shown on its respective bar. There were 2%, 4%, 17%, 60%, 13%, 3%, 1% that chose to allocate 0%, 20%, 40%, 50%, 60%, 80%, and 100% of the budget to DSS, respectively.

TABLE A1. BUDGET ALLOCATION AND DONATION IN LAB EXPERIMENT 1

	Dependent variable: Donation	
	(1) No-Coin Condition	(2) Coin Condition
Budget Squared	0.020***	0.018***
	(0.006)	(0.006)
Budget	−0.246***	−0.216***
	(0.076)	(0.080)
Easy	0.199***	0.153***
	(0.034)	(0.033)
Amount to Keep	−0.041***	−0.040***
	(0.005)	(0.005)
Age	−0.015	−0.021*
	(0.011)	(0.012)
Female	−0.091	−0.136*
	(0.061)	(0.073)
Observations	1,590	1,590
R^2	0.204	0.184

Note: We control for other factors such as whether participants are aware of the national campaign, whether there is family history of diabetes or the Alzheimer's disease, and experimental session fixed effects. Standard errors are adjusted for clustering at the individual level. Significance level: ***1%, **5%, *10%.

TABLE A2. TWO-LINE TEST ON BUDGET ALLOCATION AND COIN FLIPPING IN LAB EXPERIMENT 1

	(1) Both	(2) Hard	(3) Easy
Budget (Budget ≤ 40%)	0.060***	0.144***	0.018**
	(0.021)	(0.050)	(0.008)
Budget (Budget > 40%)	−0.036**	−0.072***	−0.018
	(0.016)	(0.027)	(0.015)
Control Variables	Yes	Yes	Yes

Note: We use the “two-line” method developed by Simonsohn (2018). Since our independent variable—budget allocation—is discrete, we can simply split the sample into two parts: participants who allocate 50% or less to DSS (budget ≤ 50%) and those who allocate more than 50% (budget > 50%). We conduct two regressions testing the relationship between budget allocation and donation while controlling for other covariates. If there is a U-shaped relationship between budget allocation to DSS and tendency to donate, we should observe a significant and negative coefficient for the budget for the first sample (budget ≤ 50%) and a significant and positive coefficient on the budget for the second sample (budget > 50%). We control for amount to keep, age, gender, family history of the disease, and experimental session effects. Standard errors are adjusted for clustering at the individual level. Significance level: ***1%, **5%, *10%.

TABLE A3. SELF-REPORTED REASONS FOR COIN FLIPPING

Classification	***Self-reported reason***
Indecisiveness	It is hard to determine which charitable organization needs the money more, so let fate decide!
Indecisiveness	no difference between the donating options, and i wasn't going to keep the money for myself
Indecisiveness	The monetary value is the same for the two options and i don't have a preference between the two organizations
Indecisiveness	i was indifferent to both choices
Indecisiveness	since both choices for donation were the same amount, and I do not have any preference for any of the charity organisation, I would leave the decision making to the experimenter.
Indecisiveness	I feel strongly for both charity organizations and could not decide between the both
Indecisiveness	Assuming that the 2 charities are equal, it does not make any difference as to which charity will receive the money. Hence i would rather use probability to allocate the money than be unbiased
Indecisiveness	Because I would like to donate, but the type of charity organization chosen does not make any difference to me.
Indecisiveness	Since i wasn't able to make a decision on which org i should contribute to
Indecisiveness	Unable to decide
Indecisiveness	I couldn't decide who to donate it to when the amount was the same
Indecisiveness	Because I had no preference in choosing any organization. I just wanted to donate so any organization would be ok
Indecisiveness	the options are about the same , so leave it to chance
Indecisiveness	I was indecisive as both diseases needs help
Indecisiveness	Because the amount allocated for each organisation was the same, and I couldnt decide which one to choose. Hence, I picked the toss a coin to help me decide.
Indecisiveness	I would want to donate to both but i wasn't sure on which criteria to base my decision on, so i let luck decide instead.
Indecisiveness	I could not decide which organisation to choose
Indecisiveness	To test my luck.undecisive
Indecisiveness	The money (hopefully) will improve someones life. So it does not matter to me which organisation the money goes to if the amount is the same.
Indecisiveness	The donation amount was the same; easier to decide with a coin flip.

Indecisiveness	Because I don't know which one is better and I feel that two options should have equal chance to be chosen.
Indecisiveness	I can't really make a decision on which organization deserves the donation because they both are equally deserving, and partly because i don't know the background knowledge to either organization to decides who deserves more. Hence I tossed a coin.
Indecisiveness	I can't really make a choice between the options
Indecisiveness	I don't think I am in the capacity to decide which beneficiary should receive the payment
Indecisiveness	I don't know which charity to donate to, both equally needs the money.
Indecisiveness	To me, the donation to either charity is the same. I do not feel very strongly for either Alzheimer's Disease or Diabetes as the people around me have not encountered them. I also did not take the costs of either charity into account, hence the coin flip when the value donated would be the same.
Indecisiveness	almost both donation was same and previous donation also came in mind which association get money for this time don't matter.
Equity concern	I will be donating equal amounts to either organizations and ceteris paribus, there is nothing that will lead me to prefer the Alzheimer organization over the Diabetic organization (or vice versa).
Equity concern	i have chosen this open when there is equal opportunity of distributing the equal money based on luck factor
Equity concern	To give both of them equal priority and chance
Equity concern	I have equally donated the amount . To solve a dilemma before seeing a situation. I would not toss if i have seen the organization wealth exists before
Equity concern	Equal amount to either organisation.
Equity concern	Both associations have equal importance in my opinion,thus giving equal chances in donating
Equity concern	The payout was equal so it does not matter which organisation to donate to
Equity concern	I feel that both organisations are equally deserving and in need of external help, and in the situations whereby I chose that option, the donation amounts are identical/similar so the amount of money was a less significant factor which affected my decision. As such, I decided to do it through luck.
Equity concern	Because the amount that will be given to both organization is the same, and both organizations are equally likely to need the money. If the amount that will be given to one organization is higher than the

	other, I will choose one organization that was given higher amount of money.
Equity concern	Both have equal amounts for donation... This situation is good for selecting the charity organization by tossing a coin..
Equity concern	so both organizations have equal chance of getting the money
Equity concern	It indicates that either of an organisation will receive money instead of with me.
Other reasons	Just to try a different option
Other reasons	Only when the SUM of amount is equal and less, at that point i choose to toss the coin. This is because our decision doesnt hold strong there and can leave it for coin to decide.
Other reasons	The amount donated is the same, so either way the same amount will be donated to the organisations.
Other reasons	Cause the amount is the same, and I will only be able to donate to one of the organisation
Other reasons	Increase the chances of me getting paid
Other reasons	To try out the decision making based on probability
Other reasons	when the returns were the same for both choices and the amount that i needed to invest was not greater than $6 (which was my threshold) i'll let the dice decide
Other reasons	This is because in that situation (if I remember correctly), the amount of money donated for Alzheimer is doubled that of diabetic. Hence, in the end, both society will still receive the same amount of help.Thus, I have decided to let the coin decide.

ONLINE APPENDIX B: EXPERIMENTAL INSTRUCTIONS

Experimental Instructions for Field Experiment

In the end of the survey questionnaire, we randomly assigned the participants to one of six treatment conditions. The question started as:

You can either keep the $5, or donate it to a charity organization. Please indicate the option that you prefer with a tick (√):

In treatment one – the ADAS condition, we gave the following options:

1) *I would like to keep $5 for myself*
2) *I would like to donate $5 to the Alzheimer's Disease Association of Singapore*

In treatment two – the DSS condition, we gave the following options:

1) *I would like to keep $5 for myself*
2) *I would like to donate $5 to the Diabetic Society of Singapore*

In treatment three – the hard/no-coin condition, we gave the following options:

1) *I would like to keep $5 for myself*
2) *I would like to donate $5 to*
   - A. *the Alzheimer's Disease Association of Singapore (ADAS)*
   - B. *the Diabetic Society of Singapore (DSS)*

In treatment four – the hard/coin condition, we gave the following options:

1) *I would like to keep $5 for myself*
2) *I would like to donate $5 to*
   - A. *the Alzheimer's Disease Association of Singapore (ADAS)*

B. the Diabetic Society of Singapore (DSS)

C. one of two organizations above randomly by tossing a coin (Heads for ADAS; Tails for DSS)

In treatment five – the easy/no-coin condition, we gave the following options:

1) I would like to keep $5 for myself

2) I would like to donate $5 to

A. the Alzheimer's Disease Association of Singapore (ADAS) + $5

B. the Diabetic Society of Singapore (DSS)

Note: if you choose to donate to ADAS, we will add $5 on top of your donation, and as a result, your donation to ADAS will become $10.

In treatment six – the easy/coin condition, we gave the following options:

1) I would like to keep $5 for myself

2) I would like to donate $5 to

A. the Alzheimer's Disease Association of Singapore (ADAS)+$5

B. the Diabetic Society of Singapore (DSS)

C. one of two organizations above randomly by tossing a coin (Heads for ADAS; Tails for DSS)

Note: If you choose to donate to ADAS, or if you choose to toss a coin and the coin lands on Head (ADAS), we will add $5 on top of your donation, and as a result, your donation to ADAS will become $10.

Experimental Instructions for Lab Experiment 1

Thank you for participating in this study on economic decision-making. The instructions are simple and please read it carefully. You will receive $8 show-up fee and potentially extra monetary rewards depending on your decisions. The procedure mentioned in the experiment will be implemented truly and faithfully. There is no right or wrong answer for any of these decisions.

Choice Situation

You are to make 30 choices in different choice situations. Each choice situation concerns how you would like to deal with certain amount of money $X ($X = $2, $4, $6, $8 or $10). You have the options to keep the money to yourself or donate it to a charity organization. Choice situations also vary in terms of which organization being considered to donate to.

Situation 1: You choose whether you want to donate to one of two charity organizations as the example below.

I would like to A. keep $2 for myself B. donate $2 to the Alzheimer's Disease Association of Singapore C. donate $2 to the Diabetic Society of Singapore

In this example, if you choose Option A, you will keep $2 for yourself. If you choose Option B, you will donate $2 to the Alzheimer's Disease Association of Singapore. If you choose Option C, you will donate $2 to the Diabetic Society of Singapore.

Situation 2: You choose whether you want to donate to one of two charity organizations, or to randomly choose one of the two charity organizations by tossing a coin as the example below.

I would like to

A. keep $4 for myself
B. donate $4 to the Alzheimer's Disease Association of Singapore
C. donate $4 to the Diabetic Society of Singapore
D. donate by tossing a coin (Heads for Option B; Tails for Option C)

In this example, if you choose Option A, you will keep $4 for yourself. If you choose Option B, you will donate $4 to the Alzheimer's Disease Association of Singapore. If you choose Option C, you will donate $4 to the Diabetic Society of Singapore.

If you choose Option D, the experimenter will toss a coin to decide to which organization you are to donate. If it is head, you will donate $4 to the Alzheimer's Disease Association of Singapore (Option B); if it is tail, you will donate $4 to the Diabetic Society of Singapore (Option C).

Payment

We will randomly pick one choice out of the 30 choices to pay you as follows. Before the start of decision-making tasks, you will first randomly pick 1 envelope from 30 envelopes. The 30 envelopes correspond to all the 30 choices you will encounter in the choice tasks. After you pick an envelope, you make the 30 choices. That is, you will make a decision for each possible content in your envelope. After you finish the choice tasks, we will then unseal the envelope and reveal the actual choice situation to determine your payment. Since all decisions are equally likely to be chosen, you should make each decision as if it will be the decision-that-counts.

Your final payment consists of two parts. The first part is $8 show-up fee. The second part depends on the selected choice situation and your choice in that situation.

Before we start:

- Please make sure that you have picked an envelope.
- Please **DO NOT UNSEAL** the envelope until the experimenter tells you to do so.
- Do you have any questions?

Experimental Instructions for Lab Experiment 2

Thank you for participating in this study on economic decision-making. The instructions are simple and please read it carefully. You will receive $8 show-up fee and potentially extra monetary rewards depending on your decisions. The procedure mentioned in the experiment will be implemented truly and faithfully. There is no right or wrong answer for any of these decisions.

Choice Situation

You are to make 15 choices in different choice situations. Each choice situation concerns how you would like to deal with certain amount of money – $X ($X = $2, $4, $6, $8 or $10). You have the options to keep the money to yourself or donate it to a charity organization.

Situation 1: You choose whether you want to donate to one of two charity organizations as the example below.

I would like to D. keep $2 for myself E. donate $2 to the Alzheimer's Disease Association of Singapore F. donate $2 to the Diabetic Society of Singapore

In this example, if you choose Option A, you will keep $2 for yourself. If you choose Option B, you will donate $2 to the Alzheimer's Disease Association of Singapore. If you choose Option C, you will donate $2 to the Diabetic Society of Singapore.

Situation 2: You choose whether you want to donate to one of two charity organizations, or to randomly choose one of the of two charity organizations by tossing a coin as the example below.

I would like to

E. keep $2 for myself
F. donate $2 to the Alzheimer's Disease Association of Singapore
G. donate $2 to the Diabetic Society of Singapore
H. donate by tossing a coin (Heads for Option B; Tails for Option C)

In this example, if you choose Option A, you will keep $2 for yourself. If you choose Option B, you will donate $2 to the Alzheimer's Disease Association of Singapore. If you choose Option C, you will donate $2 to the Diabetic Society of Singapore.

If you choose Option D, the experimenter will toss a coin to decide to which organization you are to donate. If it is head, you will donate $2 to the Alzheimer's Disease Association of Singapore (Option B); if it is tail, you will donate $2 to the Diabetic Society of Singapore (Option C).

Situation 3: You choose whether you want to donate to one of two charity organizations, or to randomly choose one of the of two charity organizations by tossing a coin as the example below.

I would like to

A. keep $2 for myself
B. donate $2 to the Alzheimer's Disease Association of Singapore
C. donate $2 to the Diabetic Society of Singapore

D. donate by tossing a coin (You can toss as many times as you want, and choose the outcome you prefer)

In this situation, if you choose Option D, we will provide a coin to you. You can toss the coin as many times as you want to decide which organization you are to donate. You can consider Head as Option B and Tail as Option C, or Head as Option C and Tail as Option B. It is up to you to choose the outcome you like. After you make the decision, you return the coin to us.

Payment

We will randomly pick one choice out of the 15 choices to pay you as follows. Before the start of decision-making tasks, you will first randomly pick 1 envelope from 30 envelopes. 15 envelopes correspond to all the 15 choices you will encounter in the choice tasks. The other 15 envelopes are the exact copies of the first 15 envelopes. This is to make sure that you have equal chance of picking any one of the 15 choices.

After you pick an envelope, you make the 15 choices on the computer. That is, you will make a decision for each possible content in your envelope. After you finish the choice tasks, we will then unseal the envelope and reveal the actual choice situation to determine your payment. Since all decisions are equally likely to be chosen, you should make each decision as if it will be the decision-that-counts.

Your final payment consists of two parts. The first part is $8 show-up fee. The second part depends on the selected choice situation and your choice in that situation.

Before we start:

- Please make sure that you have picked an envelope.
- Please **DO NOT UNSEAL** the envelope until the experimenter tells you to do so.
- Do you have any questions?