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Efficacy of Opt-in vs. Opt-out Default Nudges to Encourage Socially Responsible Investing: The Moderating Role of Financial Literacy

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ABSTRACT

This study intends to investigate the impact of opt-in and opt-out default nudges on Pakistani investors' decisions to make socially responsible investments, with the moderating influence of investors' financial literacy. A commercial online panel is used to gather data as part of an experiment with an incentive-based online survey. A total of N = 518 individuals is randomly assigned to two treatment groups—opt-in and opt-out—and one control group. The empirical findings of this study show that, although being less effective than the opt-out nudge effect, the opt-in nudge effect nevertheless has a considerable impact on SRI decisions. The study's results also show that financial literacy moderator has partially significant impact on the efficacy of default nudges. In order to improve investment instruments that might encourage SRI investment in society, SRI policymakers can benefit from this study.

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Introduction

In 2015, the UN adopted the sustainable development goals (SDGs) as a universal call to stimulate action in areas of critical importance. Pakistan is one of the first countries to adopt and commit to the United Nations 2030 Agenda for Sustainable Development. In order to implement the UN SGDs, socially responsible investment (SRI) can be used as a measure to promote responsible finance. SRI has grown recently (Nilsson et al., 2014; Falcone et al., 2018), businesses now have a chance to strengthen their sustainable business models through CSR initiatives. A socially responsible investment (SRI) is a type of investment that fosters both meaningful societal development and solid financial returns. SRI refers to the process of incorporating environmental, social, and governance (ESG) considerations into investment decisions (Sandberg & Nilsson, 2011). In the emerging and frontier economies, SRI is not popular and is still in its initial phase. They have to join this global momentum, even at the most basic level of implementation, or else they will be left behind. An effective and inexpensive strategy to encourage acceptance of SRI seems to be required.

Choice architecture interventions have gained popularity among public policymakers over the past ten years as a way to encourage pro-social behaviour in either individuals or society as a whole.

These interventions are referred to as "nudges," which are defined as little adjustments to the choice architecture that modify behaviour in a predictable way without prohibiting or monetarily restricting any of the alternatives (Thaler & Sunstein, 2008). The term "nudging" refers to a broad range of strategies that all have the goal of making the desirable action the default choice. Early nudge research found positive behavioural effects and other advantages of nudges as a policy instrument, including simplicity of adoption and cost-effectiveness (Benartzi et al., 2017).

Jachimowicz et al. (2019) argued that default is the most simple and effective nudge that can be used to influence behavior. In terms of behaviour change, default nudges are among the most successful (Hummel & Maedche, 2019), which makes them particularly interesting in regard to how effectively autonomy is honoured. In contrast to the opt-in default, which is sometimes referred to as an express consent policy and calls for individuals to explicitly state their choices, the opt-out default holds that everyone is willing to accept the preselected option unless they expressly opt-out of doing so (Etheredge, 2021). Usually, frequencies are much greater in an opt-out system than in an opt-in system. Defaults are typically regarded as the most typical example of nudging (e.g. Thaler & Sunstein, 2008) and have most consistently been classified as Type 1 (Hansen & Jespersen, 2013) or non-educative (Sunstein, 2016) nudges.

Several behavioural areas, such as sustainable behaviour (Pichert & Katsikopoulos, 2008; Vetter & Kutzner, 2016) and financial behaviour, provide examples of default effects (Madrian & Shea, 2001). Johnson and Goldstein (2003) presented a striking disparity in the percentage of citizens registered as organ donors as the most illuminating difference between having an opt-in and an opt-out system. Countries that followed an opt-in approach had consent rates between 4.25% and 27.5%, but those that followed an opt-out system saw consent rates between 85.9% and 99.98%. The question of whether this variation in consent rates actually translates into greater donation rates has been contested, but the variation powerfully demonstrates the influence defaults may have on behaviour.

Furthermore, there are increasing issues and criticism concerning the legitimacy of opt-out default nudges. Even nudges that retain a pretence of decision freedom, according to Hausman and Welch (2010), may reduce a person's autonomy. According to Smith et al. (2013), default nudging can violate people's autonomy and their capacity to make informed decisions, even when the results are positive. According to a survey, default nudges were rated less positively and as greater threats to autonomy (Jung and Mellers, 2016). So, in this study, we compare the effectiveness of more manipulative and less autonomous opt-out default with less manipulative and more autonomous opt-in default. This comparison is drawn to check whether it is possible to nudge an individual without compromising on autonomy. To examine these potential trade-offs and the implications for empirical validation of default nudges designed to improve responsible investment, we conducted an online experiment comparing the effectiveness of opt-in and opt-out default nudges on share of individual who choose SRI as an investment decision in a hypothetical investment scenario.

Agnew and Szykman (2005) found that the effectiveness of information architecture vary with financial literacy of the individual. They further elaborated that individuals with low levels of knowledge are more likely than those with high levels of knowledge to choose the default allocation. Carpenter et al. (2021) demonstrated that choice architecture seems to differentially assist those who have a lot at stake, poor family income, high cognitive capacity, and low financial literacy to avoid making the worst choice. Few studies are available in the literature on how to identify the role of financial literacy in the effectiveness of nudges. So, we further investigate the moderating effects of financial literacy on the efficacy of opt-out and opt-in default nudges in order to understand the impact of financial literacy in this study.

Literature Review

Thaler and Sunstein (2008) define "nudge" as a component of the choice architecture that influences people's decisions predictably without changing the incentives or constraints they face. People frequently lack the time, desire, or resources necessary to think intentionally, clearly, and logically. As a result, rather than being the outcome of logical and rational processes, most acts are the result of habits, heuristic processes, unconscious associations, or automatic and learnt responses (Hofmann et al., 2009; Kahneman, 2011; Smith & DeCoster, 2000). Then, nudges take advantage of flaws that affect automatic unconscious processes and passive decision-making, such as the fact that people do not fully consider their options, they tend to follow the path of "least resistance," they lack clear preferences and complete information, and choices will inevitably be influenced by defaults, framing and anchoring, to capitalize on the unconscious interaction between a person and the environment, and thus of the so-called System 1 way of thinking (Sunstein & Thaler, 2003; Thaler & Sunstein, 2008).

Camilleri et al. (2019) tested two interventions to improve retirement savings investment decisions by doing an experiment. They studied the efficacy of a "nudge" by maneuvering the default option and the efficacy of a "signpost" by influencing the display of a pictograph, briefing the expected return of each option. Their findings suggested that both smart defaults and better risk information by using pictographs can be used to positively influence behavior. Gajewski et al. (2021) examined the effect of nudges on the behaviour of investors in favour of socially responsible investment (SRI) by setting up two online experiments with 713 US retail investors. By using three nudges, i.e., SRI as the default investment, an SRI explanation message, and negative priming ethical values by revealing shocking images, they found that the SRI default option was the most efficient nudge to alter investors' behaviour towards SRI. The remaining two nudges marginally increased the SRI investment, but in isolation they appeared non-significant.

For instance, in the area of economics, a customer may be accidentally persuaded to take the default option (Brown and Krishna, 2004). Research demonstrates that increasing defaults caused consumers to save more for retirement and buy more insurance (Johnson et al., 1993; Madrian and Shea, 2001). Defaults frequently impact the approval of policies in the health sector, including those pertaining to organ donation and transplantation (Johnson and Goldstein, 2003; Abadie and Gay, 2006; Ahmad et al., 2019). The opt-out approach has also been proposed as a successful intervention to change employee behaviour in the workplace, including stand-up working (Venema et al., 2018), enrolling in pension plans (Thaler and Sunstein, 2008; Robertson-Rose, 2021), and energy efficiency (Brown et al., 2013; Egebark and Ekström, 2016). In addition, default nudges are simple and inexpensive to apply (Thaler and Sunstein, 2008), making them appropriate for fostering policy support. The majority of research examined how opt-in and opt-out default options affected the health, energy, and savings and retirement areas. There have been few research on the impact of default options on socially responsible investing, and none have evaluated the efficacy of opt-in and opt-out defaults.

Bassen et al. (2019) provided empirical evidence for the effectiveness of climate labelling as a potential nudge for climate-friendly investing. Madrian and Shea (2001) discovered that automatic enrollment (opt-out default) had a significant impact on the saving behaviour of employees in large US corporations. Johnson and Goldstein (2003) showed that changing the default increases the rate of organ donation in Europe from 15% (opt-in default) to 98% (opt-out default). In addition, defaults can have a significant impact on behaviour, with a wide range in effect sizes, according to a recent meta-analysis of default effects (Jachimowicz et al., 2019). This meta-analysis revealed that when a certain choice is established as the opt-out default as opposed to an opt-in scenario, the chance of selecting it is.68 SDs greater. Nevertheless, the authors also found considerable

impact size heterogeneity, which might imply moderating. The features of the study showed that default effects are smaller for judgements involving sustainable behaviour (as opposed to decisions not pertaining to sustainable behavior) and bigger in consumer domains (than in non-consumer domains).

As an often mentioned example of nudges, default nudges have been employed more and more to affect a variety of societal concerns (Nicolao et al., 2018; Zhao et al., 2022). The opt-out default believes that all people are prepared to accept the preselected choice unless they clearly "opt-out" of doing so, whereas the opt-in default is also known as a "express consent" policy and requires people to manifestly declare their preferences (Etheredge, 2021). Aysola et al. (2016) compared opt-in vs. opt-out defaults in the health sector. "Opt-in Default Nudge", are those nudges in which participant are asked to opt-in the default SRI fund (Steffel et al, 2016). The explicit consent is required from a person in opt-in default system (Meszaros et al., 2020). It is simply the facilitation of behavior. This type of nudge is used in another study by Meske et al. (2020), where they compare opt-in checkbox nudge and force choice nudge in the form of a text box. On the basis of literature, the following relationship is expected:

H1a: The opt-in nudge has a significant positive impact on SRI decision of investors.

Meszaros et al. (2020) define out-of-the-box default as a system in which the consent of a person is automatically assumed. It falls under the category of manipulation of behavior. Johnson and Goldstein (2003) compare the effectiveness of opt-out default over opt-in default. The "opt-out default nudge", are nudges in which the default SRI fund is pre-selected for participants and they are asked to fill out a short form if they want to opt out of the default option (Gajewski et al., 2021). Default nudges are used to reduce the complexity of decision-making. The following relationship is anticipated based on the literature:

H1b: The opt-out nudge has a significant positive impact on SRI decision of investors.

According to Agnew and Szykman's (2005) research, an individual's financial literacy affects how effective information architecture is. They went on to explain that people with less information are more inclined to select the default allocation than people with greater knowledge are. Anderson and Robinson (2018) examined how financial literacy moderated investors' reactions to nudges. According to their findings, financially literate investors and those who believed they were not financially literate were less reactive to nudges. Investors who mistakenly believed that they were financially literate were more responsive to nudges. Carpenter et al. (2021) showed that people with a lot on the line, low family income, high cognitive ability, and little financial literacy appear to receive differential assistance from choice architecture to avoid making the worst decision. Considering the relevant literature, the following two relationships are predicted:

H2a: The financial literacy moderates the relationship between opt-in nudge and SRI decision of investors.

H2b: The financial literacy moderates the relationship between opt-out nudge and SRI decision of investors.

Methodology

We use a sample size of N = 518, a representative sample of potential private investors from Pakistan, who are recruited through a commercial online panel and pay compensation for it. This approach of using a commercial online panel has been used in many studies, like Ingendahl et al., (2020) and Hainmueller & Hiscox (2010). This sample size is obtained after excluding very inattentive responses and those who are uncertain about their responses. Following Levin et al. (2020), randomization is done through Qualtrics software in this study. Participants in a commercial online panel are randomly assigned to a control group and two experimental groups.

Yet, the exclusions were disproportionate, leading to three distinct group sizes: 179 (control group), 176 (opt-in), and 163 (opt-out). Here, a sufficient sample size of the control group and each experimental group is employed to reliably detect treatment effects (Gajewski et al., 2021; Momsen & Stoerk, 2014).

In this study, the online survey experiment approach is used to collect data from a sample of potential private investors in Pakistan. Firstly, the participants have received general instructions about the importance of giving serious responses in order to ensure research quality. Participants are asked to complete the hypothetical investment task of allocating PKR 1000,000 in any one investment option provided by the investment bank, as described by Gajewski et al. (2021). These investment options are equity funds, SRI funds, asset allocation funds, and bond funds. These options are equally efficient in terms of risk/return. The risk-return profile of SRI funds is the same as that of the Equity Fund. In opt-in test group, participant are asked to opt-in the SRI fund before presenting all choices. In opt-out test group, SRI fund is pre-selected for participants and they are asked to fill out a short form if they want to opt out of the default option. In control group, there is no default option.

Qualitative data is collected by using an online questionnaire in the survey experiment approach. This study implements the online survey experiment through Qualtrics, which is a secure web-based survey platform. The experiment is performed remotely through an incentivized web-based questionnaire. It takes almost 10 minutes to complete the questionnaire. After the initial instructions, the first question is a hypothetical investment task. After this task, participants are required to answer questions about demographics, financial literacy, risk tolerance, and social behavior. The participants are asked to answer the closed-ended questions on the given scale in the questionnaire. The data is qualitative and comes from interventional nudges. It is quantified by assigning dummies to each nudge.

The variations in features and other factors are statistically controlled when individuals are randomly allocated to several treatment groups and a control group (Momsen and Stoerk, 2014). Using a Kruskal-Wallis test, the randomization effect is examined. This non-parametric statistical test is used to determine whether or not there is a statistically significant difference between all experimental groups. Only the qualitative response regression model or probability model is used in this investigation since SRI choice is a categorical variable. In the experiment, choosing an SRI fund as an investment choice is rated as 1, while choosing any other investment option is rated as 0. As the SRI decision (dependent variable) is a binary variable, the linear probability model (LPM) and the logit model are used to estimate the model.

This study moves on to conduct moderation analysis to see how financial literacy affects the relationship between SRI (a dependent variable) and default nudges (an independent variable). Moderator is introduced as an interaction term in both LPM and logit models. To measure financial literacy, we use the Big 3 scale of Lusardi and Mitchell (2011). In this scale, three questions about inflation, interest, and risk are asked, and a financial literacy score is calculated. Demographics, risk tolerance level and social behavior of investors are used as control variable in this study. Age, gender, education, marital status, employment, income and investment experience are taken as demographics in this study. For investment experience, score is calculated by asking them about their investment history. To measure risk tolerance, a modified scale from Kapteyn and Teppa (2011) is used, which was also employed in the study by Apostolakis et al. (2016). Social behavior is the type of behaviour that leads to people being drawn to charitable causes. To measure this behavior, we ask several questions to be answered on a 5-point Likert scale (Polonsky et al., 2002).

Results:

Table 1 shows the descriptive statistics on the composition of both treatment groups and the control group alongside the three dimensions of covariates i.e. demographics, risk tolerance level, and social behavior, and a moderator i.e. financial literacy. Demographics include age, gender, education, marital status, employment, income, and investment experience.

Table 1: Descriptive Statistics

Variables	Attributes	Opt-in	Opt-out	Control	Kruskal-Wallis test P-values
		n [%]	**n** [%]	**n** [%]	
Demographics					
Age	18-24	**77** [44.3]	**60** [36.8]	**65** [36.3]	0.534
	25-34	**56** [31.8]	**58** [35.6]	**70** [39.1]	
	35-49	**36** [20.5]	**41** [25.2]	**40** [22.4]	
	≥ 50	**7** [4.0]	**4** [2.5]	**4** [2.2]	
Gender	Male	**112** [63.6]	**110** [67.5]	**119** [66.5]	0.815
	Female	**64** [36.4]	**53** [32.5]	**60** [33.5]	
Education	Ph.D. or equivalent	**15** [8.5]	**15** [9.2]	**22** [12.3]	0.008***
	Master's degree	**41** [23.3]	**45** [27.6]	**59** [33]	
	Bachelor's degree	**57** [32.4]	**49** [30.1]	**59** [33]	
	Intermediate	**61** [34.7]	**51** [31.3]	**39** [21.8]	
	High School or less	**2** [1.1]	**3** [1.8]	**0** [0]	
Martial Status	Married	**76** [43.2]	**78** [47.9]	**95** [53.1]	0.257
	Unmarried	**100** [56.8]	**85** [52.1]	**84** [46.9]	
Employment	full time	**62** [35.2]	**59** [36.2]	**66** [36.9]	0.715
	part time	**38** [21.6]	**41** [25.2]	**36** [20.1]	
	retired	**0** [0]	**2** [1.2]	**5** [2.8]	
	self employed	**31** [17.6]	**29** [17.8]	**32** [17.9]	
	student/unemployed	**45** [25.6]	**32** [19.6]	**40** [22.4]	
Salary	<50,000	**114** [64.8]	**105** [64.4]	**115** [64.3]	0.991
	50,000-100,000	**41** [23.3]	**37** [22.7]	**44** [24.6]	
	100,000-250,000	**18** [10.2]	**16** [9.8]	**11** [6.2]	
	>250,000	**3** [1.7]	**5** [3.1]	**9** [5]	
		Mean [Std dev]	**Mean** [Std dev]	**Mean** [Std dev]	
Investment Experience	Score (0-4)	**1.949** [1.378]	**1.908** [1.374]	**1.866** [1.412]	0.849
Risk tolerance	5-point Likert scale	**3.475** [0.97]	**3.221** [1.073]	**3.402** [0.923]	0.191
Social Behavior	5-point Likert scale	**3.647** [0.736]	**3.733** [0.526]	**3.663** [0.576]	0.782
Financial literacy	Score (0-3)	**1.443** [0.873]	**1.352** [0.916]	**1.181** [0.899]	0.0269**

This table shows the desciptive statistics of two treatment groups and one control group along the dimensions of control variables i.e. demographics, investment experience, risk tolerance and social behavior, and moderator variable i.e. financial literacy. P-values are obtained through Kruskal-Wallis rank test is used to assess the difference among all these groups collectively.

***,** and * indicate significance at 1%, 5% and 10% levels respectively.

The participants are randomly allocated to all three experimental groups. So, it is anticipated that due to randomization, the difference among the all three groups is insignificant. When randomization worked effectively, it means there is no need of control variables. The Kruskal-Wallis rank test is used to test whether randomization is effective. The p-values of kruskal-wallis test shows that randomization worked, excepting the odd of education and financial literacy, the differences among all groups are insignificant.

Next, we test whether any of the treatment or nudging groups differ substantially from the control group in terms of the likelihood of selecting an SRI fund. Table 2 reports the empirical findings of both LPM and logit models. Here, the dummies are assigned to each experimental treatment group, with the control group omitted. Omitted categories are used as reference categories in this model.

The coefficient on each dummy shows the average treatment effect of that nudge as compare to control group, and the sign of the coefficient shows the direction of the relationship, which is more important in this case.

Table 2: Average Treatment Effects of Both Opt-in and Opt-out Defaults: Results of LPM and Logit Models

	Linear Probability Model (LPM)			Logit Model			
		p-value	t-statistics		Odds Ratio	M.E	P>|z|
Opt-in	0.1744***	0.000	3.57	0.8145***	2.258	0.203	0.000
	(0.0489)			(0.2337)			
Opt-out	0.5445***	0.000	11.96	2.4430***	11.507	0.608	0.000
	(0.0455)			(0.2584)			
	Observations	518		**Observations**	518		
	R-squared	0.203		**LR Chi Sq.**	110.29		
	F-Statistics	73.76		**P-value**	0.000		
	F significance	0.000					

Robust Standard Error (LPM) /Standard Error (Logit Model) in Parentheses. Model include the constant. So n-1 dummies are allotted and omitted category is reference category. All the nudge coefficients are relative to control group. M.E is the marginal effect of each independent variable in Logit Model, which is calculated by formula M.E= P (1-P)*β.

***,** and * indicate significance at 1%, 5% and 10% levels respectively.

The first nudge of this study is an opt-in default nudge. The results of the LPM model show that the average treatment effect of an opt-in nudge on SRI decisions is highly statistically significant at the 1% significance level. The sign of the coefficient is positive, which shows that an opt-in nudge increases the probability of an SRI decision. The coefficient value of the opt-in nudge is interpreted as that when the opt-in choice for default is available to participants, it increases the probability of an SRI decision by 0.1744 as compared to the control group. In logit model, the odds of selecting the default option SRI fund is 2.26 in the opt-in default nudge group. The odds of taking a SRI decision in the opt-in treatment group are 1.26 times (126%) higher than the odds in the control group. The marginal effect (M.E) of an opt-in nudge is interpreted as follows: when an opt-in choice for default is available to participants, it increases the probability of an SRI decision by 0.203 as compared to the control group. The effect of an opt-in nudge on SRI decisions in logit model is also significant at the 1% significance level. These results align with the study by Steffel et al. (2016), which shows that default nudges are still significant when they are less manipulative.

The second nudge is an opt-out default nudge. The results of the LPM model show that the average treatment effect of an opt-out nudge on SRI decisions is highly statistically significant at the 1% significance level. The sign of the coefficient is positive, which shows that an opt-out nudge increases the probability of an SRI decision. The coefficient value of the opt-out nudge is explained as follows: when preselected an opt-out default choice is given to participants, it increases the probability of selecting SRI fund by 0.5445 as compared to the control group. In logit model, odds of continuing with the default option SRI decision are 11.5 in the opt-out treatment group. The odds of making a SRI decision and opting out of the treatment group are 10.5 times higher in the treatment group than in the control group. The marginal effect (M.E) value of the opt-out nudge shows that when a SRI default opt-out choice is given participants as a treatment, it increases the probability of an SRI decision by 0.608 as compared to the control group. The effect of an opt-out nudge on SRI decisions is highly significant at the 1% significance level. These results support the findings of previous studies that preselected default option have great significant impact on the financial decision of an individual (Gajewski et al., 2021; Camilleri et al., 2019; and Madrian & Shea, 2001).

The results of this study demonstrate that the opt-out nudge is nearly three times more successful than the opt-in nudge when we examine the outcomes of both opt-in and opt-out nudges. These findings align with those of Johnson and Goldstein (2003), who found that altering the default increased organ donation rates in Europe from 15% (opt-in default) to 98% (opt-out default). Another study by Aysola et al. (2016) discovered that opt-in strategy enrollment rates were 13% while opt-out strategy enrollment rates were 38%. The opt-in nudge is also less manipulative and less likely to limit the decision maker's autonomy. Contrarily, the opt-out default limits an individual's autonomy and is manipulative (Smith et al., 2013). As a result, the opt-in nudge is socially and ethically more acceptable than the opt-out default. The empirical results of this study reveal that although though the opt-in nudge effect is less powerful than the opt-out nudge, it still influences SRI decisions significantly. So, it can take the place of the opt-out default nudge to increase its legitimacy and face less ethical backlash. The opt-in default nudge, however, works without undermining autonomy. (Loewenstein et al., 2014; Sunstein, 2016).

Table 3 illustrates the findings of the interaction terms in both the LPM and the logit models that represent the moderating impact of financial literacy on the relationship between default nudges and SRI decisions. In order to interpret coefficients in a way that makes sense, mean centering is used. Prior to estimate, the moderator variable for financial literacy is mean-centered by deducting means from the starting values. To get the interaction terms, this mean-centered variable is employed. In order to interpret coefficients in a way that makes sense, mean centering is used.

Table 3: Moderating Effect of Financial Literacy for both Opt-in and Opt-out Defaults: Results of LPM and Logit Models

	Linear Probability Model (LPM)			Logit Model			
		p-value	t-statistics		Odds Ratio	M.E	P>|z|
Opt-in	0.1613***	0.001	3.270	0.7467***	2.110	0.186	0.002
	(0.0493)			(0.2381)			
Opt-out	0.5402***	0.000	11.740	2.4635***	11.746	0.613	0.000
	(0.046)			(0.2657)			
Financial Literacy	0.0099	0.781	0.280	0.0544	1.056	0.014	0.782
	(0.0356)			(0.1963)			
Opt-in×Financial Literacy	0.0732	0.178	1.350	0.2941	1.342	0.073	0.269
	(0.0543)			(0.2663)			
Opt-out×Financial Literacy	-0.0865*	0.093	-1.680	-0.4941*	0.610	-0.123	0.084
	(0.0514)			(0.2862)			
	Observations	515		**Oservations**	515		
	R-squared	0.213		**LR Chi Sq.**	116.28		
	F-Statistics	33.15		**[P-value]**	0.000		
	F significance	0.000					

These are the results of moderation effect of Financial Literacy from both LPM and Logit Model, which provide interactions on additive and multliplicative scales respectively. Robust Standard Error (LPM) /Standard Error (Logit Model) in Parentheses. Model include the constant. So n-1 dummies are alloted and ommitted categoey is reference category. All the nudge coefficients are relative to control group. M.E is the marginal effect of each independent variable in Logit Model, which is calculated by formula M.E= P(1-P)*β.

***,** and * indicate significance at 1%, 5% and 10% levels respectively.

The main effects of opt-in and opt-out nudges are at the reference level of financial literacy zero, which is the mean value of financial literacy as a result of mean centering, and the main effect of financial literacy displays the effect in the control group where there is no nudge. In moderated regression, the interaction effects are more relevant. The positive sign of the opt-in interaction term is explained as the financial literacy of an individual enhancing the effectiveness of the opt-in nudge, but this effect is not significant. The negative sign of the opt-out interaction term is explained as the financial literacy of an individual reducing the effectiveness of the opt-out nudge. The opt-out nudge is significant for this moderating effect at the 10% level of significance. Hence, the moderation effect of financial literacy is generally just partially significant. The coefficient

value of the opt-out nudge in the LPM model is -0.0865, which is interpreted as when financial literacy is increased by one unit from its mean value, the success probability of opt-out nudge is reduced by 0.0865 and vice versa. Similar to this, the opt-out nudge's marginal effect (M.E) in the logit model is -0.123, which may be translated as: when financial literacy is raised by one unit from its mean value, the opt-out nudge's success probability is decreased by 0.123, and vice versa. Dawson (2014) two-way logistic interaction plot is used to further evaluate the substantial moderating effects, as illustrated in figure 1. The dotted line depicts a less significant influence, whereas the solid slope depicts a significant effect. This figure shows that the moderation effect of financial literacy is significant for an opt-out nudge at low levels. The nudge-ability of an opt-out nudge is greater at low financial literacy levels and less at high financial literacy levels. In other words, as financial literacy rises, opt-out default's efficacy decreases, as seen by the slopes in the interaction plot.

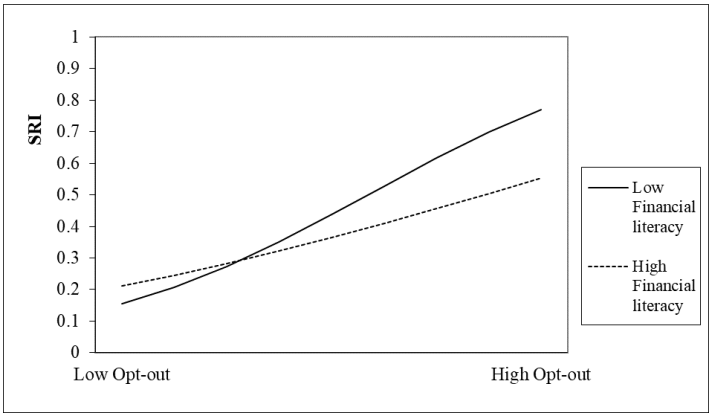

Figure 1: Two-way Logistic Interaction Plot for Opt-out nudge

Conclusion

This study empirically investigates the impact of default nudges on SRI decision of investors in Pakistan. This study used the opt-out default and opt-in default nudges to increase the SRI investment by overcoming the complexity barrier. A sample size of N = 518, a representative sample of potential private investors from Pakistan, who are recruited through a commercial online panel, is used in this study. To collect the data, an incentivized online survey experiment is conducted. In this experiment, nudges are assigned randomly through software to different groups in such a way that only one nudge is given to each of the eight treatment groups and no nudge is assigned to the control group. The covariates of the SRI decision are controlled automatically through this randomization. The overall empirical findings of this research conclude that nudges can be used as an effective strategy to enhance socially responsible investment. This study also concluded that the financial literacy partially reduce the effectiveness of nudges.

Both nudges used in this study significantly increase the share of individuals who choose SRI as an investment decision. The results of this study demonstrate that the opt-out nudge is nearly three times more successful than the opt-in nudge when we compare the outcomes of both nudges. The empirical findings of this study show that the opt-in nudge effect still has a considerable impact on SRI decisions, albeit being less potent than the opt-out nudge. This might thus be used as a counter-strategy to the opt-out default nudge in order to increase its legitimacy and encounter fewer ethical concerns. In addition to the core relationship between nudges and SRI, this study also examines the moderation effect of financial literacy on this relationship. The empirical findings imply that opt-out nudge effectiveness is reduced if the individual is financially literate, and vice versa. Financial literacy doesn't have a significant impact on the effectiveness of an opt-in nudge. The empirical findings of this study can aid state-level SRI policymakers in creating better

investment instruments that, when used in conjunction with other policy tools, can promote SRI investment in society.

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Appendix 1:

Table 4: Results of LPM Model with Financial Literacy and Education Used as Control Variable

```
. regress SRI OI OO FL education, vce(robust)

Linear regression                               Number of obs =     515
                                                F(  4,   510) =   38.20
                                                Prob > F      =  0.0000
                                                R-squared     =  0.2056
                                                Root MSE      =  .44678
```

SRI	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
OI	.1594546	.0496142	3.21	0.001	.0619813	.2569279
OO	.5309674	.0463059	11.47	0.000	.4399936	.6219411
FL	-.0026388	.0230576	-0.11	0.909	-.0479384	.0426608
education	.0398196	.020169	1.97	0.049	.0001951	.0794441
_cons	.1318186	.0613391	2.15	0.032	.0113101	.2523271

Table 5: Results of Logit Model with Financial Literacy and Education Used as Control Variable

```
. logit SRI OI OO FL education

Iteration 0:   log likelihood = -355.78056
Iteration 1:   log likelihood = -299.94131
Iteration 2:   log likelihood = -299.90553
Iteration 3:   log likelihood = -299.90553

Logistic regression                             Number of obs   =        515
                                                LR chi2(4)      =     111.75
                                                Prob > chi2     =     0.0000
Log likelihood = -299.90553                     Pseudo R2       =     0.1570
```

SRI	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
OI	.7435754	.2376638	3.13	0.002	.2777629	1.209388
OO	2.393341	.2601849	9.20	0.000	1.883388	2.903294
FL	-.0145678	.1134574	-0.13	0.898	-.2369401	.2078046
education	.201846	.1032079	1.96	0.050	-.0004378	.4041298
_cons	-1.712059	.3362246	-5.09	0.000	-2.371047	-1.053071

Table 6: Results of the LPM of financial literacy moderation using education as a control variable

```
. regress SRI OI OO FL OIxFL OOxFL education, vce(robust)

Linear regression                               Number of obs =     515
                                                F(  6,   508) =   29.11
                                                Prob > F      =  0.0000
                                                R-squared     =  0.2182
                                                Root MSE      =   .4441
```

SRI	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
OI	.1513333	.0496412	3.05	0.002	.053806	.2488606
OO	.5320354	.046502	11.44	0.000	.4406755	.6233953
FL	.0032331	.036838	0.09	0.930	-.0691404	.0756066
OIxFL	.0697126	.0542091	1.29	0.199	-.0367891	.1762143
OOxFL	-.0851137	.0514976	-1.65	0.099	-.1862881	.0160608
education	.0370341	.020013	1.85	0.065	-.0022843	.0763525
_cons	.1400775	.0615456	2.28	0.023	.0191623	.2609927

Table 7: Results of the Logit model of financial literacy moderation using education as a control variable

```
. logit SRI OI OO FL  OIxFL OOxFL education

Iteration 0:   log likelihood = -355.78056
Iteration 1:   log likelihood = -296.05145
Iteration 2:   log likelihood = -295.87075
Iteration 3:   log likelihood = -295.87058
Iteration 4:   log likelihood = -295.87058

Logistic regression                             Number of obs   =        515
                                                LR chi2(6)      =     119.82
                                                Prob > chi2     =     0.0000
Log likelihood = -295.87058                     Pseudo R2       =     0.1684
```

SRI	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
OI	.6979464	.2400834	2.91	0.004	.2273915	1.168501
OO	2.4423	.2667424	9.16	0.000	1.919495	2.965106
FL	.0207238	.1970523	0.11	0.916	-.3654917	.4069393
OIxFL	.277189	.2669143	1.04	0.299	-.2459535	.8003314
OOxFL	-.5023187	.288322	-1.74	0.081	-1.06742	.0627821
education	.1966172	.1049472	1.87	0.061	-.0090755	.4023099
_cons	-1.692878	.3401941	-4.98	0.000	-2.359646	-1.026109

Appendix 2 (Questionnaire):

Nudges Questions Decision screenshots:

1. Hypothetical Investment scenario (control group)

In this section we have a task for you about possible investment in mutual funds. A 'Mutual fund' is a form of investment that pools money from many investors and invests their money in stocks, bonds and/or other securities.

Please carefully consider the following scenario, and act as if real money was involved.

Imagine you have PKR 1,000,000 to invest. There are four possible mutual funds options given by your Investment Bank, whose details are shown below. Your task is to choose one mutual fund which you would allocate money to achieve your investment goals.

For each fund, a risk index on a scale of 1 to 7 is indicated, 1 is the least risky, and 7 the riskiest. Similarly, a financial return index on a scale of 1 to 7 is indicated, with 1 being the lowest return and 7 being the highest return.

Names	Investment Objectives	Risk	Return
Equity fund	It aims to maximize financial returns by investing primarily in stock market.	3	6
Socially Responsible Equity fund	It aims to balance financial returns and social gains by investing in stock market.	3	6
Asset Allocation fund	It aims to offer diversification by investing in various categories of assets.	2	4
Bond fund	It aims to generate fix returns by investing in bond and fixed income securities.	1	2

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2. Opt-in Default Nudge (type 1 transparent nudge)

(After presenting hypothetical investment task, the following option is given. If the participant click this option, all choices with pre-selected SRI fund option is shown to them. If the participant do not click this option, all choices with no pre-selected option is shown to them)

Click this if you want to invest in Socially Responsible Equity Fund

Next

3. Opt-out Default Nudge (type 1 non transparent nudge)

(After presenting the hypothetical scenario with pre-selected SRI fund option, the following instructions are given)

- If you agree with Default option then just click next. However, if you still want to invest in another fund, then select the choice and fill opt-out consent form in the next page.

Financial Literacy Questions

The following questions are about finance.

Q-1: Do you think the following statement is true or false? "Buying a single company stock usually provides a safer return than a stock mutual fund."

True	False	Refuse to answer	Do not know

Q-2: Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, with the money in this account, would you be able to buy

More than today	Exactly the same as today	Less than today	Do not know	Refuse to answer

Q-3: Suppose you had amount 100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

More than 102	Exactly 102	Less than 102	Do not know	Refuse to answer

Suppose you had amount 100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

More than today	Exactly the same as today	Less than today	Do not know	Refuse to answer