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Testing Four Nudges in Socially Responsible Investments: Default Winner by Inertia

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Abstract: Socially responsible investments (SRI) suffer from a lack of investments from individual investors, despite their positive attitudes toward SRI. This attitude-behavior gap is a serious issue, as SRI is often perceived as a way to promote sustainable development. We extend Gajewski et al.'s (2022) work investigating nudges, especially the default option, as a way to encourage SRI. In a pre-registered study conducted in October 2021 with 1,050 US investors, we pit four nudges against one another to encourage individual investors to invest in SRI. All nudges significantly increase investment in SRI compared with the control group. Making SRI the default option with frictions to opt-out is the most efficient intervention. This is closely followed by a default option without friction to opt out and option partitioning, which are not significantly different from each other. Precommitment, although statistically significant, has a modest effect on investment in SRI and inferior to the other nudges. Overall, the two types of default as well as option partitioning are significant and impactful solutions for increasing investment in SRI.

Keywords: ESG, individual investors' behavior, nudges, socially responsible investments, sustainable development

1. Introduction

Socially responsible investments (SRI) integrate extra-financial criteria in investment decisions in an “*attempt to express, and possibly promote, certain ethical values through the choice of financial instruments*” (Pilaj, 2017, p. 244). SRI can favorably impact sustainable development by ensuring money flows to firms with the highest corporate social responsibility (CSR; Pilaj, 2017). In Europe, SRI labeled funds represent 777 billion euros under management in 2021 (Novethic, 2022). The SRI market is dominated by institutional investors, who account for 69% of SRI assets (Eurosif, 2018). Yet, only a small minority of individuals hold SRI investments. Meanwhile, a majority of them declare that they would like to hold “at least some” in their portfolio, leading to a large attitude-behavior gap. For instance, while 57% of French retail investors are willing to invest at least a small part of their portfolios in SRI, only 7% actually do so (BNP, 2018). Historically, institutional investors have driven this market (Forum for Sustainable & Responsible Investment, 2018). This lack of investment from individual investors jeopardizes the future development of SRI, and thus, the development of more responsible finance in the service of sustainable development. As Cunha et al. (2021) emphasized in their call for research, we need to investigate the main barriers to SRI and find ways to overcome them. How best should we encourage individual investors to invest in SRI?

Previous academic literature proposed nudges as a potential solution, which are interventions that promote behavior without forbidding any options or changing economic incentives (Pilaj, 2017). In the SRI context, Gajewski et al. (2022) tested three nudges and their potential combinations: priming, messaging, and setting a 100% investment in SRI as the default option. Although priming and messaging were not individually significant, their combination resulted in a small increase in SRI investment. Meunier et al. (2022) also tested the effect of priming (human faces) on investment in SRI and found a modest effect of a male face on SRI investment compared to no face or a female face. Liu and Peifer (2022) tested the effect of framing on SRI, and found that a slight change in wording to emphasize fairness was sufficient to increase investment in SRI, particularly under win-win conditions. As tested by Gajewski et al. (2022), setting SRI as the default option results in a striking increase of 40 to 50 percentage points in SRI investment. Thus, this appears to be the most impactful nudge to promote investment in SRI.

Although using a default investment in SRI is attractive due to its impact, the original design used by Gajewski et al. (2022) creates friction. This has already been pointed out by Madrian and Shea (2001), who found that the default option can generate inertia due to the passivity of participants. In Gajewski et al.'s (2022) default option, investors had to tick a box and move to another page to opt out of default. This increase in friction could be considered unfavorable by investors who do not wish to invest in SRI, as they may consider it to be a sludge (following the definition of Mills, 2023). The additional friction and resulting annoyance could impede the real-world application of this form of the default option in SRI.

Here, we test four nudges: i) a default (strong) choice, identical to that used by Gajewski et al. (2022); ii) a default (soft) choice, identical to that used by Gajewski et al. (2022), but without the friction generated by the need to tick a box and change screens; iii) an option partitioning, where individuals must first select the percentage of their portfolio they would like to invest in SRI before making the actual allocation; and iv) a precommitment, where individuals first have to indicate whether they would like to invest a significant portion of their wealth in SRI.

Our results show that, as per our pre-registered hypotheses, all these nudges significantly increase SRI investment compared to a control group subjected to no nudges. Cohen's d effect size (Cohen, 2013) indicates a small effect size for precommitment ($d > 0.2$), medium effect size for option partitioning ($d > 0.5$), and large effect size for both types of default ($d > 0.8$). The impact of precommitment is

significantly inferior to that of option partitioning and default without friction. Moreover, option partitioning and default without friction are inferior to default with frictions. Overall, option partitioning and the two types of defaults are the three solutions with significant and economically relevant effects on SRI investing.

Our contribution to the academic literature is fourfold: i) we successfully tested, for the first time, three new nudges (precommitment, option partitioning, and default without friction) in the framework of SRI; ii) compared with the default with friction, our results demonstrate that the default without friction and option partitioning provide credible and easier to implement alternatives iii) we show that part of the efficiency of the default option used in Gajewski et al. (2022) comes from frictions, and iv) we provide a ranking of the impact of these nudges:

Default (strong) > Default (soft) \approx Option Partitioning > Precommitment > Control (1)

The remainder of this article is organized as follows. We first review the literature on sustainable development and nudges in SRI, generating our hypotheses. After a brief description of our methodology, we move on to the results, which provide a ranking of the impact of the nudges on SRI. Finally, we conclude by providing policy implications and avenues for future research.

2. Nudging toward SRI: Sustainable Development and Ethics

We must tackle two essential questions before proceeding further: i) whether SRI can promote sustainable development and ii) whether nudges comply with ethical values.

Although SRI has a broad meaning and acceptance, it can be defined as an investment that considers environmental, social, and governance (ESG) factors. It is expected to benefit society by influencing firms' behavior (Eurosif, 2021), guiding money toward companies most likely to improve sustainability (Pilaj, 2017). SRI has become an important topic for all firms' stakeholders. Tong et al. (2022) showed that investors' negative attitudes toward some firms encourage them to engage in CSR. Brogi et al. (2022) observed that governments and investors increasingly require banks to channel their loans toward socially responsible borrowers; further, the authors showed that ESG scores are linked to better creditworthiness. Notably, better CSR is linked to more transparency, which helps firms in raising debt (Abbassi et al., 2022). Lu and Abeysekera (2021) noted that voluntary CSR disclosure is more common in firms that are more closely monitored by analysts. Alharbi et al. (2023) showed how governments that issue green bonds increase renewable energy production. Similarly, Al Ayoubi and Enjolras (2021) showed that the Norwegian sovereign fund's decision to divest some firms for social and environmental reasons led to a decrease in stock prices, which could act as a pressure mechanism for firms to engage in CSR. Supporting Pilaj's (2017) argument, Li et al. (2021) and Barko et al. (2021) empirically showed that SRI funds improve the CSR and ESG of target firms. Thus, it indeed appears that SRI promotes sustainable development by encouraging better corporate behavior.

A rich debate exists regarding nudges and ethics. Choice architecture is inevitable in most situations (Sunstein, 2015). Hence, there is often no neutral way to present choices, and choice architectures, including defaults, are often unavoidable. Thaler and Sunstein (2008) explicitly placed nudges within a liberal paternalistic framework. Even if the nudges' goal is to influence respondents' choice behavior, they should not forbid any option and preserve the right to freely choose. On the issue of manipulation, Nys and Engelen (2017) introduced the concept of *democratically legitimate manipulation*. They estimated

that some people's worry about being manipulated by nudges is valid but counterbalanced by the nudges' ability to serve important goals, such as environmental protection or sustainable development. Thus, nudges can be considered ethical tools and their legitimacy must be evaluated on a case-by-case basis (Nys & Engelen, 2017).

Two frameworks have been proposed to evaluate the ethical character of nudges. First, Sunstein (2016) proposed three criteria: nudges must preserve freedom of choice, have licit ends, and be fully transparent. Governments act unethically if they use nudges to reduce welfare, autonomy, dignity, or self-governance. For instance, nudges are ethical in the context of promoting collective action to preserve the environment, which can be more efficient than providing information, education, or economic incentives (Sunstein, 2016).

Another, possibly more complete framework for evaluating nudge ethics is FOREGOOD, developed by Lades and Delanay (2020). The authors listed seven ethical dimensions that business, industry actors, and policy-makers should consider to "nudge for good": Fairness, Openness, Respect, Goals, Opinions, Options, and Delegation. For each key dimension, they suggested questions that choice architects can ask themselves to identify potential ethical problems before they arise. The nudges proposed in this study are compatible with these seven FOREGOOD criteria (Lades & Delanay, 2020) and those proposed by Sunstein (2016), and hence, can be considered ethical.

In their thorough literature review, Cunha et al. (2021) emphasized as a promising path for future research investigating the main barriers to SRI, and, more specifically, finding how innovative solutions can help in overcoming these barriers. SRI has spread over the past two decades, driven mainly by institutional investors who still dominate the market (Eurosif, 2018). The real challenge now is to deal with the impediments to SRI investment by individual investors, as we depict in the following sections.

3. Literature Review and Hypotheses

Here, we first describe our theoretical framework based on Pilaj (2017), including the main hurdles to SRI investments by individual investors. Then, we describe the main categories of nudges, highlighting their efficiency in previous settings through meta-analyses and their ability to overcome the aforementioned hurdles. Finally, based on this review, we derive our hypotheses.

3.1. Theoretical Framework

Pilaj (2017) proposed a theoretical model depicting barriers to SRI and suggested using nudges to overcome them. The author considered the lack of investment in SRI to be a market failure due to behavioral factors that should be remedied using nudges. In the context of the mental processes based on Kahneman's (2011) approach, the author's theoretical model consists of four mental steps that an investor goes through to make the decision to invest in SRI: activation, awareness, attitude, and action (excluding the adjustment and monitoring of portfolios, which needs not concern us at this juncture). Each step is associated with various barriers: complexity, limited attention, cost-benefit concerns, and procrastination.

Therefore, the first step involves activation. Individuals must first decide to invest actively in something other than a conventional savings account. As there are many investment products, individuals are often overwhelmed by a sense of complexity and simply choose *not to choose*, thus investing in the conventional savings account.

Second, individuals must recognize that the savings decision encompasses an ethical dimension and is not just a pure risk-and-return optimization. Pilaj (2017) argued that due to limited attention, individuals often

unintentionally disregard this ethical dimension. Indeed, the investment environment is highly primed for money, which is detrimental to ethical decision-making (Kouchaki et al., 2013). By contrast, the ethical aspects of investment decisions are typically far from salient.

Once the ethical dimension is recognized, the third step involves developing an informed opinion on SRI. Numerous misconceptions surround SRI (Larcker et al., 2022, Meunier & Ohadi, 2022). Dumas and Louche (2016) found that concerns regarding SRI performance remained constant in UK press articles reviewed between 1982 and 2010. As highlighted by Cunha et al. (2021), the academic literature has also extensively focused on this financial performance aspect, but reported conflicting results. While some studies find a positive effect of considering ESG factors in investment decisions (see Ferrat et al., 2023, for moderate screening), others find a negative link between ESG exposure and financial performance (Karoui & Nguyen, 2022). Meanwhile, others find an effect that depends on the business cycle or social responsibility scores (Matallín-Sáez et al., 2019), or no effect at all (Ur Rehman et al., 2016). Overall, the aggregated evidence indicates no notable difference between the performance of conventional investments and SRI (see Revelli & Viviani, 2015, Larcker et al., 2022). Nonetheless, individuals may form negative attitudes toward SRI, causing them to disregard it.

Fourth, individuals should then implement their decisions—that is, invest in an SRI product. Often, procrastination proves to be too large an obstacle, leading to an attitude-behavior gap. Pilaj (2017) attributed this procrastination to the fact that the short-term costs associated with implementing an investment decision (e.g., facing a myriad of complex investment products to find the one best fitting an individual’s preferences) are given disproportionate weight compared to the long-term benefit (Akerlof, 1991). This has been observed in a large survey of 5,000 individuals in five European countries conducted by BNP (2018). The willingness to hold “at least some” SRI in portfolios ranged from 52% in the Netherlands to 80% in Italy. Notably, the percentage of individuals with SRI was below 7% in all countries.

Essentially, in this fourth step, Pilaj (2017) theoretically argues that procrastination, that is, the lack of implementation of decisions, might lead individuals to display an attitude-behavior gap. This attitude-behavior gap was visible in the BNP (2018) survey. Thus, it seems that the final step of implementation might indeed be impeding individuals from investing in SRI. Clearly, while individuals are willing to invest in SRI, they fail to act on this positive attitude. Thus, the nudges that we develop should target this step. In particular, Pilaj (2017) mentioned the famous *Save More Tomorrow* program of Thaler and Benartzi (2004), which combines both precommitment and default options, as a promising path for future research.

Next, we review the literature to identify the most impactful nudges that could enable us to overcome the hurdles depicted by Pilaj (2017) using previously published meta-analyses (Mertens et al., 2022, Luo et al., 2021).

3.2. Finding Efficient Nudges

In a literature review of nudges, Beshears and Kowosky (2020) called for research to determine the most impactful design for nudges. Outside the specific context of SRI, Mertens et al. (2022) answered this call by studying the relative efficiency of several classes of nudges in a large meta-analysis across several behavioral domains. They split nudges between i) “decision structure” (default, effort, and change in the composition or partitioning of options), ii) “decision assistance” (reminders and precommitment), and iii) “decision information” nudges (using salience, social norms, or providing information). The authors highlighted that interventions in decision structure nudges consistently outperform the other two categories, which are somewhat equivalent in their efficiency. In particular, the default nudge (changing

the default option) was the most powerful. The remainder of this article follows this classification of nudges used in Mertens et al.'s (2022) meta-analysis.

Luo et al. (2021) reached a similar conclusion in their meta-analysis using another framework. Again, their results underlined the fact that nudges are efficient tools, with the default setting being one of the most efficient interventions. Interestingly, Luo et al. (2021) distinguished between nudges that decrease (e.g., hurdles or obstacles to reaching the best decision) and increase friction. They found a small advantage of nudges that reduced friction.

However, the SRI domain may yield different results. Mertens et al.'s (2022) meta-analysis indicated that finance is the domain with the smallest effect size. This may be unsurprising as numerous nudges tend to appeal to the intuitive and emotional System 1, while financial decisions typically involve a deliberative System 2 process (see Kahneman, 2011).

Furthermore, nudges in finance are typically pro-self as they aim to improve the situation of the individuals being nudged (for instance, encouraging individuals to save more in anticipation of their retirement; see Thaler & Benartzi, 2004). This is consistent with the fact that investment decisions typically occur in the financial markets, which tends to prime people toward self-oriented utility maximization, as opposed to social markets (Heyman & Ariely, 2004, Vohs et al., 2008). In contrast, investing in SRI is a prosocial decision, thus being at a disadvantage in an environment highly primed for money.

3.2.1. Structure Nudges

On structure nudges, Gajewski et al.'s (2022) main conclusion is consistent with Mertens et al.'s (2022) meta-analysis regarding default options. Specifically, the default nudge was by far the most powerful intervention in inducing US respondents to choose SRI over conventional investments. The default option increased SRI allocation by approximately 40% compared with the control group, in line with the rather strong effect size (Cohen's $d=0.62$; Cohen, 2013) for the default option observed in both meta-analyses of nudges (Mertens et al., 2022, Luo et al., 2021). Interestingly, the default used by Gajewski et al. (2022) required a small effort from respondents to opt out, as it required them to tick a box and move on to another screen. That is, it induced a small increase in friction compared to a simpler procedure in which all operations could occur on the same page.

However, other structure nudges, such as changing the grouping of options, have not been tested in the SRI context, but appear promising in Mertens et al.'s (2022) meta-analysis, with the second largest effect size of all nudges ($d=0.55$). Within the SRI decision framework, it may be reasonable to ask investors about their willingness to invest in SRI. As investors are typically biased toward even allocation, this option partitioning may lead to approximately 50% investment in SRI.

As addressed by Gajewski et al. (2022), the default nudge is a response to the complexity of the investment decision, which is one of the main hurdles to investment in SRI (Pilaj, 2017). An option-partitioning nudge is another way to address this difficulty by first addressing the ethical side of investing before dealing with the risk and return considerations. Both nudges address several obstacles as depicted in Pilaj's (2017) model. They make the ethical dimension more salient, helping reduce the issue of potential unintended disregard of the ethical dimension of investing. Importantly, we argue that they significantly reduce the complexity of the investment task, especially the implementation of investment decisions. That is, they should greatly reduce the large attitude-behavior gap observed in SRI, which seems to be at the heart of individuals' lack of investment in SRI (Pilaj, 2017, BNP, 2018).

3.2.2. Decision Assistance Nudges

We are not aware of any studies on SRI that use reminders or precommitment (the two nudges comprising the decision assistance category). Although the use of reminders does not appear to be directly applicable to SRI, precommitment is promising. Breman (2011) and Bennett and Oppenheimer (2010) emphasized that it is useful in promoting prosocial behavior (charity donations). In Mertens et al.'s (2022) meta-analysis, precommitments had one of the smallest effect sizes ($d=0.3$).

In the SRI framework, precommitment could help with the large attitude-behavior gap in SRI (Pilaj, 2017, BNP, 2018). In other words, individuals display a positive attitude toward SRI but fail to implement it. Pilaj (2017) attributed this attitude-behavior gap to procrastination. Ariely and Wertenbroch (2002) previously showed that a precommitment can be effective in tackling procrastination within the framework of time management. Thus, we argue that a precommitment to investing in SRI can be a prime candidate for reducing the gap between attitudes and actual investment behavior.

3.2.3. Decision Information Nudges

Gajewski et al. (2022) and Meunier et al. (2022) studied other types of decision information nudges. The results of these nudges were much more mitigated. Gajewski et al. (2022) found no effect of messages depicting the merits of SRI or a priming picture taken in isolation. A modest increase was observed when both these nudges were used together. Similarly, Meunier et al. (2022) observed a modest effect of the presence of a male face on SRI compared to no model or a woman. While these results were statistically significant, the economic effects may be too small to warrant their practical use.

Liu and Peifer (2022) thoroughly studied the framing effect in SRI. They emphasized that framing SRI with notions of fairness increases investments in SRI. This was particularly remarkable as the manipulation used was relatively small; only a few words were modified between the different treatment groups. However, the authors found no significant improvements when framing SRI investments using words related to care, loyalty, authority, and sanctity.

In our opinion, these results are consistent with the specificities and hurdles of SRI investments depicted in our theoretical framework. Financial decisions occur in environments highly primed for money, deliberative, and considered extremely complex by most individuals. Nudges that appeal to emotions may not be the best tools in such environments. Similarly, the inherent complexity of investment decisions means that providing additional information on SRI may not be useful as individuals are overloaded with information.

This is also consistent with the theoretical reasoning developed in this study. Decision information nudges aim to create a positive attitude toward SRI. While developing a positive attitude toward SRI is an essential step in Pilaj's (2017) theoretical model, it does not seem to be the main problem in practice. The large BNP (2018) survey highlighted that individuals have, on average, a positive attitude and some appetite toward SRI. Therefore, we focus on decision structure and decision-assistance nudges.

3.3. Selection of Nudges and Hypotheses

Following the literature review, we selected four nudges to promote SRI investment: i) default (strong), identical to Gajewski et al. (2022), where opting out of the default requires ticking a box and moving to another screen; ii) default (soft), where participants can opt out of the default on the same screen; iii) option partitioning, where investors are first asked to allocate their investment between SRI and conventional funds; and iv) precommitment, where investors first choose to commit to invest a sizeable portion of their investment in SRI.

The first three nudges were largely selected based on their potential to remediate the complexity of the investment decision, instrumental in creating the attitude-behavior gap observed in SRI (Pilaj, 2017, BNP, 2018) and their rather large effect size, as observed in Mertens et al.'s (2022) meta-analysis.

The last nudge, precommitment, is another promising way to remediate the attitude-behavior gap. To our knowledge, this may be the first time that a decision-assistance nudge was used to promote SRI. We elected to avoid decision information nudges, given their relatively poor performance in prior studies (Gajewski et al., 2022, Meunier et al., 2022).

Following our pre-registration (available at <https://osf.io/8hdg3>), we hypothesize that:

Hypothesis 1: Nudges positively affect SRI.

Mertens et al.'s (2022) meta-analysis clearly showed that some nudges are more efficient than others. Default appears to be the most efficient nudge in all behavioral domains considered. This observation is consistent with Gajewski et al. (2022), who showed that the default option results in a large increase in investment in SRI. Several propositions have been advanced to explain the mechanism by which the default option impacts behavior. First, the default option may indicate a social norm or a recommendation. Alternatively, individuals might stick to the default because of their natural inertia; that is, the default creates friction to opt out (Madrian & Shea, 2001, Jachimowicz et al., 2019). We find this second explanation to be more promising and test it in our experiment.

The way Gajewski et al. (2022) implemented their default option created some friction to opt out, corresponding to our default (strong) condition. These additional frictions are the only differences between the default (strong) and default (soft) conditions. We hypothesize that these additional frictions are significant drivers of the default nudge's efficiency. That is, our default (strong) condition prompts significantly more investment in SRI than other nudges. Therefore, we hypothesized the following:

Hypothesis 2: Default (strong) has a stronger impact on SRI than other nudges.

Finally, based on the effect size in Mertens et al. (2022), we expected the precommitment to have the lowest effect on all four nudges. This should be particularly prevalent in SRI. As noted before, investment decisions take place in the financial markets, which prime individuals toward self-oriented utility maximization (Heyman & Ariely, 2004, Vohs et al., 2008).

In our framework, as is often the case, failure to honor one's precommitment entailed a small emotional cost. In such a money-primed environment, we posited that this consideration is typically pushed to the background.

That is, we posit that the default (strong) condition (as already underlined in Hypothesis 2), option partitioning, and default (soft) condition have a stronger impact on SRI than the precommitment.

Hypothesis 3: Option partitioning and default (soft) have a stronger impact on SRI than precommitment.

Thus, our three hypotheses summarize the impact of our nudges in the following order (Equation 1):

Default (strong) > Default (soft) ≈ Option Partitioning > Precommitment > Control (1)

We also investigated several paths through which these nudges affected allocations in SRI. Individuals scoring higher in reactance may be less influenced by nudges, leading to lower investment in SRI. A higher propensity to anchor may be linked to a higher investment in SRI in both default groups, where participants can allocate up to 100% of their portfolio in SRI. Integrity may be linked to higher investment in SRI in the partitioning and precommitment groups, where participants engage in some form prior to the

investment task. Cognitive reflection test (CRT), which measures the ability to override an initial intuitive impulse, may be linked to a lower propensity to accept default allocations.

4. Methods

As depicted in our pre-registration (available at <https://osf.io/8hdg3>), we administered an online experiment on Prolific Academic to 1,050 individuals from the US who had experience investing in financial markets. The exact pre-screening question used by Prolific Academic was, “*Have you ever made investments (either personal or through your employment) in the common stock or shares of a company?*”. The questionnaire took less than 10 minutes to complete, and investors were paid 1£ for their contributions. Of the 1,050 investors, 30 failed the attention check and were excluded from the analysis. We did not winsorize the data. The remaining investors were randomly assigned to one of five groups (see Figure 1): (1) control, (2) precommitment, (3) partitioning, (4) default soft, or (5) default strong. We used the same funds as Gajewski et al. (2022), the same endowment of 10,000\$, and similar wording¹. All funds are equally efficient in terms of risk and returns. Two funds have the same risk-return profile; the only difference is that one of them is socially responsible.

- (1) The control group was asked to participate in an investment task in which individuals had to allocate their wealth between three conventional funds and a socially responsible fund.
- (2) The precommitment group investors were first asked if they would be willing to invest a “significant part” of their money in SRI and then presented with the same investment task as the control group.
- (3) The option-partitioning group was first asked to allocate their wealth between conventional investments and SRI investments, and then participated in the investment task on another screen, where the percentage of SRI they allocated in the first screen was recalled.
- (4) (5) The default group had an allocation set by default at 100% for SRI. For the default soft group (4), the allocation could be changed on the same screen, whereas the default strong group (5) needed an additional click leading to another screen.

Investment Game

Imagine that you have **\$ 10,000 to invest**. Your bank proposes you the 4 funds below. Your task is to choose the percentage you would allocate to each of the 4 funds by clicking and dragging the bars below the description. The total percentage needs to equal 100%.

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**.

The Socially Responsible Fund chooses its assets based on environmental, social and governance criteria in addition to pure financial performance.

Name	Risk	Return
Equity Fund	2	4
Bond Fund	1	2
Index Fund	3	6
Socially Responsible Fund	3	6

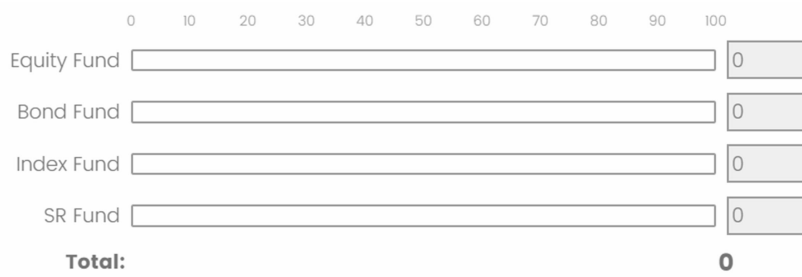


Figure 1.1 - Investment Task - Control Group

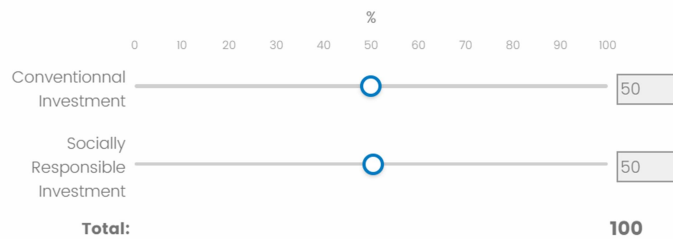
If I was offered the opportunity to invest in Socially Responsible Investments which display similar performance to conventional ones, I would invest a significant amount in it

Yes

No

Figure 1.2 - Investment Task - Precommitment

If you had the choice between a conventional investment and a socially responsible one offering similar financial performance, how would you allocate the amount?



Remember that you indicated you wanted to invest 50 % in the Socially Responsible Fund.

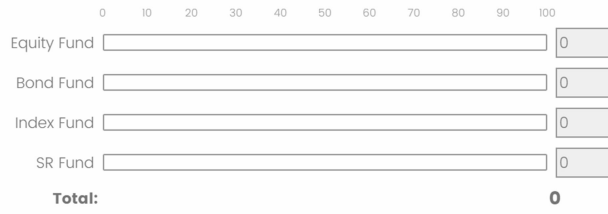


Figure 1.3 - Investment Task - Option Partitioning

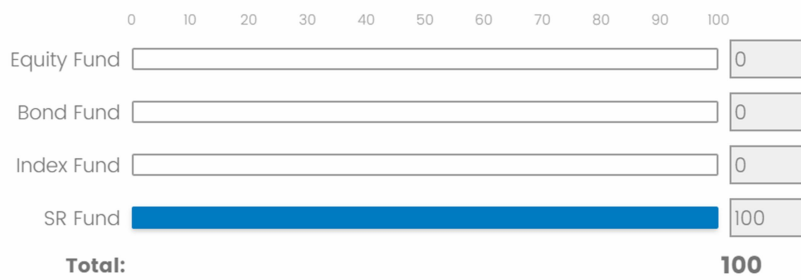
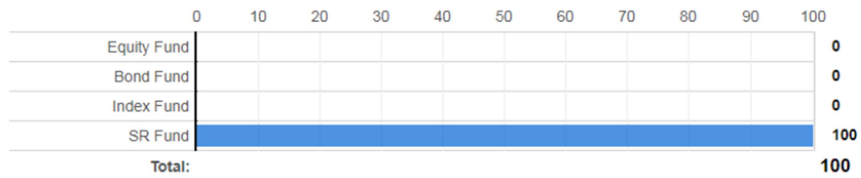


Figure 1.4 - Investment Task - Default (soft)



I would like to change this allocation

Figure 1.5 - Investment Task - Default (strong)

Figures 1.1 to 1.5 present the tasks faced by respondents in the five experimental groups.

Respondents then took six personality trait tests: an altruism scale (Costa & McCrae, 1992), a risk-taking measure (Dohmen et al., 2011), the three-question CRT (Frederick, 2005), a reactance scale (Hong & Faedda, 1996), an anchoring task (Jahedi et al., 2017), and an Integrity/Honesty/Authenticity scale (Peterson & Seligman, 2004). The actual ways the questions were displayed to the respondents are reproduced in the figures in the Appendix (see Figures A1 to A6).

The treatment groups, order of the personality trait test blocks, and items within the block were randomized. We also obtained several participant demographic variables from Prolific Academic. Table 1 presents the descriptive statistics for these variables. In the Appendix, we provide a definition for each variable used in the analysis (see Table A1) and the correlations between these variables (see Table A2).

Table 1 - Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	First Quartile	Median	Third Quartile	Maximum
SRI	47.24	31.54	0	25	40	70	100
Male	49.71%	0.5	0	0	0	1	1
Age	33.79	12.34	18	24	31	41	83
Working	72.25%	0.44	0	0	1	1	1
Charity Aff.	21.86%	0.41	0	0	0	0	1
Concern Env.	3.95	1.03	1	3	4	5	5
Single	15.78%	0.36	0	0	0	0	1
Bachelor	62.75%	0.48	0	0	1	1	1
Income	7(60 - 70K\$)	3.53	0 (0-10K\$)	5 (30-39K\$)	7 (60-69K\$)	11 (100-149K\$)	12 (>150K\$)
Student	24.80%	0.43	0	0	0	0	1
Conserv.	11.08%	0.31	0	0	0	0	1
Atheist	45.59%	0.5	0	0	0	1	1
EvalFirm	83.33%	0.37	0	1	1	1	1
CRTTot	1.54	1.19	0	0	2	3	3
Integrity	17.44	6.89	-6	13	18	22	31
Reactance	41.15	10.32	11	34	41	48	77
Risk Taking	5.29	2.11	0	4	5	7	10
Altruism	15.40	7.80	-30	10	16	21	30
Anchoring	50.95	17.50	0	40	50	60	100

This table presents the sample's descriptive statistics. The first variable is the main variable used in the analysis, i.e., the percentage of the endowment allocated to SRI. We then present statistics about gender, age, whether the respondent is working, affiliated to a charity, and concerned about the environment (on a scale from 1 to 5). Respondents' relationship status (binary variable, single = 1), whether they have a bachelor's degree (or a higher degree, binary variable), are currently students, conservative in their political orientation, their religious belief (binary variable, atheist = 1), their income bracket, if they perform some financial analysis of firms before investing and the results of their Cognitive Reflection Test (CRT). Integrity, Reactance, Risk Taking, and Altruism are the scores obtained by participants on the related scales. Anchoring is the result obtained by participants on the anchoring task.

Our sample was slightly younger (33.8 versus 38.4 years) and more educated (62.75% versus 35% had a bachelor's degree) than the general population. However, our sample appears representative of the population in terms of gender and income, with 49.71% males and household earnings of \$60,000–70,000, while the US population is 49.48% male with a median household income of \$67,521 in 2020 (Shrider et al., 2021).

5. Results

5.1. Univariate Analysis

Our results highlight that all three nudges significantly increase investments in SRI funds ($p < 0.01$ in all cases; see Table 2). This increase is both statistically and economically significant (see Figure 2). Thus, Hypothesis 1 is supported.

Result 1: Nudges have a positive impact on SR investment.

Precommitment increased investment in SRI funds (29.8% in control versus 38.4% in precommitment groups). SRI allocation jumps to 46.3% for option partitioning, 52.7% for default (soft), and 65.7% for default (strong). These are rather large economic effects. Individuals in the default (strong) condition (65.7% allocation to SRI) invested more than twice the amount of the control group (29.8%). Individuals in the default (soft) and option-partitioning conditions invested approximately 50% more in SRI than those in the no-nudge condition. The effect of precommitment is more modest, with a 20% increase in investments in SRI. Using Cohen's d effect size (Cohen, 2013), this translates into a small effect size for precommitment ($d > 0.2$), medium effect size for option partitioning ($d > 0.5$), and large effect size for both types of default ($d > 0.8$).

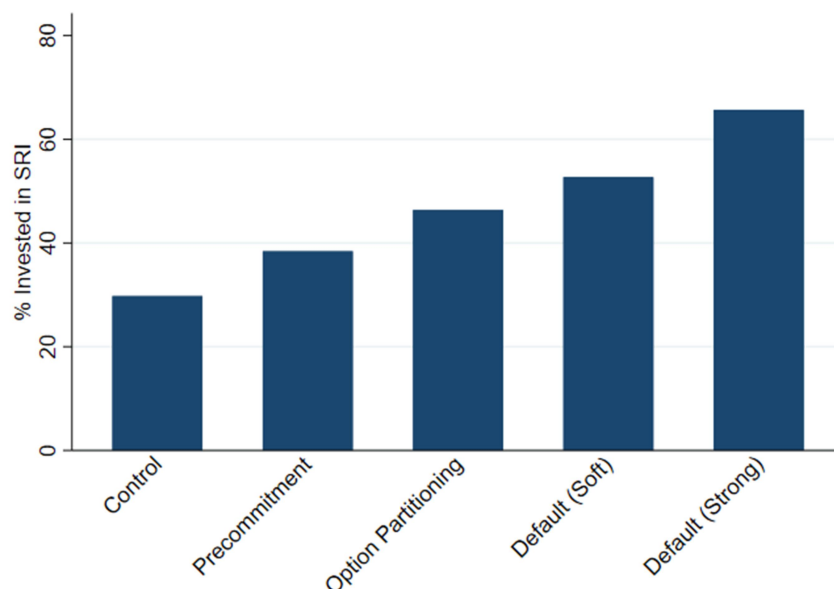


Figure 2 - Investment in SRI by Treatment

This figure shows the percentage of the initial endowment invested in SRI for each experimental group.

Table 2 - Simple Hypothesis Testing

Group	Obs.	Mean	H1 - Nudges positively affect SRI.			H2 - Default (Strong) has a stronger impact on SRI than the other nudges.		H3 - Option partition and default (soft) > precommitment.	
			Cohen's d	T-test	P-value	T-test	P-value	T-test	P-value
Control	199	29.77%	-	-	-	-	-	-	-
Precommitment	186	38.41%	0.382	3.746	0.001	8.558	0.001	-	-
Option Partit.	207	46.35%	0.685	6.904	0.001	6.118	0.001	3.132	0.002
Default (Soft)	199	52.71%	0.860	8.579	0.001	3.843	0.001	5.081	0.001
Default (Strong)	229	65.66%	1.143	11.796	0.001	-	-	-	-

This table presents simple hypotheses testing for Hypotheses H1, H2, and H3. We used simple t-tests. This table also displays the effect size of each nudge compared with the control group by the way of Cohen's d. The typical guidelines of interpretation of that statistics are that the effect is weak for a $d=0.2$, medium for $d=0.5$, and strong for $d=0.8$ (Cohen, 2013).

As highlighted in Table 2 and proposed in Hypothesis 2, default (strong) leads to substantially more investment in SRI than in other nudges ($p<0.01$ in all cases, see Table 1). For instance, individuals in the second-best-performing nudge, default (soft), invested 52.7% in SRI compared to 65.7% in default (strong). A simple t-test showed that this difference was statistically significant (t-test; $p<0.01$). This echoes Gajewski et al. (2022), who underlined the “power” of the default option in the case of SRI. It also complements their work by showing that the effect of default partly comes from the friction it generates. This is consistent with Mertens et al.'s (2022) meta-analysis, which suggests that defaults are among the most efficient nudges available. Thus, Hypothesis 2 is supported.

Result 2: Default (strong) has a stronger impact on SR investment than other nudges.

Finally, as predicted by Hypothesis 3, option partitioning and default (soft) perform better than precommitment in promoting SRI ($p<0.01$ in both cases, see Table 2). This is consistent with Mertens et al.'s (2022) meta-analysis. This highlights that while precommitment is efficient, its effect size tends to be smaller than that of other nudges.

Result 3: Option partitioning and default (soft) have a stronger impact on SR investment than precommitment.

5.2. Regression Analysis – Main Effects

We then proceeded with the regression analysis and report the results in Table 3. First, we perform a simple ordinary least squares (OLS) regression analysis. As there was evidence of heteroscedasticity, we performed robust OLS and multiplicative heteroscedastic linear regressions using the nudge group to model variance. This last specification is probably the best because most of the heteroscedasticity seems to originate from the default nudge. To remain conservative, we only discuss the variables that are significant in all three specifications.

Table 3 – Regressions Analysis – All Treatments

	OLS		OLS - Robust SE		Het. Reg.	
	Coef.	P> t	Coef.	P> t	Coef.	P> z
Precommitment	6.373**	0.027	6.373***	0.005	6.677***	0.003
Option Partit.	15.330***	0.001	15.330***	0.001	15.350***	0.001
Default (Soft)	20.900***	0.001	20.900***	0.001	21.012***	0.001
Default (Strong)	34.828***	0.001	34.828***	0.001	34.932***	0.001
Male	-2.516	0.205	-2.516	0.202	-2.002	0.265
Age	0.129	0.125	0.129	0.120	0.172**	0.024
Working	0.628	0.764	0.628	0.766	1.397	0.468
Charity Aff.	4.037*	0.065	4.037*	0.070	3.607*	0.072
Concern Env.	4.498***	0.001	4.498***	0.001	3.984***	0.001
Single	2.325	0.358	2.325	0.380	0.810	0.728
Bachelor	2.276	0.251	2.276	0.256	3.004*	0.096
Income	0.314	0.253	0.314	0.262	0.232	0.356
Student	-1.702	0.467	-1.702	0.475	-0.603	0.781
Conserv.	-3.501	0.261	-3.501	0.272	-3.360	0.224
Atheist	4.093**	0.028	4.093**	0.027	4.153**	0.014
EvalFirm	-3.691	0.125	-3.691	0.123	-4.076*	0.059
CRTTot	1.217	0.127	1.217	0.123	1.221*	0.092
Integrity	-0.398**	0.013	-0.398**	0.013	-0.365***	0.013
Reactance	-0.130	0.166	-0.130	0.184	-0.204**	0.015
Risk Taking	0.438	0.317	0.438	0.319	0.844**	0.034
Altruism	0.237*	0.097	0.237*	0.087	0.109	0.407
Anchoring	0.079	0.126	0.079	0.133	0.083*	0.078
Constant	7.217	0.389	7.217	0.371	9.473	0.207
Exponential model for variance						
Precommitment					0.183	0.214
Option Partit.					0.360**	0.013
Default (Soft)					0.698***	0.001
Default (Strong)					1.194***	0.001
Constant					6.034***	0.001
R ²	0.230		0.230			
Adjusted R ²	0.213		0.213			
F	13.54		17.01			
p > chi2					0.001	
N	1020		1020		1020	

This table presents the regression analysis for all groups and variables for the whole sample. The first specification is an OLS regression. As there was evidence of heteroscedasticity, we perform an OLS with robust standard errors in specification 2 and a heteroscedastic regression in specification 3. The VIF index revealed that there was no apparent issue of multicollinearity, as the mean VIF was 1.31 for these regressions and the maximum was 1.70. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

All three regressions underline that the nudged groups invest significantly more in SRI than non-nudged individuals ($p < 1\%$ in all cases, in line with Hypothesis 1). Then, we tested the equality of the coefficients using Wald tests. These tests underline that the coefficient for default (strong) is significantly larger than the coefficients for the other groups ($p < 1\%$ in all cases, in line with Hypothesis 2). Similarly, the

coefficients for default (soft) and option partitioning are larger than the coefficient for precommitment ($p < 1\%$ in all cases, in line with Hypothesis 3). Overall, we find support for our three hypotheses, both with simple univariate t-tests (see Table 2) and when accounting for the covariates in the regressions in Table 3.

Some variables drive investment in SRI across all groups. In particular, concern about the environment was a strong driver of SRI in this experiment. In terms of economic effect, an increase from 1 (lowest concern) to 5 (highest concern) is predicted to increase SRI allocation by more than 16 percentage points. This effect was present in all regression specifications. Similarly, being affiliated with a charity organization is linked with an approximately four percentage points increase in SRI in all regression specifications ($p < 10\%$ marginal significance), as is being an atheist ($p < 5\%$).

Finally, integrity is also significantly negatively related to SRI in all regressions ($p < 5\%$). This effect was somewhat surprising and stands at odds with previous findings of a positive correlation between integrity and charitable donations (Kowalski et al., 2021). This could constitute an area for further research.

5.3. Nudge Mechanisms of Action

Next, we explore the underlying mechanisms that drive the performance of each nudge used here.

5.3.1. Precommitment

The precommitment nudge functions in two steps: first, individuals were asked whether they would be willing to invest a significant part of their wealth in SRI. Second, they were presented with an investment task.

Overall, 80.7% (150 out of 186 individuals in the Precommitment group) indicated their willingness to invest a significant amount in SRI in the first step. As shown in Figure 3, these individuals invested significantly more in SRI than those who refused to commit (t-test; $p < 0.01$; see Table 4).

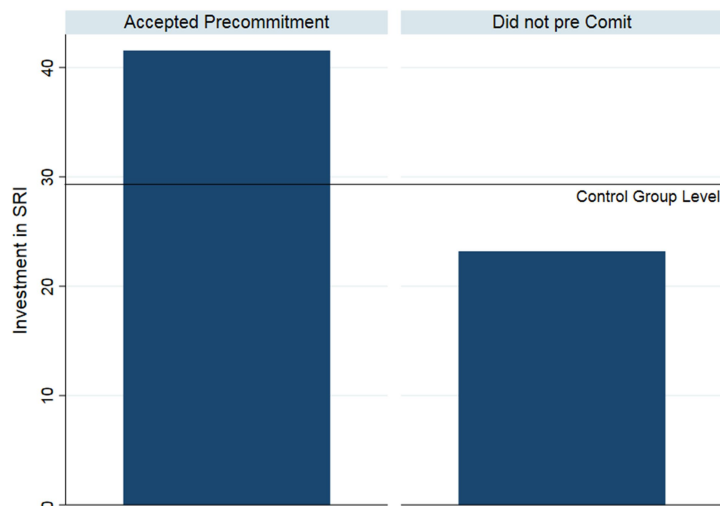


Figure 3 - Effect of Precommitment

This figure shows the percentage invested in SRI depending on whether or not the respondent has pre-committed. The horizontal line represents the control group level of investment in SRI.

When performing a regression analysis on the propensity to refuse to pre-commit (Table 4), three variables were significant. Concerns about the environment and performing financial analyses before investing were positively linked to the propensity to commit to investing in SRI ($p < 0.01$). In terms of economic effect, the model predicts that respondents with the lowest concern for the environment would have an approximately 11% propensity to pre-commit compared to 53% for those most concerned. Similarly, the model predicts that individuals who perform some financial analysis before investing would have an approximately 36% propensity to accept to pre-commit compared with 15.7% for those who do not perform any financial analysis.

Table 4 – Regressions, Precommitment

	Logistic - Refuse to Precommit		OLS - SRI Invest.	
	Coef.	P> z	Coef.	P> z
Refuse PreCom			-14.361***	0.002
Male	-0.413	0.412	-0.938	0.808
Age	0.020	0.337	0.234	0.149
Working	-0.491	0.342	7.175*	0.098
Charity Aff.	-0.151	0.778	5.201	0.206
ConcernEnv.	-0.631***	0.008	-0.192	0.923
Single	0.449	0.452	-2.404	0.618
Bachelor	-0.554	0.275	2.657	0.510
Income	-0.073	0.244	-0.418	0.398
Student	0.032	0.960	0.114	0.982
Conserv.	0.864	0.190	-4.793	0.441
Atheist	-0.011	0.981	6.452*	0.071
EvalFirm	-1.415**	0.011	0.424	0.925
CRTTot	0.050	0.804	1.078	0.485
Integrity	0.049	0.270	-0.409	0.239
Reactance	0.056**	0.020	-0.212	0.223
Risk Taking	-0.091	0.404	1.613*	0.065
Altruism	0.040	0.303	-0.060	0.842
Anchoring	-0.005	0.729	0.062	0.572
Constant	-0.695	0.713	30.641	0.047
(Pseudo) R2		0.184		0.207
Adjusted R2		-0.035		0.116
P > chi2 / F		0.013		2.28
N		186		186

*This table presents the regression analysis for the precommitment group. The first regression is a logistic one, the dependent variable being a binary variable coded 1 if the respondent has refused to pre-commit. The second variable is a regression on the percentage invested in SRI, including the binary variable coded as 1 if the respondent has refused to pre-commit. The VIF index revealed no visible issue regarding multicollinearity. The mean VIF index is 1.38 for the first specification with a maximum of 1.78. For the second regression, the mean VIF index is also 1.38 with a maximum of 1.8. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.*

Importantly, individuals scoring higher on reactance were less likely to pre-commit to investing in SRI. These individuals are more prone to unpleasant motivational arousal in response to situations that threaten their freedom of choice. Precommitment is typically such a situation, and thus, triggers their reactance responses. Economically, the model predicts that, other variables held at the mean, the lowest score in reactance is associated with a 5% probability of refusing precommitment compared to 54% for the highest level of reactance observed in our sample. Overall, reactance was negatively linked to SRI investment for respondents faced with precommitment ($p < 10\%$). This is in line with Sunstein (2017), who indicated that nudges could sometimes fail because of reactance, although he indicates that it is more the exception than the rule.

5.3.2. Option Partitioning

The option-partitioning nudge also operated in two steps. First, individuals were asked to allocate their wealth between conventional and SRI investments. Thus, we created an artificial first step in the choice architecture for investment decisions.

The amount entered in the first step was a strong predictor of the amount invested in SRI in the second step (see the second regression in Table 5, with an R^2 of 0.609 mainly because of this variable). The SRI allocation in the first step was higher for older individuals ($p < 5\%$) and individuals concerned about the environment ($p < 10\%$, marginally significant). Economically, the model predicts that an increase in age by 10 years would lead to an increase in allocation in the first step of four percentage points. Similarly, the model predicts that individuals most concerned about the environment would allocate 15 percentage points more to SRI in the first stage of this allocation compared to individuals least concerned. Being conservative from a political standpoint and earning a higher income were linked to lower SRI allocations in the first step. However, further analysis revealed that these respondents increased their allocations in the second step (see regressions 2 and 3). This may be connected to Døskeland and Pedersen (2021), who showed that wealthier individuals behave differently with regard to SRI; specifically, they are more convinced by financial arguments than by moral ones.

Overall, there is no evidence that the option-partitioning nudge performs worse on these respondents; they are affected differently, as they allocate less in the first step but more in the second and final step. However, this implies that a small change in task structure can adversely affect these individuals. If the commitment made in the first partitioning step was *binding*, these individuals would have invested less in SRI mechanically.

Finally, CRT is a strong predictor of SRI investment in the first step. Compared to a respondent with 0 correct answers to the CR test, the model predicts that a respondent with three correct answers allocates 20 more percentage points to SRI. Analyzing the data shows the effect was driven by the number of respondents scoring high on the CRT and selecting a 100% allocation in the SRI. If SRI displays a similar performance to conventional investment, one may argue that the investment which is most beneficial to society should be chosen. The question being asked along those lines can make sense that the most “logical” respondents in our sample, as measured by the CRT test, chose a 100% allocation in SRI. Overall, the option-partitioning nudge performs better on individuals who scored higher on the CRT.

Table 5 – OLS Regressions, Option Partitioning

	Allocation in 1st step		Allocation in SRI		Deviation from 1st step	
	Coef.	P> t	Coef.	P> t	Coef.	P> t
Parti. Opt.			0.688***	0.001		
Male	-5.708	0.150	-1.878	0.504	-0.099	0.974
Age	0.433**	0.012	0.041	0.735	-0.094	0.475
Working	4.847	0.229	-2.356	0.409	-3.866	0.213
Charity Aff.	-5.651	0.209	5.375*	0.092	7.136**	0.040
ConcernEnv.	3.708*	0.063	0.461	0.745	-0.695	0.650
Single	7.691	0.114	3.117	0.367	0.720	0.847
Bachelor	4.496	0.270	5.101*	0.078	3.700	0.239
Income	-1.374**	0.020	0.481	0.252	0.909**	0.045
Student	2.128	0.640	2.428	0.451	1.765	0.615
Conserv.	-13.819**	0.025	8.020*	0.069	12.326***	0.010
Atheist	4.711	0.220	1.638	0.547	0.170	0.954
EvalFirm	-4.819	0.300	-6.481**	0.050	-4.979	0.165
CRTTot	6.839***	0.001	0.807	0.509	-1.324	0.300
Integrity	0.157	0.631	-0.041	0.859	-0.090	0.721
Reactance	-0.144	0.448	-0.118	0.377	-0.074	0.614
Risk Taking	-0.765	0.414	0.224	0.735	0.463	0.522
Altruism	0.463	0.103	0.004	0.986	-0.141	0.519
Anchoring	0.058	0.561	0.123*	0.084	0.105	0.175
Constant	26.312	0.129	-4.771	0.698	-12.971	0.330
R ²		0.275		0.609		0.127
Adjusted R ²		0.206		0.570		0.043
F		3.97		15.35		1.53
N		207		207		207

This table presents the regression analysis for the option-partitioning group. We first perform an OLS regression on the amount allocated to SRI in the first step of the task (regression 1). In the second regression of the table, we perform an OLS regression on the amount actually allocated to SRI in the second and final step of the task. The third regression is an OLS regression whose dependent variable is the difference between the allocation in the first step and the allocation in the second one. The mean VIF indices were 1.38, 1.41, and 1.38 for regressions 1, 2, and 3, respectively. The maximum VIF values were 1.98, 2.01, and 1.98, respectively, revealing no issue with multicollinearity. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

5.3.3. Default Nudges

Consistent with Gajewski et al. (2022), the two default nudges performed the best in our experiment. The only difference between default (soft) and default (strong) is the ease of changing default allocation. For default (soft), the allocation can be changed on the same screen. Meanwhile, default (strong) requires an additional click, leading to another screen.

As Figure 4 shows, this small change in choice architecture leads to a large change in the number of respondents accepting the default allocation. With default (soft), 20.1% participants chose a 100% allocation in SRI. With default (strong), this percentage increases to 51.1%.

Our default (strong) task was identical to that used by Gajewski et al. (2022), and yielded similar results: approximately 50% of the corresponding respondents in Gajewski et al. (2022) accepted the default allocation.

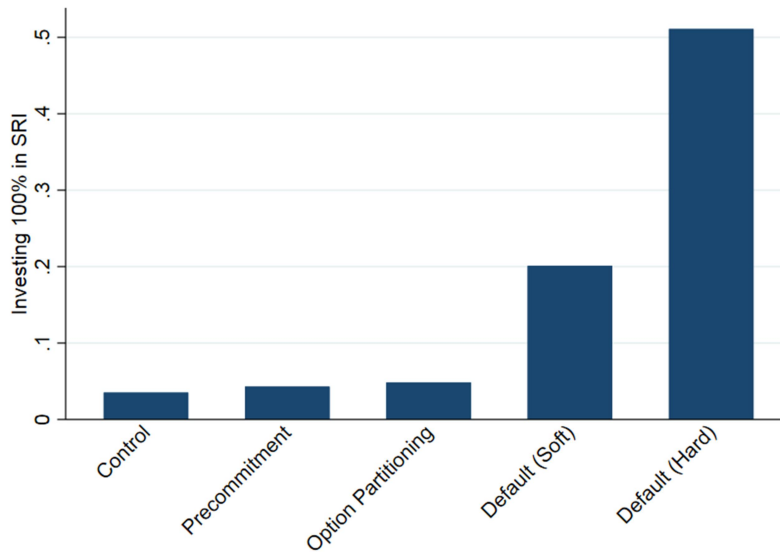


Figure 4 - Percentage of Respondents Allocating 100% in SRI

This figure shows the percentage of respondents who invested 100% of their endowment in SRI for each treatment group. For instance, more than 50% respondents in the default (hard) group invested 100% of their endowment in the SRI fund.

For default (strong), the task was performed in two steps. In the first step, respondents could choose to accept the default, and thus, allocate 100% to the SRI. In the second step, those who refused the default allocation were offered the possibility of investing between the four funds in the same manner as the control group.

In the first step, altruism is positively related to the propensity to accept the default allocation ($p < 5\%$, see Table 6), as in Gajewski et al. (2022). The economic effect in our experiment is quite strong holding all other variables at the mean, the propensity to accept the default in SRI increasing from 11% for individuals scoring the lowest in altruism to 67% for the highest scorers. The self-declared tendency to take risks was negatively linked to the propensity to accept the default (marginally significant, $p < 10\%$).

In the second step, we focused on respondents who refused the default allocation. Essentially, they allocated their investments in the same manner as the control group (29.79% versus 29.77%). A subsequent regression on individuals who refused the default allocation revealed that those who were more concerned about the environment invested more in SRI ($p < 1\%$). The model predicts that these respondents would invest 24 percentage points more in SRI than those least concerned about the environment.

Table 6 – Regressions, Default

	Logistic - Accepting the Default		OLS - Investment in SRI when refusing the Default	
	Coef.	P> z	Coef.	P> z
Male	0.080	0.807	-2.964	0.485
Age	0.004	0.772	-0.317	0.113
Working	-0.201	0.547	-1.378	0.757
Charity Aff.	0.514	0.140	2.602	0.584
ConcernEnv	0.037	0.808	6.662**	0.003
.			*	
Single	-0.141	0.734	0.757	0.886
Bachelor	-0.050	0.872	3.686	0.336
Income	0.005	0.903	0.650	0.247
Student	-0.219	0.533	-6.812	0.151
Conserv.	-0.359	0.513	-2.252	0.722
Atheist	0.172	0.578	4.378	0.279
EvalFirm	-0.388	0.402	1.526	0.822
CRTTot	-0.023	0.859	3.021	0.100
Integrity	-0.040	0.142	-0.049	0.888
Reactance	0.017	0.292	-0.088	0.679
Risk Taking	-0.140*	0.052	-0.321	0.740
Altruism	0.049**	0.036	0.200	0.507
Anchoring	0.002	0.855	0.053	0.645
Constant	0.099	0.941	4.686	0.797
R ²		0.053		0.290
Adjusted R ²		-0.073		0.152
P>chi2 / F		0.525		2.11
N		229		112

*This table presents the regression analysis for the default (hard) group. The first regression is a logistic regression, the dependent variable being a binary variable coded 1 if the participant accepted the default allocation of 100% in SRI. The second regression is an OLS regression on the sub-sample of respondents who refused the default, and thus, faced a classic allocation task of their endowment. The mean VIF were 1.32 and 1.43 in the first and second regressions, respectively, with a maximum VIF of 1.85 and 1.99, respectively, pointing toward no multicollinearity issues. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.*

Our results do not perfectly reproduce those of Gajewski et al. (2022). They found that respondents who refused the default allocation tended to invest slightly more in SRI later. Further studies can help provide a more definitive answer. However, both our study and that of Gajewski et al. (2022) agree that the default nudge (strong) is a very powerful tool in the SRI framework that is not detrimental to SRI, even for the opt-out population.

6. Discussion and Conclusion

SRI suffers from a lack of investment by individual investors, even though they display positive attitudes toward it. This attitude-behavior gap threatens the future growth of SRI. Addressing it is desirable because SRI can help promote sustainable development (Pilaj, 2017).

Nudges have been proposed as a way to encourage individuals to invest in SRI (Pilaj, 2017). For instance, research suggests that making SRI the default investment vehicle can be a promising solution for encouraging SRI investments (Gajewski et al., 2022). However, the default tested in a previous study created friction, which may deter its application in real-world situations due to the fear that customers hostile to SRI might feel “sludged” (Mills, 2023).

In this study, we pitted four nudges against one another, all of which aimed to reduce the attitude-behavior gap observed in SRI (Pilaj, 2017, BNP, 2018). Three of these nudges were tested for the first time (precommitment, option partitioning, and default without friction). These three nudges significantly increased investments in SRI. However, the default with frictions, as used in Gajewski et al. (2022), remains the most efficient nudge for promoting SRI. This effect is partly due to the inertia created by the generated friction. Although significantly inferior, a default without friction also significantly increases SRI investment with a large effect size ($d > 0.8$). Its effect is not significantly different from that of option partitioning (although option partitioning has a medium effect size, $d > 0.5$). Both types of default and option partitioning are more effective than precommitment. Our results can be summarized by the following ranking of the effectiveness of nudges (Equation 1):

$$\text{Default (strong)} > \text{Default (soft)} \approx \text{Option Partitioning} > \text{Precommitment} > \text{Control} \quad (1)$$

Overall, while precommitment is significant, its small effect size might not warrant its implementation, similar to what can be said regarding priming with faces in Meunier et al. (2022) or the use of priming alongside a message in Gajewski et al. (2022). In contrast, both types of default and option partitioning, with medium to large effect sizes, provide solutions with a visible impact on the lack of investment in SRI.

Studies in different contexts have highlighted that default behavior results from participants' inertia (Madrian & Shea, 2001, Jachimowicz et al., 2019). Our findings in the context of SRI complement this literature by showing that the addition of friction to default improves efficiency. However, such friction is not necessary for the default to function. A default without friction also leads to a large increase in SRI investment.

We also investigated numerous variables that may be related to nudging efficiency. Reactant individuals are less likely to pre-commit, in line with the fact that they dislike seeing their freedom reduced. Thus, nudges can backfire when used with certain categories of individuals, as postulated by Sunstein (2017).

Default options are accepted by individuals with higher levels of altruism more often. Similarly, individuals more concerned about the environment were more positively affected by precommitment and

option partitioning. This finding is in line with Taube and Vetter (2019), who showed that stronger pro-environmental attitudes are linked to a higher acceptance of green products promoted by a default nudge. Thus, nudges do not override people's preferences but provide a push toward a choice they already like. Essentially, nudges promote better choices for individuals, "as judged by themselves."

In terms of policy implications, this study expands the toolbox of nudges with demonstrated efficacy for increasing SRI that choice architects can use. Our results can prove useful for banks or wealth advisors trying to push SRI funds toward their customers. These nudges can be easily implemented in the form of sales techniques to encourage customers to choose a socially responsible alternative with equivalent financial performance. For instance, in 2018, ABN AMRO decided to propose SRI to its customers by default, with the option of opting out (Sloley, 2018). We show that while this appears to be the most efficient strategy, other options exist in the form of precommitment and option partitioning, which may appear less constraining to customers. Other stakeholders may also be interested in our results. Governments interested in financing sustainable development can use these results to force wealth advisors to change their investment choice architectures. This could include forcing a two-step investment decision, the first step being a decision about allocation in SRI (i.e., option partitioning), or forcing a default allocation in SRI with the possibility to opt out. If reproduced in real-world settings, our results indicate that such a policy could double the amount invested in the SRI if a default with friction is used. The use of option partitioning or a default without friction can also increase investment in SRI by 50%.

This study suffers from two limitations that can provide avenues for future research. First, while we provide an interesting explanation for the effect of the default nudge on SRI through friction, this pathway is just one piece of the puzzle. The effect may also partly come from the fact that it represents the recommendation of the wealth advisor in our setting. Jachimowicz et al. (2019) demonstrated that default nudges are more efficient when endorsement is used because they convey advice from the choice architect. In our survey, as in Gajewski et al. (2022), we mentioned the following regarding our SRI default: "*By default, your wealth advisor recommends you to invest 100% in this fund.*" Thus, respondents perceive the default option as investment advice (Madrian & Shea, 2001). Future research can attempt to assess which part of the default effect comes from this endorsement in the same way we measure the share of the efficiency of the default coming from frictions. Second, this study used hypothetical scenarios. As such, a field experiment can be extremely useful in solving this limitation and furthering our understanding of SRI investment dynamics.

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Appendices

Figures A1–A6 present the tests faced by the respondents in the five experimental groups. The tests were displayed after the respondents had performed the investment tasks. The order of apparition of the tasks was randomized, and the items within the scales were also randomized.

Please indicate whether you agree with the following statements:

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Keep my promises.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Believe that honesty is the basis for trust.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Can be trusted to keep my promises.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Like to exaggerate my troubles.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am hard to understand.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am true to my own values.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am trusted to keep secrets.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lie to get myself out of trouble.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please click on "Strongly agree" to show us that you are attentive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feel like an imposter.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure A1 - Integrity/Honesty/Authenticity Scale

This figure displays the statements the respondents had to rate to measure their integrity. The scale was taken from Peterson and Seligman (2004). The penultimate statement is an attention question to ensure that the respondent has read everything and answered carefully to the survey. The respondents who failed the attention question were removed from the final sample.

This question is a counting problem with limited time which has 2 parts. In the first part, you will see a 10*10 matrix that contains the letter "S" and the number "5" for **10 seconds**. You are asked to guess whether the number of "S"s is more or fewer than the random number on the screen.

The matrix will then appear again for **10 seconds** and you will be asked to write down your best guess of **the exact number of "S"s** in the matrix.

You have 10 seconds to count and guess the number of "S"s characters in the matrix below

S	5	S	S	5	5	S	S	5	5
S	S	S	S	5	S	S	S	5	S
S	S	S	S	5	S	S	S	5	S
S	S	5	S	5	S	5	S	5	S
S	5	S	5	S	5	S	5	S	5
S	S	5	S	5	S	5	S	5	S
S	S	5	S	5	S	5	S	5	S
S	5	S	S	S	S	S	S	S	S
S	S	S	S	S	S	S	S	S	S
S	S	S	S	5	S	5	S	5	S

Are there more or fewer "S" characters in the matrix below than the random number generated below?

10

More <input type="radio"/>	Fewer <input type="radio"/>
-------------------------------	--------------------------------

You guessed the number of "S" characters to be Fewer than **10**
Now give us your best guess about how many "S" characters are in the matrix.

How many "S" characters are there in the matrix?

Figure A2 - Anchoring Task

This figure displays the task the respondents had to perform to measure their anchoring propensity; taken from Jahedi et al. (2017).

To what extent these statements correspond you? Please indicate your choice.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I make people feel uncomfortable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I take no time for others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am indifferent to the feelings of others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am concerned about others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a good word for everyone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I love to help others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I anticipate the needs of others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I turn my back on others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I look down on others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I make people feel welcome.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure A3 – Altruism (A3) Facet Scale

This figure displays the statements the respondents had to rate to measure their propensity toward altruism. The scale was taken from Costa and McCrae's (1992) NEO Personality Inventory (NEO-PI).

How do you see yourself: are you generally a person who is fully prepared to take risks or do you try to avoid taking risks? Please use the slider, where the value 0 means: 'not at all willing to take risks' and the value 10 means: 'very willing to take risks'

0 1 2 3 4 5 6 7 8 9 10



Figure A4 - Risk Taking Measure

This figure displays the statements the respondents had to rate to measure their propensity to take risks; taken from Dohmen et al. (2011).

A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball. How much does the ball cost, in cents?

In a lake, there is a patch of lily pads. Every day, the patch doubles in size.

If it takes 48 days for the patch to cover the entire lake, how many days would it take for the patch to cover half of the lake?

If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets, in minutes?

Figure A5 - The Cognitive Reflection Test (CRT)

This figure displays the questions the respondents had to answer to measure their Cognitive Reflection Test score, which was developed by Frederick (2005). This test measures both cognitive ability and the capacity to refrain from replying with the first answer that comes to mind.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
It irritates me when someone points out things which are obvious to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It makes me angry when another person is held up as a role model for me to follow.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I resist the attempts of others to influence me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I consider advice from others to be an intrusion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When someone forces me to do something, I feel like doing the opposite.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regulations trigger a sense of resistance in me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I become frustrated when I am unable to make free and independent decisions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find contradicting others stimulating.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I become angry when my freedom of choice is restricted.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When something is prohibited, I usually think, "That's exactly what I am going to do."	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice and recommendations usually induce me to do just the opposite.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure A6 - Reactance Scale

This figure displays the statements rated by respondents to measure their reactance propensity, which is the propensity to react negatively to threat toward one's freedom. The scale was taken from Hong and Faedda (1996).

Table A1 – Variable Definitions

Variable	Source	Definition
SRI	Survey	Main dependent variable. The percentage from 0 to 100 of the initial endowment that was invested in the SRI fund by participants.
Male	Prolific Academic	Binary variable which equals 1 if the participant is male.
Age	Prolific Academic	Continuous variable, age in years.
Working	Prolific Academic	Binary variable which equals 1 if the participant is currently employed.
Charity Aff.	Prolific Academic	Binary variable which equals 1 if the participant is affiliated to a charity.
Concern Env.	Prolific Academic	Result of a Likert scale indicating concern for the environment, from low (1) to high (5).
Single	Prolific Academic	Binary variable which equals 1 if the marital status of the participant is "single".
Bachelor	Prolific Academic	Binary variable which equals 1 if the participant has a bachelor's degree or higher.
Income	Prolific Academic	Ordinal variable coding for interval of income. The ordinal variable goes from 1 (0-10K\$) to 12 (>150K\$).
Student	Prolific Academic	Binary variable which equals 1 if the participant is a student.
Conserv.	Prolific Academic	Binary variable which equals 1 if the participant is politically conservative.
Atheist	Prolific Academic	Binary variable which equals 1 if the participant is an atheist.
EvalFirm	Prolific Academic	Binary variable which equals 1 if the participants declare performing financial analysis before investing.
CRTTot	Survey	Total score from 0 to 3 to the three questions of the Cognitive Reflection Scale of Frederick (2005); see Appendix A5 for more details.
Integrity	Survey	Nine items scale taken from Peterson and Seligman (2004) scale measuring integrity (see Appendix A1 for the items).
Reactance	Survey	11 items scale measuring reactance (the propensity to react negatively to threats toward one's freedom). Taken from Hong and Faedda (1996); see Appendix A6 for more details.
Risk Taking	Survey	Participant's answer on a scale from 1 to 10 to the question "How do you see yourself? Are you a person fully prepared to take risks or do you avoid taking risks? Please use the slider, where the value 0 means 'not at all willing to take risk' and the value 10 means 'very willing to take risks'." Taken from Dohmen et al. (2011); see Appendix A4 for more details.
Altruism	Survey	10 items scale taken from Costa and McCrae (1992) NEO-PI; see Appendix A3 for more details. Altruism is a sub-scale of the larger construct of Agreeableness, one dimension of the Big 5 traits of personality.
Anchoring	Survey	Task from Jahedi et al. (2017) measuring the propensity of participants to anchor on an (irrelevant) piece of information which will bias them when giving an estimation (see Appendix A2 for the task).

This table presents a definition of the various variables used in the analysis.

Table A2 – Pearson Correlation Matrix of the Variables Used in the Analysis

	SRI	Male	Age	Working	Charity Aff.	ConcemEnv.	Single	Bachelor	Income	Student	Conserv.	Atheist	EvalFirm	CRTTot	Integrity	Reactance	Risk Taking	Altruism	Anchoring	
SRI	1																			
Male	-0.098	1.000																		
<i>p-value</i>	0.002																			
Age	0.034	0.127	1.000																	
<i>p-value</i>	0.283	0.000																		
Working	0.022	0.060	0.073	1.000																
<i>p-value</i>	0.480	0.056	0.019																	
Charity Aff.	0.095	-0.127	0.038	0.047	1.000															
<i>p-value</i>	0.002	0.000	0.226	0.134																
ConcemEnv.	0.203	-0.208	-0.044	-0.019	0.077	1.000														
<i>p-value</i>	0.000	0.000	0.158	0.538	0.014															
Single	0.041	0.059	0.060	0.118	-0.027	0.014	1.000													
<i>p-value</i>	0.196	0.060	0.057	0.000	0.383	0.650														
Bachelor	0.101	-0.049	0.121	0.202	0.108	0.070	0.083	1.000												
<i>p-value</i>	0.001	0.117	0.000	0.000	0.001	0.025	0.008													
Income	0.054	-0.004	0.172	0.209	0.071	-0.034	-0.191	0.252	1.000											
<i>p-value</i>	0.082	0.888	0.000	0.000	0.024	0.278	0.000	0.000												
Student	-0.022	-0.108	-0.431	-0.192	0.004	0.055	-0.105	-0.201	-0.150	1.000										
<i>p-value</i>	0.477	0.001	0.000	0.000	0.904	0.082	0.001	0.000	0.000											
Conserv.	-0.137	0.111	0.149	0.037	-0.036	-0.362	0.001	-0.070	0.000	-0.116	1.000									
<i>p-value</i>	0.000	0.000	0.000	0.234	0.257	0.000	0.964	0.025	0.994	0.000										
Atheist	0.110	-0.012	-0.068	0.057	-0.098	0.172	0.014	0.046	0.033	-0.011	-0.198	1.000								
<i>p-value</i>	0.000	0.694	0.030	0.068	0.002	0.000	0.654	0.144	0.297	0.734	0.000									
EvalFirm	-0.040	0.108	0.069	-0.019	0.027	-0.046	-0.030	-0.040	0.039	0.013	0.082	-0.066	1.000							
<i>p-value</i>	0.205	0.001	0.028	0.553	0.398	0.144	0.338	0.203	0.212	0.674	0.009	0.035								
CRTTot	0.063	0.228	0.059	0.088	-0.039	-0.016	0.092	0.169	0.068	-0.095	0.022	0.071	-0.006	1.000						
<i>p-value</i>	0.044	0.000	0.058	0.005	0.211	0.611	0.003	0.000	0.029	0.002	0.480	0.024	0.841							
Integrity	-0.031	0.011	0.312	0.074	0.022	-0.021	-0.025	0.019	0.123	-0.157	0.131	-0.100	0.048	-0.068	1.000					
<i>p-value</i>	0.326	0.738	0.000	0.019	0.493	0.498	0.417	0.554	0.000	0.000	0.000	0.001	0.124	0.030						
Reactance	-0.066	0.075	-0.071	-0.067	-0.024	-0.112	-0.010	-0.072	-0.053	0.013	0.062	0.035	-0.021	-0.031	-0.305	1.000				
<i>p-value</i>	0.034	0.016	0.024	0.033	0.438	0.000	0.742	0.022	0.090	0.670	0.049	0.272	0.500	0.323	0.000					
Risk Taking	0.006	0.170	0.127	-0.050	-0.050	-0.074	0.011	-0.016	0.033	-0.018	0.086	-0.035	0.128	-0.042	0.114	0.084	1.000			
<i>p-value</i>	0.859	0.000	0.000	0.109	0.113	0.019	0.727	0.614	0.292	0.562	0.006	0.258	0.000	0.183	0.000	0.008	0.008			
Altruism	0.060	-0.265	0.070	0.036	0.103	0.157	-0.035	0.067	0.047	-0.006	-0.049	-0.141	0.008	-0.109	0.485	-0.335	0.073	1.000		
<i>p-value</i>	0.057	0.000	0.026	0.253	0.001	0.000	0.263	0.033	0.132	0.840	0.115	0.000	0.794	0.001	0.000	0.000	0.020	0.020		
Anchoring	0.060	0.006	0.132	-0.008	-0.029	0.039	0.034	0.044	0.014	-0.085	-0.048	0.040	0.000	0.156	0.069	-0.001	0.073	0.018	1.000	
<i>p-value</i>	0.055	0.856	0.000	0.805	0.359	0.210	0.277	0.163	0.649	0.007	0.126	0.198	0.997	0.000	0.027	0.972	0.020	0.563	0.563	

This table presents the Pearson correlation matrix for the variables used in the analysis with associated p-values.

¹ The investment game respondents faced was taken from Gajewski et al.'s (2022) study on nudges in SRI. We used a somewhat generalist SRI fund, as in Gajewski et al. (2022). We did not go into the details of the investment strategy used by the SRI fund, as this aspect varies (see, for instance, Carlsson Hauff & Nilsson, 2023).

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