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Investors' preferences for sustainable investments: Evidence from the U.S. using an experimental approach

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Abstract

Besides the classical risk-return approach in investment, there is an increasing awareness of integrating sustainable development goals (SDGs) as a new dimension to value creation. Limited research has been done, offering mixed results. Therefore, we examine investor preferences for investment funds contributing to achieving the clean water and sanitation SDG goal. We apply a choice experiment to analyze funds' value for U.S. investors, adopting a survey approach based on 581 actual observations from October to December 2022. The findings reveal that investors show stronger preferences to portfolios contributing to sustainable development goals, they are willing to forgo returns when investments contain SDGs or provided by a sustainable bank. The findings provide relevant implications for investors and fund managers.

Keywords: Investor preferences, Sustainability, Investment decisions, U.S. environment

Jel Classification: G10, G14

1. Introduction

The 2030 Agenda for Sustainable Development establishes the so-called Sustainable Development Goals, abbreviated as SDGs, which are a global appeal to eradicate poverty, safeguard the environment, and promote economic peace and development. To that purpose, each goal specifies several targets that must be met by 2030. In many situations, achieving these objectives necessitates mobilizing substantial financial resources, which will be achieved through various financial instruments (United Nations, 2017). Investment funds are common financial market instruments to achieve socially desired goals under the so-called thematic investment funds. Such funds are becoming increasingly popular and vital in today's globe. These funds are intended to invest in initiatives and businesses consistent with the United Nations' SDGs, which aim to address global issues such as poverty, inequality, climate change, and environmental degradation. These funds contribute to a more sustainable and equitable future for everybody by diverting funding into projects that support sustainable development. One of the primary advantages of SDG

investment funds is their potential to address major global concerns. These funds actively seek investments with a beneficial social and environmental impact, such as renewable energy projects, clean water efforts, and affordable housing alternatives. By allocating funding to certain sectors, these funds can assist in speeding progress toward the SDGs.

Furthermore, they can persuade corporations and industries to adopt more sustainable practices by expressing market demand for socially and ecologically responsible investments. Another advantage of SDG investment funds is their ability to generate financial gain. Given the increased global attention on sustainability, companies implementing sustainable practices into their operations are expected to fare better in the long run. As a result, these funds can benefit from such enterprises' growth and profitability. Furthermore, when sustainable investments acquire traction, they become more appealing to a broader spectrum of investors who prioritize sustainable development alongside financial advantages. This rising demand can potentially raise the value of sustainable projects, resulting in larger returns for investors. Gutche and Ziegles (2019) and Lagerkvist et al. (2020) demonstrate that contributing to the SDGs can be regarded as a nonfinancial motive for sustainable investments, adding new considerations for value creation.

On the empirical side, current literature, in this regard, provides inconclusive evidence. Private investors who want to invest in funds that achieve sustainable goals must evaluate variables that may appear conflicting, such as investment objectives via profitability and the style of analysis of achieving sustainable objectives (Joliet and Titova 2018). In turn, studies show positive results for ESG investments, as shown by (Friede et al. 2015). Such results can also be state-dependent (the type of industry analyzed, the ESG criteria applied, and the location). In Europe, we observe a negative relationship between ESG and profitability, demonstrating how sustainable investment has not been profitable (Auer and Schuhmacher 2016). On the other hand, (Gutsche et al. 2021) study the Japanese context, presenting a review of the drivers of sustainable investment, demonstrating that sustainable investment is not as widespread in Japan as it is in Europe and that Japanese investors do not exhibit relevant preferences when compared to European investors.

Regarding portfolio considerations, there is little or no support for positive performance ratios in portfolios with ESG criteria and profiles (Halbritter and Dorfleitner 2015; Friede et al. 2015). This directly contradicts the increase of assets managed under ESG criteria, which has led to the inclusion of ESG criteria as a fundamental objective in many circumstances (Revelli 2017; Joliet and Titova 2018). However, asset allocation is crucial because, if it is centered on investment selection using ESG criteria, it leads to a fixation on single returns rather than diversifiable returns, resulting in lower returns from selecting securities with reduced systematic risk (D. D. Lee et al. 2010). It can also be seen that some investors are concerned with nonfinancial attributes, such as the contribution to the SDGs using an analysis of the performance of conventional and non-conventional investment funds (Bollen 2007; Renneboog et al. 2008b, 2011; Friede et al. 2015).

In a closely related context, Díaz-Caro et al. (2023) assess sustainability by Spanish investors using a choice experiment, applying the Bayesian approach with Markov chain Monte Carlo sampling and obtaining the willingness to pay (invest) for each attribute. The results show that profitability remains the most important factor, although risk is at the same level as sustainability. Similarly, Escribano et al. (2021) also adopt a choice experiment to assess the Spanish consumers' preferences for consuming sustainable meat, showing that consumers' motivations and interactions with these products are complex.

Against the above background, and given the complexity of the context, the limited research provided, and the mixed results, we fill the research gap by modeling investors' preferences in funds with clean water SDG using a mixed logit model. In particular, we analyze U.S. investors' preferences regarding investment funds contributing to the 2030 agenda of clean water and sanitation goals due to its vital global importance. We employ a choice experiment method through three alternatives, which are considered

attributes of the contribution of achieving the SDG. Further, the willingness to pay off investors is computed in order to get a real value based on the interest rate for quantifying the various attributes.

2. Methodology

2.1 Data

We collect data from a sample of U.S. investors from October to December 2022. The questionnaire is set up through Google Forms¹, and participants are hired using professional social networks² thanks to research databases³ constructed from prior investment studies. After the questionnaire is created in English with closed questions, we divide the survey into two parts; the first is regarding the choice experiment in order to regress the investors' preferences about investment funds, and the second concerns the socio-economic questions. We conduct this research in compliance with the regulations of studies with human participants. All participants agreed on their own to participate in the research and obtained insurance that their answers would be kept confidential and completely anonymous. Participants did not receive any compensation for giving their responses in this study. We started with a total number of 658 questionnaires, reduced by rejected 77 participants for various reasons, for example, incomplete answers. Thus, we consider 581 complete and valid questionnaires for the current study.

Table 1: The sample statistics

Variable	Mean
Age s.d	46.005% (16.567)
Gender Female	48.813%
Income lower than 2000\$	3.947%
Income from 2001\$ and 2500\$	22.269%
Income from 2501\$ to 3500\$	46.861%
Income higher than 3501\$	32.475%
Size of household 1	14.385%
Size of household 2	20.179%
Size of household 3	37.805%
Size of household 4 or more	33.172%

Note: Sociodemographic characteristics of the final sample related to the examined population of U.S. investors (%). Abbreviations: Age, Age of individual; s.d, standard deviation; Income, revenue based on the individual; Size of household, number of persons in a private household. Source: Authors compilation.

2.2 Choice experiment

We consider in our study a technique, choice experiment, which is seen as the most appropriate tool for regressing the investors' preferences for funds that have an investment policy to reach the goal of clean water and sanitation. Lancaster (1966) affirms that the choice experiment method is based on the theory that a good or service can be described by its component attributes and that consumers, i.e., investors, make financing decisions based on these attributes. The characteristic of a choice experiment is that it includes alternative options of the same product having various traits and characteristics, and then the respondent chooses the option or alternative that shows their preferences in the best manner. The first step in our choice experiment method is to select the attributes and levels composing the various products proposed to the investors. The attributes and degrees chosen for this analysis are presented in Table 2.

Table 2: The choice experiment's attributes and degrees

Attributes	Levels

¹ <https://docs.google.com/forms/d/1KNb8-8oxzao64wlbIF9tPmBI8UHco7CCQ7rgu4D-ei8/prefill>

² LinkedIn in this case

³ Scopus

Supplier	Conventional, Cooperative, Sustainable
Interest rate	1%, 3%, 5%
Risk	Low, Medium, High
Contribution to sustainable development goals	Yes, No

Note: Table 2 shows the attributes and levels selected based on previous literature investors' preferences (Apostolakis et al. 2018; Gutsche and Ziegler 2019; Lagerkvist et al. 2020).

We construct a total number of 56 hypothetical products based on the combination of the chosen attributes or degrees, and this can be an excessive number of products for comparing to participants. Assuming that they are displayed as choice sets composed of two products and a no-choice option, we have a total set of 3020 possible comparisons that are unmanageable in terms of economics and time. A fractional structure is employed to diminish the number of comparisons to achieve the efficient degree goal through the *Dcreate*⁴ module in Stata that helps to generate such a structure. **This command uses the modified Fedorov algorithm to construct the efficient design of the experiment (Cook and Nachtsheim, 1980; Zwerina et al., 1996; Carlsson and Martinsson, 2003).** Lastly, we create 8 choice sets and employed them in the survey. An example of a choice set is presented in Table 3. We note that the correction of the hypothetical bias that may appear in the analysis is done using the cheap talk approach⁵, which aims to put oneself in a real and current investment situation. Incorporating a text that explains the hypothetical bias and its importance for the validity of the analysis into the questionnaire is mandatory. **Economists have been trying to contain or limit the impact of hypothetical bias in experiment design by introducing ex-ante information that informs experiment participants of the existence of the bias. This ex-ante information is generally referred to as a cheap talk script. Cummings and Taylor (1999) initially implemented Cheap talk scripts by informing the participants, before making a decision, the propensity of respondents like themselves to exaggerate stated willingness to pay (WTP). Subsequent evaluations of cheap talk scripts have found mixed results (i.e., Brown et al. 2003; Lusk, 2003; Murphy et al. 2005; Tonsor and Shupp, 2011; Díaz-Caro et al. 2023).**

Table 3: The example of choice obtained by participants

	Comparison 1		
	Choice 1	Choice 2	Choice 3
Supplier	Sustainable Bank	Bank	None before
Interest rate Risk	3%	5%	
Risk	Medium	High	
Contribution to the SDG	None	Water	

Note: Table 3 provides an example of a choice set based on 8 choice sets constructed using "Dcreate" in Stata for this research design. This package utilizes the modified Fedorov algorithm to produce an efficient design (Carlsson and Martinsson 2003).

⁴ Dcreate creates efficient designs for discrete choice experiments using the modified Fedorov algorithm (Cook and Nachtsheim, 1980; Zwerina et al., 1996; Carlsson and Martinsson, 2003). The algorithm maximizes the D-efficiency of the design based on the covariance matrix of the conditional logit model. The D-efficiency of a random design can be improved by systematically changing the levels in the alternatives using a search algorithm. You can also refer to <https://ideas.repec.org/c/boc/bocode/s458059.html>

⁵ Basically, cheap talk is communication that is: costless to transmit and receive. non-binding (i.e. does not limit strategic choices by either party) unverifiable (i.e. cannot be verified by a third party like a court)

2.3 Empirical modeling

Following Mcfadden (1974) and Train (2009), we employ the mixed logit model for assessing the investors' heterogeneous preferences. The empirical modeling applies random utility that takes into account the utility function of each investor as the sum of two components, i.e., a deterministic part that can be derived as a function of the factors that impact the utility of investors and a random element that is not directly seen and viewed as stochastic. Hence, we formulate the utility U_{njt} of an investor n selecting the alternative j with comparison t as follows:

$$U_{njt} = V_n' x_{njt} + c_{njt} \quad (1)$$

Where V_n' refers to the vector of individual-specific coefficients, x_{njt} refers to the vector of visible attributes of individual n and c_{njt} represents the random term considered an independent and identical distributed extreme value. Thus, it indicates the probability that client n selects alternative j with comparison t . We mention that the limitation of this conditional logit modeling is the hypothesis that preferences are similar for everyone, but the mixed logit model is able to correct the limitation as it permits various coefficients for each person. Specifically, we estimate the mixed logit choice following the below formula:

$$SLL(\theta) = \sum_{i=1}^N \ln \left\{ \frac{1}{R} \sum_{r=1}^R \prod_{t=1}^T \prod_{j=1}^J \left[\frac{\exp(x'_{njt} \beta_n^r)}{\sum_{j=1}^J \exp(x'_{njt} \beta_n^r)} \right]^{y_{njt}} \right\} \quad (2)$$

We choose the base levels of each qualitative attribute to benchmark zero utility to the other attribute levels. We select conventional base levels for the supplier attribute and low base levels for the risk. We do not disaggregate the interest rate attribute into variables, i.e., 1%, 3%, and 5%, but we unify it into one continuous non-dummy variable, and then, in this sense, we are able to monetize it. Overall, in this study, we use econometric modeling as expressed below:

$$U_{njt} = V_0 CS + V_1 COOP_{njt} + V_2 SOST_{njt} + V_3 INT_{njt} + V_4 RIESM_{njt} + V_5 RIESA_{njt} + V_6 Ods_{njt} + c_{njt} \quad (3)$$

Where V_0 is the actual situation CS , which means not buying the two suggested products and V_k indicates the marginal utility linked to each attribute given through the particular product. However, we include price represented by interest rate as an attribute in a choice experiment to have the marginal ratio of substitution between a coefficient and price, which is known as "want to pay" for the specific attribute, computed via this formula:

$$WTP_k = - \left(\frac{\beta_k}{\beta_{price}} \right) \quad (4)$$

It is noted that WTP_k refers to how much investors would want to pay in the currency for each rise in the degree or level of attribute k given through the product.

3. Analysis and Discussion

We report the findings of the mixed logit modeling of our sample in Table 4. It includes the mean and the standard deviation of each factor. **The estimated coefficients represent each attribute's marginal utility, a relative measure of investors' preferences for the indicated attribute.** The coefficients' sign shows whether the existence of the level from some attribute adds (positive sign) or diminishes (negative sign) the utility for the investors. We can observe that the interest rate results, sustainable bank, and sustainable development goals show positive and statistically significant coefficients, which means a positive utility to investors by the levels of these attributes, **and that investors show relatively stronger preferences for such**

attributes with a positive contribution to their utilities. Furthermore, the medium and high risks indicate negative and significant coefficients, contributing to diminishing the marginal utility of investors. Our findings corroborate the results of Díaz-Caro et al. (2023) and Escribano et al. (2021), who find a positive utility contribution of SDGs and sustainable intermediaries but a negative utility from the interest rate attribute. In a broad sense, our results align with other related research studies (Gutche and Ziegles, 2019; Lagerkvist et al., 2020) investigating investors' preferences for sustainability.

Moreover, we obtain a significant standard deviation for all the coefficients, indicating a level of heterogeneity in the preferences of investors. The greater value corresponds to greater risk degrees. The contribution to the goal also provides a great standard deviation, followed by the medium risk and interest rate. However, looking at the coefficient of variation as a relative measure of risk, it shows that interest rates followed by cooperative banks have the highest relative variation to utility contribution, whereas risk attributes show the lowest deviation, and the SDG variation collocates in the middle.

Table 4: The results of mixed logit modeling specifications

	Mean of parameter	z-value	standard deviation	CV
interest rate Risk	0.095*** (0.042)	2.253	0.828***	8.715
cooperative	-0.147 (0.147)	-1.123	0.406	2.762
sustainable	0.337** (0.136)	2.518	0.807**	2.395
medium risk	-0.902*** (0.126)	-7.340	1.102***	1.222
high risk	-3.034*** (0.263)	-11.551	3.466***	1.142
SDGs	0.611*** (0.105)	6.379	1.102***	1.804
Current situation (C.S.)	-2.370*** (0.295)	-7.984	3.699***	1.561

Note: The table presents the findings of the mixed logit modeling. It includes each factor's mean and standard deviation (supplier, interest rate, risk, and contribution to SDG); C.S. represents the current situation (not buying both suggested products). The estimated coefficients' sign shows whether the existence of the level from some attribute adds, i.e., a positive sign, or diminishes, i.e., a negative sign, utility for the investors. The standard deviation of the mean of the parameter is between brackets, and (, **, ***) indicates that the appropriate parameter is not equal to 0 at the 10%, 5%, 1% levels of statistical significance, respectively.*

The results of "want to pay" or invest depending on the interest rate are reported in Table 5. Given that wanting to pay or invest is a function of the interest rate, we interpret the results as the interest rate that the investor is willing to accept or decline for the attribute; **it is a relative price or a substitution coefficient in terms of the interest rate accepted or rejected**. Obviously, we observe that both high and medium risks give a greater desire to pay or invest. The investors accept a 35.618% interest rate to assume a high-risk investment, showing that investors are extremely sensitive to risk. A negative "wanting to pay or invest" is presented by the sustainable development goals, i.e., the investors would decline an 8.166% interest rate to invest in funds that contribute to the goal of clean water and sanitation.

In the same way, we see that investors want to decline 4.957% of interest rate when a sustainable bank markets the fund. Lastly, we find no significance for cooperative banks. **While Díaz-Caro et al. (2023) and Escribano et al. (2021) find positive coefficients for "want to pay" to all attributes, including SDG and sustainable banks, we show that investors sometimes are willing to forgo returns to achieve SDGs.** Our results are interpreted as a commitment to SDG (clean water and sanitation) or the risk profile of the funds containing such goals.

Table 5: The wanting to pay or invest following the interest rate results

	cooperative	sustainable	medium risk	high risk	SDGs
WTP	not specified	-4.957	10.541	35.618	-8.166
L1	not specified	-9.306	-0.427	0.464	-15.227
U1	not specified	-0.469	20.398	69.740	- 0.105

Note: Table 5 shows the results of the Willingness to Pay or Invest (WTP) in each attribute (supplier, interest rate, risk, and contribution to SDG). Positive values are related to risk attributes (higher risk, higher assumed return), whereas negative values are associated with sustainable banks as promoters and funds with SDG (investors would forgo returns to invest in those funds). L1 and U1 are the level of intervention and the utility generated,

4. Conclusions

Our study provides modeling of investors' preferences towards sustainable investments and the relative price they are willing to pay "want to pay" or invest in them, adopting a choice experiment approach using mixed logit models. We contribute to the literature by examining the heterogeneous preferences of thematic investment funds that, through their investment policy, help achieve the sustainable development goals (SDGs) of clean water and sanitation. We mainly find that the degree of risk plays an essential key role with regard to the decision-making by investors who are quite sensitive to risk. These results align with the classical risk-return trade-off where investors would require higher returns for riskier investments. In addition, we find that the investors want to decline any profitability to contribute to achieving the goal of clean water and sanitation or operating with sustainable banks. This could be intuitive for two reasons: investors perceive investments with SDGs as safer, thus declining a portion of their returns, or some investors are committed to investing in SDGs funds to achieve long-term development regardless of the return they offer. Our findings send two distinct messages for two groups of investors (depending on their appetite for SDGs investments): if markets and investors perceive funds with SDGs as of lower risk, they should be ready to forgo interest returns to fit the risk-return models; other considerations could also contribute to holding SDGs investment such as long-term commitment to achieving the goal or other financial considerations such as hedging purposes and portfolio diversification; finally, some investors category are being challenged by significant global investment funds which started to liquidate and close ESG and SDGs funds, putting responsible investors on the edge of continuing or liquidating responsible investments.

This study is not free of limitations; behavioral and experimental studies often suffer from bias issues; however, further development could be applied to avoid bias. We surveyed 581 U.S.-based investors; further research could benefit from extending the number of respondents to include global investors from different countries. It could also be interesting to survey the same investors at different times to track preferences changes over time.

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