Institut sur la retraite
et l'épargne
HEC MONTRÉAL

Sustainable Investment Decisions: Heterogeneous Beliefs and Preferences

CAHIER DE RECHERCHE Nº 24
WORKING PAPER No. 24

Philippe d'Astous, Iwan Meier and Pierre-Carl Michaud

Mai / *May* 2026

Retirement and Savings Institute

Les opinions et analyses contenues dans les cahiers de recherche de l'Institut ne peuvent en aucun cas être attribuées aux partenaires ni à l'Institut lui-même et elles n'engagent que leurs auteurs.

Opinions and analyses contained in the Institute's working papers cannot be attributed to the Institute or its partners and are the sole responsibility of the authors.

©2026 Philippe d'Astous, Iwan Meier and Pierre-Carl Michaud. Tous droits réservés. All rights reserved. Reproduction partielle permise avec citation du document source, incluant la notice ©. Short sections may be quoted without explicit permission, if full credit, including © notice, is given to the source.

Dépôt légal : Bibliothèque et Archives nationales du Québec et Bibliothèque et Archives Canada, 2026.
ISSN 2561-9039

SDG-13359

Sustainable Investment Decisions: Heterogeneous Beliefs and Preferences*

Philippe d'Astous
HEC Montréal

Iwan Meier
HEC Montréal

Pierre-Carl Michaud
HEC Montréal, CIRANO and NBER

May 29, 2026

Abstract

We analyze whether households' investment decisions in ESG assets can be explained by their preferences for sustainability or by their beliefs about future returns. To address this question, we develop a structural discrete-choice model with heterogeneous beliefs and preferences. Using a large-scale survey with randomized mutual fund allocation scenarios and elicited return expectations, we recover individual-level willingness to pay for sustainability (and financial risk). Our specification does not restrict investors' willingness to pay for sustainability to be positive, allowing the data to determine both the magnitude and direction of sustainability preferences at the individual level. The results show that beliefs about expected returns are the driving factor for investing in sustainable assets and non-pecuniary preferences for sustainability play only a secondary role. Moreover, respondents' return beliefs exceed the beliefs implied by the model's equilibrium predictions.

Keywords: Sustainable investing, beliefs and preferences, ESG.
JEL codes: G11, G41

*We acknowledge financial support from the Social Sciences and Humanities Research Council (SSHRC) Insight Grant [grant number 435-2021-1012]. We are grateful to Cristina Cardenas (HEC Montréal) for outstanding research assistance. d'Astous (HEC Montréal): philippe.dastous@hec.ca; Meier, iA Financial Group Chair in Sustainable Finance, corresponding author (HEC Montréal): iwan.meier@hec.ca; and Michaud (HEC Montréal, CIRANO, and NBER): pierre-carl.michaud@hec.ca.

1 Introduction

Global assets under management in sustainable funds reached $3.9 trillion in 2025 (Morningstar, 2026). However, investor demand weakened substantially relative to the rapid growth observed during the 2019–2021 period, with global sustainable funds recording approximately $84 billion in net outflows.[1]

The academic literature cites two broad channels through which sustainability characteristics can affect investor behavior. First, investors may derive utility from holding sustainable assets because these investments align with their personal values or social objectives (Riedl and Smeets, 2017, Hartzmark and Sussman, 2019, Barber et al., 2021, Bauer et al., 2021). Under this view, investors are willing to sacrifice part of their expected financial return in exchange for social or environmental impact.[2] Second, investors may view ESG characteristics as financially material signals about firms' future cash flows, implying that sustainable assets may generate superior returns (Amel-Zadeh and Serafeim, 2018, Pástor et al., 2021). In this case, investment in sustainable assets reflects beliefs about future performance rather than non-pecuniary motives. In her presidential address to the American Finance Association, Starks (2023) emphasizes that it remains unclear whether ESG investment decisions are primarily driven by *value*—the belief that ESG characteristics affect firm value and expected returns—or by *values*—the desire to invest in ways that are consistent with investors' ethical or social preferences.

This paper examines how individual investors perceive and value sustainability in financial decision-making. We develop and estimate a structural model that extends the framework of Pástor et al. (2021) by incorporating heterogeneity in both investor preferences and beliefs regarding the expected return of sustainable investments. The model maps observed portfolio allocation decisions into individual-level preferences for expected return, financial risk, and sustainability characteristics, thereby allowing us to quantify investors' willingness to pay for sustainability (and also for conventional financial risk). Prior research shows substantial heterogeneity across investors in both non-pecuniary sustainability preferences and beliefs about expected returns

[1] 2025 marked the first year of net annual redemptions since Morningstar began tracking sustainable funds in 2018. It was also the first year of net outflows for both Europe and the rest of the world, while the United States recorded its third consecutive year of withdrawals from sustainable funds (Morningstar, 2026).

[2] Riedl and Smeets (2017) provide evidence that such behavior is largely driven by intrinsic non-pecuniary preferences (warm-glow motives), although social signaling may also play a secondary role.

(Giglio et al., 2025, Egan et al., 2026). Our specification does not restrict investors' willingness to pay for sustainability to be positive, allowing the data to determine both the magnitude and direction of sustainability preferences at the individual level. This flexibility accommodates the possibility that some investors derive positive utility from sustainable investments, while others may dislike ESG-oriented assets or perceive them as financially unattractive.

Beliefs about expected returns cannot easily be derived from archival data. Thus, we conducted a large-scale survey with randomized investment choice scenarios and questions designed to elicit respondents' beliefs and preferences. The respondents were presented with a choice between mutual funds with different Morningstar Sustainability Ratings ("globe ratings") and a risk-free investment. The mutual fund flow literature provides evidence that such Morningstar performance ratings (Del Guercio and Tkac, 2008, Reuter and Zitzewitz, 2021) and sustainability ratings (Hartzmark and Sussman, 2019, Ammann et al., 2019, Gantchev et al., 2024) influence investor allocation decisions. We then ask questions about their expectations for future returns from funds with different globe ratings, their views on ESG-related factors that influence expected returns, their preferences for sustainable choices, their environmental knowledge and financial literacy, and their environmental behavior.

Our main findings can be summarized as follows. First, we estimate our model with heterogeneous preferences but without incorporating individual beliefs (baseline model), that is, under the assumption that investors extrapolate the historical return and risk characteristics of the assets presented in the scenarios when making their portfolio allocation decisions (Del Guercio and Tkac, 2002, Rossi et al., 2019, Evans and Sun, 2021, Ben-David et al., 2022). Within this framework, we find that the willingness to sacrifice financial return in exchange for the non-pecuniary benefits associated with investing in funds with high ESG scores is low for the majority of respondents.

Second, we estimate the model by updating past fund returns with respondents' expectations about future returns on sustainable investments (beliefs-adjusted model). Andries et al. (2025) conclude that investors adjust their forecasting model when they receive additional ESG information and no longer extrapolate from past returns. We find that incorporating individual beliefs about future returns substantially increases the estimated heterogeneity in investors' willingness to pay for higher sustainability ratings. In our sample, the average coefficient on non-pecuniary preferences even becomes negative, implying that investors, on average, require compensation to

hold sustainable investments.[3] At the same time, allocations to funds with high Morningstar globe ratings are driven primarily by subjective beliefs that these funds will generate superior future returns.

Third, using the estimated individual preference and beliefs parameters from the beliefs-adjusted model, we calibrate an equilibrium model building on the framework of Pástor et al. (2021). Compared to the baseline model that does not account for investors' subjective returns beliefs, optimistic expectations about the future performance of sustainable investments substantially reduce the compensation required to induce investors to hold ESG funds. Absent these beliefs, investors would require annual compensation of roughly 2% to hold funds with five-globe sustainability ratings and about 1% to hold four-globe funds relative to an ESG-neutral three-globe fund (Morningstar Sustainability Ratings range from one to five globes, with five-globe funds holding portfolios with the lowest ESG risks). Once investors' optimistic return expectations are incorporated, however, the implied premium to hold a five-globe fund declines to an economically modest 40 basis points per year. These results suggest that the higher expected returns associated with sustainable investments are driven primarily by investors' beliefs rather than by compensation for non-pecuniary preferences. In a dynamic setting, these higher expected returns increase the prices of sustainable investments, thereby lowering future returns. This adjustment, in turn, reduces investors' expectations until prices and expected returns converge to a long-term equilibrium.

Finally, we examine respondent characteristics associated with willingness to pay (WTP) for sustainable investments. This analysis reveals systematic variation linked to environmental literacy, education, gender, and age. It also serves as a validation exercise for our structural estimates, by assessing whether the compensation for conventional financial risk implied by our model is consistent with estimates documented in the literature. Pro-environmental behavior is positively related to environmental literacy and education, but negatively related to age and financial literacy. Younger respondents report stronger ESG preferences. Across the full sample, these stated preferences are positively associated with pro-environmental behavior and, to a lesser extent, inversely related to financial literacy. Regressing the estimated WTP for ESG from the model on respondent characteristics, we find that willingness to forgo expected returns in exchange for more sustainable

[3]The negative coefficient is consistent with Baker et al. (2024), who find that the premium investors assign to index funds with an ESG mandate declined to -33 basis points in 2023, the year in which we conducted our survey, after peaking at $+17$ basis points in 2020.

investments is positively associated with environmental literacy and pro-environmental behavior. In contrast, financial literacy is largely unrelated to the WTP for ESG. This contrast suggests that environmental literacy captures a distinct dimension from financial literacy. Unlike financial literacy, environmental literacy does not exhibit a clear age gradient between respondents aged 25–39 and 40–54, with only the oldest group (55–65) showing moderately higher scores. Accordingly, we do not observe the inverse U-shaped relationship that is well documented in the financial literacy literature (Agarwal et al., 2009, Lusardi and Mitchell, 2011, Lusardi et al., 2014). However, consistent with Andersen et al. (2019), we find that respondents who incorrectly answer the question about the relationship between bond yields and prices tend to hold more optimistic expectations about the future returns of sustainable investments. Correct answers to other financial literacy questions are positively associated with higher expected ESG returns.

We also document a pronounced gender effect: female respondents exhibit a significantly higher willingness to pay for sustainability and engage more frequently in pro-environmental behavior. Similarly to the pattern observed for financial literacy, female respondents exhibit lower levels of environmental literacy. Furthermore, the WTP for ESG increases with age, consistent with the view that ESG may be perceived as a luxury good (Larcker et al., 2024, Andersen et al., 2024). Although the oldest age group (55–65) reports lower levels of environmentally oriented behavior, it displays higher environmental literacy and, in particular, significantly more optimistic beliefs regarding the impact of ESG on firm value. When we jointly include stated ESG preferences and beliefs about the impact of ESG practices on firms' expected returns to explain the WTP for ESG from the model, positive ESG beliefs emerge as a highly significant determinant, whereas stated preferences play only a marginal role, both economically and statistically. Finally, investors with lower risk aversion are less willing to forgo returns in favor of sustainability.[4]

When regressing the WTP for lower financial risk on respondent characteristics, we find a negative association with financial literacy, whereas environmental literacy and environmental behavior are unrelated to these preferences. This finding reinforces that environmental literacy is different from financial literacy. We also find the well-documented fact that women are more risk averse and therefore exhibit a higher WTP for risk reduction. However, this effect is attenuated

[4]This result also holds if we replace respondents' stated risk aversion with our parameter estimate of the WTP for less risk from the model.

among women with children: their WTP for reduced risk is significantly lower. We find no comparable effect for male respondents with children. These findings support the hypothesis that women with children are more likely to make joint financial decisions as a household and their risk aversion is attenuated. Our results on financial literacy are consistent with the existing literature and provide further support for the validity of the model's coefficient estimates.

Understanding the impact of sustainability preferences and beliefs about expected returns on sustainable investments is important to inform projections of future investor flows into sustainable assets and the design of ESG-related regulations. Sustainable investments have performed well in recent years (Pástor et al., 2022) and during the COVID-19 crisis (Albuquerque et al., 2020). However, following less favorable realized returns, investors may revise their beliefs, while those with strong sustainability preferences may continue to accept lower expected returns.[5] The modeling framework allows us to quantify the potential impact of changes in investors' beliefs about expected future returns on their investment decisions.

Related literature. We contribute to several strands of the literature. First, we add to the literature that studies the impact of preferences versus beliefs. Analyzing portfolio data from 401(k) plans, Egan et al. (2026) find that heterogeneity in expectations across investors explains twice as much variation in portfolio holdings as heterogeneity in risk aversion. Similarly, Beutel and Weber (2025) examine the conventional risk–return portfolio choice and show that, conditional on beliefs, individuals' sensitivity of risky portfolio shares is consistent with the standard Merton model of portfolio choice. Giglio et al. (2025) highlight the substantial and persistent heterogeneity in investors' beliefs about expected ESG returns and their motivations to invest in sustainable assets. They elicit expectations about returns, motives for investing in ESG portfolios, and climate concerns in an existing survey of randomly selected (predominantly retail) Vanguard clients, and link respondents' answers to administrative data on their investment portfolios. In line with our results, they document a strong association between holdings of ESG-labeled funds and higher expected returns from ESG investments. In contrast to the respondents in our survey, their sample reports average expected returns on ESG equities that are lower than those of the general

[5] For example, investors may have reassessed their beliefs about future returns of ESG investments relative to polluting firms following the outbreak of the war in Ukraine and the subsequent energy crisis in Europe, as well as during the inflationary period of 2021–2022.

stock market. However, substantial differences in sample composition, particularly in age and geographical location (and likely also in financial literacy, education, and household income), as well as differences in the framing of survey questions and timing of data collection (since respondents may update their expectations based on recent realized returns) may explain these differences in average subjective beliefs.

Related experimental evidence is provided by Heeb et al. (2023), who conduct a framed field experiment with 219 participants recruited from a Dutch investor protection interest group. They find that investors exhibit a willingness to pay (WTP) for sustainable investments but do not pay significantly more for greater impact. The authors conclude that ESG investors appear to maximize financial performance while optimizing the warm-glow benefits derived from their choices, rather than consistently optimizing investment impact. Gutsche and Ziegler (2019) document strong stated preferences and substantial WTP for certified sustainable investment products among German private financial decision makers, particularly those with higher environmental awareness and left-leaning political preferences. Using survey data on German households, Aron-Dine et al. (2024) assess the WTP by eliciting how much lower (higher) the interest rate on a green savings account could be (would need to be) for respondents to prefer it over a conventional account. They subsequently calibrate a model with heterogeneous investors using household-level data.

Baker et al. (2024) estimate that investors are willing to pay an additional 20 basis points per year in fees to invest in ESG-oriented index funds relative to non-ESG alternatives. Focusing on social preferences, Bauer et al. (2021) find that about two-thirds of Dutch pension plan members in a field experiment are willing to accept lower financial performance in exchange for greater pension fund engagement with firms aligned with selected United Nations Sustainable Development Goals. Riedl and Smeets (2017) combine survey responses with administrative data from a Dutch bank on individual allocations between socially responsible investment (SRI) and conventional mutual funds to examine the motivations underlying SRI choices. They conclude that investors hold SRI funds primarily for moral and social preferences, not because they expect higher financial returns. Complementing this evidence, Krueger et al. (2020) show, in a survey of institutional investors, that both pecuniary and non-pecuniary motives drive the incorporation of climate risks into portfolio allocation decisions. The strongest consensus emerges around moral and ethical considerations, as well as the belief that integrating climate risks improves returns and reduces portfolio risk.

Second, our findings contribute to the debate about observed patterns in the ESG fund flows literature. Hartzmark and Sussman (2019) and Ammann et al. (2019) find that following the publication of the Morningstar globe ratings in March 2016, funds with better ESG ratings saw significantly more inflows and that investors divested from funds with poor global ratings. Ceccarelli et al. (2024) document similar responses to fund inflows following the introduction of Morningstar's carbon risk metrics in April 2018. Gantchev et al. (2024) argue that these results do not reveal whether these fund flows are due to investors' sustainability preferences or their beliefs about future returns. Their analysis shows that within 18 months of the introduction of Morningstar globe ratings, upgrades or downgrades no longer had an impact on fund flows. Rather, past fund performance dominates fund flows after the introduction of Morningstar global ratings. Only funds with a rating upgrade and above-average performance attracted inflows, while funds with a rating upgrade but poor performance in the previous month recorded outflows.[6] The performance-chasing behavior (Chevalier and Ellison, 1997, Sialm et al., 2015) of investors aligns also with the findings of Ben-David et al. (2022) and Evans and Sun (2021). Both studies conclude that investors tend to follow simple metrics for past performance metrics. The results of Gantchev et al. (2024) are consistent with our finding that investors' decisions are primarily driven by their beliefs about the future returns of sustainable investments, which may be conditioned by their past performance, rather than by a preference for sustainability.

Third, we contribute to the literature by analyzing the impact of environmental literacy on financial decisions. Auzepy et al. (2024) find that sustainable financial literacy increases the likelihood of investing in sustainable instruments, specifically among investors with at least a moderate level of ESG preferences. Filippini et al. (2024) likewise show that knowledge of sustainable finance is a significant determinant of the reported ownership of sustainable investment products. These results contrast with Anderson and Robinson (2022), who do not find evidence that households with higher environmental literacy are more likely to hold pro-environment investment portfolios. Several studies examining the relationship between financial literacy and ESG portfolio choices report mixed and sometimes contradictory findings. Gutsche et al. (2023)

[6]Earlier studies on fund flows, such as Renneboog, Ter Horst, and Zhang (2011) find that global money flows of sustainable equity funds are less related to past performance than conventional equity fund flows. Similarly, Bollen (2007) and Benson and Humphrey (2008) find that U.S. investors in socially responsible funds are less concerned about past returns than conventional investors.

document a positive correlation between financial knowledge and attitudes towards sustainable investments, whereas in Rossi et al. (2019), Anderson and Robinson (2022) and D'hondt et al. (2022) the relationship between financial literacy and ESG portfolio values is negative. Varmaz et al. (2022) show that financial literacy is negatively, but insignificantly, associated with students' choice of ESG investment funds. Our study shows that environmental literacy is positively associated with the willingness to pay for sustainable investments, whereas financial literacy has only a marginal effect.

2 Experimental design

In this section, we first outline the design of the investment scenarios in our survey experiment. We then introduce our model of utility and choice, incorporate heterogeneous beliefs about ESG returns, describe the estimation approach, and derive the equilibrium returns implied by our framework.

2.1 Survey design

In September 2023, we partnered with *Asking Canadians*, a well-known online panel, to conduct an experimental survey on preferences for sustainable investments. The survey included 3,000 participants aged 25 to 65 residing in Canada. Following the questions on demographics, respondents were given explanations of key investment concepts such as mutual funds, the relationship between risk and return, and environmental, social and governance (ESG) ratings.[7] In particular, we presented Morningstar Sustainability Ratings for mutual funds, known as "globe ratings".[8] These ratings are expressed on a scale from one to five globes and reflect the extent to which the value of a fund's holdings is exposed to ESG-related risks, with a higher number of globes indicating investments in firms with better ESG practices. After these explanations, respondents answered a series of questions to assess their understanding of these concepts. Feedback was given for incorrect answers to ensure that respondents gained the necessary basic knowledge to

[7] We frame our survey questions using the term ESG. Global searches for the Google topic "environmental, social and corporate governance" have risen rapidly in recent years, while searches for the terms "corporate social responsibility" have remained important but stagnated, and searches for "socially responsible investment" are at a much lower level (Starks, 2023).

[8] The name was officially changed to Morningstar ESG Risk Rating at the end of March 2025.

understand the subsequent survey questions.[9] The survey then probes the respondents on four dimensions: 1) their expectations about future returns of mutual funds with different ESG ratings, 2) their investment choices when presented with mutual funds that differ in risk, return, and ESG ratings, 3) their beliefs, preferences, and knowledge about sustainability concepts, and 4) financial information about their investments, and their patience and risk tolerance regarding financial decisions.[10]

Expected returns. We elicited respondents' expectations regarding the future returns of mutual funds with different ESG ratings to capture how ESG ratings influence their beliefs about future returns. Respondents were asked to consider a hypothetical mutual fund with a historical 10-year return of 50%. They then provided their expectations for the fund's return over the next 10 years, given different ESG ratings ranging from one to five Morningstar globes. The interpretation of these ratings was explained at the beginning of the survey.

Investment choices. Subsequently, participants were presented with six hypothetical investment scenarios. In each scenario, they were asked to allocate a total amount of $6,000 for 10 years, in $1,000 increments across three investment products: two mutual funds with varying risk and return characteristics and different globe ratings, and one safe asset. The safe asset was described as a traditional bank savings account offering a guaranteed 10-year return of 10%.[11] We randomized the three attributes of the funds: historical 10-year total return (20%–60%), historical 10-year volatility (standard deviation of 31%–94%), and sustainability risk rating (1–5 globes). Randomization was

[9] To assess respondents' comprehension of the survey's explanations of ESG and Morningstar globe ratings, we tested whether they could correctly classify pollution, internal corporate oversight, and employee well-being into the appropriate ESG categories, as well as interpret the meaning of a mutual fund receiving more Morningstar globes. To further evaluate their understanding of the explanations on the risk–return trade-off, respondents were presented a table reporting returns and standard deviation in the same format (without the information on Morningstar globes) used for the investment scenarios of our experiment. Such attention and comprehension checks have been implemented in past research using similar survey data (e.g. Boyer et al., 2022, Gemmo et al., 2023).

[10] In the context of sustainable finance, stated willingness to pay for ESG attributes may be subject to hypothetical bias, as survey respondents can overstate their readiness to trade off financial returns for sustainability relative to actual investment behavior, especially given the social desirability of pro-environmental choices (Cummings et al., 1995; Murphy et al., 2005; Harrison and Rutström, 2008). However, Engler, Gutsche, and Ziegler(2025) compare individual investment decisions in pre-registered non-incentivized and incentivized choice experiments and conclude that the willingness to pay for sustainable investments is not significantly higher in the non-incentivized setting than in the incentivized setting. Their results are robust to various explanations of hypothetical bias and experimental design choices.

[11] Participants were instructed to disregard taxes, that is, to assume that all investments were made within a tax-free savings account (e.g., a TFSA in Canada).

set up to ensure that no fund dominated another under first-order stochastic dominance and that no two funds had identical returns or globe ratings. We presented historical returns so that respondents would form expectations of future returns when making their portfolio choices.

Beliefs, preferences, and environmental literacy. To understand the motives for their portfolio choices we then surveyed respondents on their beliefs and preferences for sustainability, their financial and sustainable investment literacy, and their environmental behavior. We measure financial literacy using the questions that became known as the Big Five (Lusardi and Mitchell, 2011, and two additional questions from the 2009 National Financial Capability Study),[12] and we created five environmental literacy questions. Survey evidence on household and individual investors indicates that ESG preferences are primarily driven by environmental considerations, with climate-related concerns systematically ranking above social and governance dimensions in importance and willingness to pay (Riedl and Smeets, 2017, Amel-Zadeh and Serafeim, 2018, Krueger et al., 2020, Bauer et al., 2021, Filippini et al., 2024). Additionally, we inquired about their environmental behaviors and their willingness to pay for an environmentally friendlier flight option from Toronto to London that emits 20% less CO_2 compared to a regular flight.

Financial information. Finally, participants were asked to provide information about their financial situation, including household income, the types of assets or savings plans they hold (such as tax-free savings accounts, retirement savings plans, or defined contribution pension plans), and the balances in these accounts. Respondents also reported the share of each account balance invested in equities and in assets labeled as ESG. In addition, we elicited self-assessments of patience and risk tolerance with respect to financial decision-making.

2.2 Utility and choice

We survey individuals $i = 1, \ldots, N$ on their preferences when distributing an endowment across a set of funds. For notational convenience, we also treat the safe asset as a fund, characterized by a fixed return and zero standard deviation. Each respondent faces $t = 1, \ldots, T$ scenarios, each with $j = 1, \ldots, J$ funds characterized by three attributes. Let $\mu_{it,j}$ denote the expected return of fund

[12] The term was coined by Hastings et al. (2013).

j, and $\mu_{it} = (\mu_{it,1}, \cdots, \mu_{it,J})'$ the vector of expected returns in scenario t. The second attribute is the standard deviation of returns, $\sigma_{it,j}$, with σ_{it} the vector of standard deviation of funds in the scenario. The third attribute is the sustainability rating from 1 to 5 globes, $g_{it,j}$, with vector g_{it} over all funds.[13]

In each scenario, respondents could allocate their endowment of \$6,000 across funds in discrete increments of \$1,000, subject to the constraint that the allocations sum to the total endowment. Consequently, the set of feasible portfolio shares is both discrete and constrained. Let C denote the number of possible discrete allocations and $c \in C$ one such allocation. Let c_{it} represent the allocation chosen by respondent i in choice situation t, and $\omega_{it,c}$ the corresponding portfolio weights. Each allocation yields a tuple of attributes $(\overline{\mu}_{it,c}, \overline{\sigma}_{it,c}, \overline{g}_{it,c})$, denoting expected return, volatility, and globe rating, respectively.

Let $\omega_{it,j}$ denote the share of the endowment invested in fund j in scenario t, and ω_{it} the vector of shares with $\omega_{it}'\iota = 1$, with ι denoting a $J \times 1$ vector of ones. The expected return of the portfolio is $\overline{\mu}_{it} = \omega_{it}'\mu_{it}$, its volatility is $\overline{\sigma}_{it} = \frac{1}{2}\omega_{it}'\Sigma_{it}\omega_{it}$, where Σ_{it} is the diagonal matrix of fund standard deviations,[14] and its average sustainability rating is $\overline{g}_{it} = \omega_{it}'g_{it}$.

Let $U_{it,c}$ be the utility associated with portfolio combination $c_{it} = c$,

$$U_{it,c} = V_{it,c} + \epsilon_{it,c}, \tag{1}$$

where $V_{it,c}$ is a deterministic part of utility and $\epsilon_{it,c}$ is a taste shock that is assumed IID across combinations and choice situations. $\epsilon_{it,c}$ is unobservable to the econometrician. We assume it is distributed Extreme Value Type 1. Let the deterministic portion of utility be given by

$$V_{it,c} = \alpha_{1,i}\overline{\mu}_{it,c} - \alpha_{2,i}\overline{\sigma}_{it,c} + \alpha_{3,i}\overline{g}_{it,c}. \tag{2}$$

The parameters $\alpha_{a,i}$ for attribute $a = 1, 2, 3$ are respondent specific. We assume that they are a function of observable taste shifters, $\mathbf{x}_{a,i}$ and an unobserved shifter (unobservable to the econometrician),

[13] In our setting, $N = 3,000$, $T = 6$, and $J = 3$ (two mutual funds, plus the safe asset).

[14] We use the half-variance convention to ensures that the estimated α_2 maps directly to the coefficient of relative risk aversion.

$\nu_{a,i}$.

$$\alpha_{a,i} \quad = \quad \mathbf{x}_{a,i}\alpha_a + \nu_{a,i}, \quad a = 1,2,3 \tag{3}$$

Define $\nu_i = (\nu_{1,i}, \nu_{2,i}, \nu_{3,i})'$. We assume $\nu_i \sim N(0, \Omega_\nu)$ where Ω_ν is a covariance matrix. Instead of estimating the terms of Ω_ν, let $\mathbf{vech}(\Omega_\nu)$ be the unique parameters of this covariance matrix.

2.3 Incorporating beliefs

For each respondent i, we construct a vector of beliefs π_i of dimension G, capturing expectations about excess returns. Because these belief measures exhibit considerable noise, we employ a mixed linear model to mitigate this measurement noise. Assume the following model for π_i,

$$\pi_{i,g} = \phi_0 + \phi_{1,i} g + \epsilon_{i,g} \tag{4}$$

This specification allows for heterogeneous beliefs regarding the gradient of return with $\phi_{1,i}$ varying across respondents. We further assume that those are distributed normally with mean ϕ_1 and standard deviation σ_ϕ. We estimate the parameters $(\phi_1, \sigma_\phi, \phi_0)$ using the the Expectation–Maximization (EM) algorithm. We then fit $\hat{\pi}_{i,g}$ for each g, substracting the mean at $g = 3$ so that $\exp(\hat{\pi}_{i,3}) = 1$. Finally, we assume that investors no longer extrapolate based on past returns but change their forecasting model when they receive supplemental ESG information (Andries et al., 2025). Thus, we adjust their expected return of fund j in scenario t for respondent i using

$$\hat{\mu}_{it,j} = \mu_{it,j} \exp(\hat{\pi}_{i,g_{it,j}}) \tag{5}$$

By design, the expected return of a fund with an intermediate ESG rating of 3 globes remains unchanged. We can estimate the same simulated likelihood as before, but now including heterogeneous beliefs. Subjective beliefs can be turned off similarly by setting $\hat{\pi}_{i,g} = 0$ for all g.

2.4 Estimation and recovering preferences

The utility specification in equation (2) combined with the Extreme Value Type 1 taste shock yields a mixed logit model with random coefficients. We estimate the parameter vector $\theta =$

$(\alpha_1', \alpha_2', \alpha_3', \text{vech}(\Omega_\nu)')$ by maximum simulated likelihood, using S draws from $N(0, \Omega_\nu)$ per respondent. We estimate the model twice: first using historical returns as presented in the survey, and second, with the belief-adjusted returns $\hat{\mu}_{it,j}$ derived from equation (5). The full estimation procedure is detailed in Appendix A.

2.5 Portfolio choice and equilibrium

The deterministic utility in equation (2) is the mean-variance objective that arises from CARA preferences with normally distributed returns, as in Pástor et al. (2021). Our estimation recovers, for each respondent, preference parameters $(\hat{\alpha}_{1,i}, \hat{\alpha}_{2,i}, \hat{\alpha}_{3,i})$ and fitted belief distortions $\exp(\hat{\pi}_{i,g})$. Our setting therefore generalizes theirs by allowing $\alpha_{1,i}$, $\alpha_{2,i}$, and $\alpha_{3,i}$ to vary across investors, and introducing heterogeneous beliefs. We embed these into an equilibrium asset pricing model and calibrate it to our data.

Demand. Consider an economy with J risky assets indexed by globe rating and a risk-free asset. Each asset j has expected excess return μ_j, return variance σ_j^2, and ESG rating g_j, with g centered so that the market portfolio is ESG-neutral ($w_m' g = 0$). Investor i maximizes the deterministic component of the estimated utility in equation (2), with expected returns adjusted for beliefs in equation (5). Collecting the belief distortions into the diagonal matrix

$$D_i \equiv \text{diag}\Big(\exp(\hat{\pi}_{i,g_1}),\ \ldots,\ \exp(\hat{\pi}_{i,g_J}) \Big), \tag{6}$$

so that $D_i \mu$ is investor i's subjective expected return vector, the first-order condition yields optimal demand:[15]

$$\omega_i = \frac{1}{\alpha_{2,i}} \Sigma^{-1} \Big(\alpha_{1,i}\, D_i \mu + \alpha_{3,i}\, g \Big). \tag{7}$$

Market clearing. Let Γ_i denote investor i's wealth share. Appendix B shows that imposing $\sum_i \Gamma_i \omega_i = w_m$ and solving for μ yields the following proposition :

[15] The half-variance convention in the definition of $\overline{\sigma}_{it,c}$ ensures that $\alpha_{2,i}$ enters without a factor of two. The derivation is in Appendix B.

Proposition 1 (Equilibrium with heterogeneous beliefs) *Equilibrium expected excess returns are given by*

$$\mu_j = \frac{\sigma_j^2 \, w_{m,j} - \bar{\alpha}_{3,2} \, g_j}{A_{jj}}, \qquad j = 1, \ldots, J, \tag{8}$$

where $\bar{\alpha}_{3,2} \equiv \sum_i \Gamma_i \, \alpha_{3,i} / \alpha_{2,i}$ *is the aggregate risk-adjusted ESG taste and*

$$A_{jj} \equiv \sum_i \Gamma_i \, \frac{\alpha_{1,i}}{\alpha_{2,i}} \, \exp(\hat{\pi}_{i,g_j}) \tag{9}$$

is the belief-weighted demand sensitivity for asset j*.*

Implications. Equation (8) embeds two channels through which ESG characteristics affect equilibrium returns. The first operates through the numerator via $\bar{\alpha}_{3,2}$. Unlike Pástor et al. (2021), who restrict $d_i \geq 0$ so that ESG taste unambiguously lowers green assets' required returns, our estimation allows $\alpha_{3,i}$ to take either sign. If $\bar{\alpha}_{3,2} > 0$, investors on aggregate enjoy holding green assets and accept a "greenium"; if $\bar{\alpha}_{3,2} < 0$, they require compensation for holding them. As the contour plots in Figure 3 show, the sign of $\hat{\alpha}_{3,i}$ shifts for the majority of respondents once beliefs are separated from preferences, making the sign of $\bar{\alpha}_{3,2}$ an empirical question that our survey can resolve.

The second channel operates through the denominator A_{jj}. If most investors expect green funds to outperform ($\hat{\pi}_{i,g} > 0$ for high g), then A_{jj} is large for green assets: optimistic demand makes the market clear easily, and the required return falls. Conversely, A_{jj} is small for brown assets, so the market needs higher returns to attract buyers. Hence, collective optimism about green assets compresses precisely the returns that optimists expect to earn. Whether these beliefs are consistent with the returns the market actually delivers is not guaranteed by the one-shot equilibrium—we examine this in Section 3.7, where we test whether the elicited beliefs converge to a rational-expectations fixed point.

Finally, when beliefs are shut down ($\hat{\pi}_{i,g} = 0$ for all i and g, i.e., $D_i = I$), A_{jj} collapses to $\bar{\alpha}_{1,2} \equiv \sum_i \Gamma_i \, \alpha_{1,i} / \alpha_{2,i}$ and the equilibrium simplifies to

$$\mu_j = \frac{\sigma_j^2 \, w_{m,j} - \bar{\alpha}_{3,2} \, g_j}{\bar{\alpha}_{1,2}}, \tag{10}$$

which is the analog of the pricing equation of Pástor et al. (2021), extended to allow $\alpha_{1,i}$ and $\alpha_{2,i}$ to vary across investors. Since A does not depend on μ, comparing equations (8) and (10) isolates the contribution of beliefs: the numerator is identical, and the entire belief effect operates through the fund-specific denominator A_{jj}.

3 Empirical results

We present results in four parts. We first describe the sample and the distribution of elicited beliefs. We then report parameter estimates from the discrete choice model and analyze the determinants of the willingness to pay for ESG and for less risk. Finally, we calibrate the equilibrium model, examine whether elicited beliefs are consistent with equilibrium returns, and investigate the economic mechanisms underlying these beliefs.

3.1 Sample description and elicited beliefs

The geographical distribution of the respondents closely matches the 2021 Canadian Census (Statistics Canada, 2023).[16] The average age of respondents is 49.0 years, which is somewhat higher than the average age of the population aged 25 to 60 (45.7 years). Table 1 reports the demographic characteristics of both survey respondents and the population. Women represent 41.7% of the sample, compared to 50.9% in the general population. Approximately 62.5% of respondents are married or in a common-law relationship, while 27.1% have never been married. Just over half of the respondents (51.9%) report having children.[17] Regarding education, the majority of respondents hold a bachelor's degree or higher (57.4%), while about one-third (31.6%) have a college, trade or other non-university diploma or certificate. The average annual imputed household income is \$118,700, though the distribution is highly skewed, with a standard deviation of \$156,500.[18]

[16] The maximum deviation in the percentage of respondents compared to Census figures is +3.1% for Ontario and -3.9% for the "Other" category, which includes Manitoba, Saskatchewan, Nova Scotia, New Brunswick, Newfoundland, Prince Edward Island, Yukon, and the Northwest Territory. The survey was available in English and French, and 18.4% of the respondents completed the French version, slightly below the 22.0% of the population who report French as their first language.

[17] While the Canadian Census does not directly provide the percentage of the adult population with children, there were 10.3 million census families, and 58.3% of those have at least one child.

[18] About three out of four respondents report their annual household income, with a self-reported mean of \$123,000.

Expected returns by globe rating. Respondents were asked to forecast the future return of a mutual fund with a historical average return of 50% over the past 10 years, but different Morningstar globe ratings g. We normalize these forecasts for each globe rating by subtracting the historical return, thereby obtaining excess return expectations. The bar chart in Figure 1 displays the annualized median excess return (relative to the historical return) associated with each globe rating. On average, respondents expect a fund with a neutral rating of three globes to perform similarly to its past performance. This pattern is consistent with mutual fund investors extrapolating from past returns (Chevalier and Ellison, 1997, Sirri and Tufano, 1998) and with survey and market-based evidence in Greenwood and Shleifer (2014) showing that investor expectations are positively correlated with historical performance.[19] For a mutual fund with one additional globe relative to the neutral three-globe rating, respondents expect it to yield a 0.67% higher return, and a five-globe fund to outperform by an additional 0.63%. Conversely, expectations for funds with lower ratings are about 0.35% lower for each fewer globe. For the mean returns, the expected return difference between funds corresponds to roughly a 1% higher annual return for each additional globe, except for the lowest-rated funds with one globe, which are expected to underperform by 3.82% (see Figure A2(a) in the Appendix).

On average, the survey respondents anticipate higher returns for mutual funds with better ESG ratings. However, there is considerable dispersion. For example, 22.9% of the respondents expect funds with more globes to have lower returns, and an additional 12.8% do not expect any difference.[20] The finding that the majority of investors expect funds with more globes to outperform in the long run is consistent with other survey evidence.[21]

[19] The question presented respondents with a screen containing sliders initially positioned at the historical return of 50%. Future expected returns could be adjusted within a range from –100% to +300%. A screenshot of this interface is provided in Figure A1 in the Appendix. Consequently, inaction resulted in maintaining the historical return as the expected value.

[20] Figure A2(b) in the Appendix shows a box plot of the expected returns for each globe rating. There is substantial dispersion in responses, particularly for funds with the lowest globe ratings. This degree of heterogeneity is not unusual. For instance, in the survey by Aron-Dine et al. (2024) on the convenience yield of green deposit accounts, more than one quarter of respondents selected either "–2%" or "2%", the extreme values of the possible interest-rate spread responses between traditional and green deposit accounts.

[21] The RBC Global Asset Management Responsible Investment Survey (2022) reports that 63% of Canadian institutional investors believe that ESG-integrated portfolios perform as well as or better than non-ESG portfolios. The 2023 Canadian RI Trends Report (Responsible Investment Association, 2023) concludes that risk mitigation and return enhancement are the main motivations for incorporating ESG considerations. The Schroders Institutional Investor Study (2023) shows that more than half of North American investors consider ESG a risk management tool that improves long-term performance. Giglio et al. (2025) find a negative average expected ESG premium among U.S. Vanguard clients, but their sample is substantially older and more male than ours.

Belief distribution. There is substantial variation across individuals in their beliefs about the future returns of investments with different globe ratings. The average slope parameter $\hat{\phi}_{1,i}$ is 0.324 for the $N = 2{,}731$ risk-averse respondents used in the equilibrium calibration, with a standard deviation of 0.192. Recall that we normalize the responses for expected returns over the next ten years by dividing them by the past return of 50%. Therefore, an increase by one globe translates into an average $50\% \times 0.324 = 16.2\%$ increase over a 10-year horizon, or $(1 + 0.162)^{(1/10)} - 1 = 1.5\%$ per year. Figure 2 plots the full distribution. Roughly three-quarters of the respondents have $\hat{\phi}_{1,i} > 0$, expecting funds with more globes to outperform, while approximately one-quarter expect the opposite. This heterogeneity in beliefs is a key input to the equilibrium model: it generates the fund-specific demand elasticities A_{jj} in equation (9) that differentiate our pricing equation from the standard Pástor et al. (2021) result.

Literacy and behavior indices. We also collected measures of environmental literacy, environmental behavior, and financial literacy, which serve as controls in the regressions below. Appendix C reports the construction of these indices and their demographic determinants. Environmental literacy is positively associated with education and negatively with being female, but unlike financial literacy, it does not display the inverse U-shaped relationship with age documented in prior work. Pro-environmental behavior is higher among younger, female, and more educated respondents. Financial literacy follows the standard patterns in the literature. Environmental literacy is positively related to both environmental behavior and financial literacy, though the knowledge–action gap documented in the psychology literature (Kaiser and Fuhrer, 2003, Frick et al., 2004) is also apparent in our data. Appendix D further reports the determinants of respondents' ESG beliefs and stated ESG preferences, and Appendix E analyzes their willingness to pay for a transatlantic flight with lower emissions.

3.2 Parameter estimates

We present two sets of parameter estimates. In our baseline estimation in columns (1) and (2), we assume that investors extrapolate their expected returns based on the historical returns presented to them. In our beliefs-adjusted estimation in columns (3) and (4), we update past returns with respondent's expectations about future returns on sustainable investments. Table 2 report the

parameter estimates for the two models.

For each model, we first consider a specification with homogeneous preferences, i.e. we estimate constant α_a. We then extend our specification to account for observed and unobserved heterogeneity (Ω). For α_1, the loading on returns, we include age (three categories), gender (an indicator variable for female), and the score to the five financial literacy questions (scaled from zero to one). For α_2, the loading on portfolio variance, we include the same shifters and additional dummies for self-reported risk aversion. For α_3, the loading on the sustainability rating (scaled from -1 for one Morningstar globe to 1 for five globes, in 0.5 increments), we include age, gender, the indices for environmental literacy and environmental behavior, and the answers to the question on non-pecuniary preferences for ESG (scaled from zero to one).

Baseline estimation. Column (1) of Table 2 shows that both expected returns and variance load with the expected signs, and all coefficients are statistically significant at conventional levels. Preferences increase with expected returns and decrease with variance. Returns and variances are expressed in decimals; for example, a 50% return over ten years is recorded as 0.5. We find that respondents require, on average, a 1.95 percentage point increase in expected returns to compensate for a one percentage point increase in variance to maintain utility (5.824/2.974). This implies a relative risk aversion coefficient of 3.9, based on the standard first-order approximation to the risk premium.[22]

The coefficients for the sustainability rating allow us to infer respondents' willingness to pay funds with a higher Morningstar globe rating g. We scale g to be between -1 and 1, i.e. $(g-3)/2$. Therefore, moving from 1 to 5 Morningstar globes increases utility by $2 \times 0.75 = 1.50$. This suggests that, on average, respondents are willing to sacrifice approximately 50 basis points in expected return over a 10-year horizon in order to invest in a fund with a 5-globe rating rather than one with a 1-globe rating: $2 \times 0.75/2.97$. Hence, under the assumption of homogeneous preferences, the willingness to pay for ESG appears relatively modest.

[22]The first-order approximation to the risk premium is $\frac{1}{2}A\sigma^2$. Hence, the marginal rate of substitution between expected return and variance is given by 5.824/2.974, and the implied coefficient of relative risk aversion is $2 \times (5.824/2.974) = 3.9$.

Beliefs-adjusted estimation. Similar to column (1), for the estimation in column (3) with homogeneous parameter estimates, we observe that preferences increase with expected returns and decrease with variance. The willingness to pay for an increase from 1 to 5 globes decreases to 31 basis points $2 \times 0.26/1.66$). This suggests that part of the ESG preference captured in the baseline specification (1) reflects differences in beliefs about expected returns. Additionally, in column (4), the utility derived from investing in funds with superior globe ratings varies depending on gender, environmental literacy, and environmental behavior. For some investors, these factors may offset the negative constant term associated with α_3, while for others, they will not.

We can illustrate the impact of beliefs on the parameter estimates using the histogram contour plot in Figure 3. For the baseline model without beliefs in Panel (a), preferences for most respondents exceed zero, implying that most would derive utility from investing in stocks with higher globe ratings. However, for the beliefs-adjusted model in Panel (b), there is no longer, on average, a consensus about the impact of ESG investing on utility, and α_3 becomes negative for most respondents. In addition, in the specification that incorporates heterogeneity in beliefs—both with respect to loadings on ESG ratings and portfolio variance—the magnitude of the gender effect becomes even more pronounced. The main implication from the estimation of the model with heterogeneity is that the impact of preferences becomes less persuasive once we introduce heterogeneity in beliefs. In other words, the asset allocations of respondents with strong preferences for sustainable investing are also driven by their beliefs about expected returns. This is consistent with the observation by Giglio et al. (2021) that only investors with ethical motives and high return expectations actually hold 12% of their assets in sustainable investments, while investors with low return expectations hold only 4% in sustainable investments.

3.3 Willingness to pay for ESG

Our primary variable of interest is the willingness to pay (WTP) for sustainable investments, which we proxy using allocations to funds with higher Morningstar globe ratings. In our econometric specification of the beliefs-adjusted model, this WTP corresponds to the ratio $\hat{\alpha}_3/\hat{\alpha}_1$. Table 3 reports regressions of this ratio on the stated preferences of respondents for sustainable investments, their beliefs about the impact of ESG on firm value, their environmental literacy and environmental

behavior, as well as their financial literacy; controlling for age, education, income, gender, and a treatment effect.[23]

In column (1), where we include only socio-demographic control variables, we find that age and education are positively associated with the WTP for ESG. This suggests that older respondents and those with higher levels of education allocate a larger share to mutual funds with stronger ESG ratings.[24] We also observe a gender effect: female respondents weigh ESG considerations more heavily than males.[25] Consistent with this, the RBC Global Asset Management (2023) survey reports that women are significantly more likely than men to discuss responsible investing with a financial advisor (62% versus 47%).[26]

As shown in column (2), the WTP for ESG increases with higher levels of environmental literacy and greater engagement in pro-environmental behavior. At the same time, controlling for environmental literacy renders the previously significant coefficients on higher education insignificant.

In columns (3) and (4), we separately include respondents' scores on their stated preferences for ESG (*Preference for ESG*) and on whether they believe that better ESG ratings enhance firm value (*Positive ESG beliefs*). Both variables enter with positive and highly significant coefficients at the 1% level, with the coefficient on positive ESG beliefs being more than twice as large. When included jointly in column (5), the coefficient on *Positive ESG beliefs* remains of similar magnitude and significance, whereas the coefficient on *Preferences for ESG* is reduced by half and remains significant only at the 10% level. These results reaffirm that the WTP for ESG is driven primarily by beliefs about the value implications of ESG rather than by stated preferences for ESG investments. Finally, in column (6) we include financial literacy and stated risk aversion. The coefficient for financial literacy is small compared to environmental literacy and only marginally significant. For

[23]The coefficient estimates of the additional controls for marital status, parental status (having children), and province are reported in the corresponding Table O2 of the Online Appendix.

[24]The implications for absolute ESG fund holdings and flows are further amplified by the fact that stock market participation increases with both age and income. Appendix F discusses the observed patterns of stock market participation and ESG investment behavior in our sample of respondents.

[25]The coefficient for the categorical variable "Marital status" is negative (-0.031) and significant at the 5% level. Once environmental literacy is included in columns (2)–(6), the coefficient decreases in magnitude and loses its statistical significance.

[26]Moreover, female respondents are more inclined to invest exclusively in traditional energy companies that have concrete plans to reduce greenhouse gas emissions and address climate-related risks (59% of women vs. 41% of men) and expressed greater interest in investment themes such as water, health, education, and affordable or clean energy, while male respondents showed a stronger preference for "industry, innovation and infrastructure."

risk aversion, we observe an interesting pattern: respondents with low risk aversion, in our sample 38.2% of all respondents, are less willing to pay for better ESG ratings. This result also holds if we replace the stated risk aversion with our parameter estimate for the willingness to pay, $\hat{\alpha}_2/\hat{\alpha}_1$ (the coefficient estimate is -0.019 and also significant at the 1% level).

3.4 Risk preferences

Next, we analyze in Table 4 the determinants of the willingness to pay for less risk, $-\hat{\alpha}_2/\hat{\alpha}_1$. In column (1) education is negatively related to the WTP for risk. This aligns with the findings of Black et al. (2018), whose results (for men who invest in risky assets) suggest that lower risk aversion may be a channel through which education increases stock market participation. Once we include financial literacy in column (2), the effect that respondents closer to retirement age are more risk averse becomes significant at the 5% level. The insignificant coefficient for the age group 40-54 and then positive coefficient for the age group 55-65 is largely in line with Cardak and Martin (2023) who find that risk tolerance increases with age for young through middle-aged households, but decreases thereafter as households approach retirement age.[27]

Regarding financial literacy, Van Rooij et al. (2011) show that individuals with low literacy are substantially less likely to invest in stocks. More broadly, Grinblatt et al. (2011) document that stock market participation increases with IQ, a result that holds independent of gender. What stands out in columns (4) and (5) is that beliefs about and preferences for ESG investments, as well as environmental behavior, do not show a significant relationship with risk aversion, whereas financial literacy remains significantly associated with risk aversion.[28] This asymmetry confirms that environmental and financial literacy capture distinct dimensions of knowledge.

The regression analysis also contributes to the literature on sociodemographic determinants of risk behavior. First, the coefficient on the female indicator is significantly negative.[29] This result is consistent with Barber and Odean (2000), who document that men assume greater financial risk and trade more frequently due to overconfidence. Greater risk aversion among women has also

[27] The evidence in the psychology literature is also somewhat mixed. The review of König (2021) documents that eight out of eleven studies find a negative relationship between age and risk taking in financial decisions.

[28] When environmental instead of financial literacy is included in column (2), its coefficient is smaller (-0.170), but also significant at the 1% level. Financial and environmental literacy are correlated to some extent (see Appendix C).

[29] Based on stated risk preferences, 27.8% of female respondents report high risk aversion (taking below average financial risks or not willing to take any risks), compared with 16.8% of male respondents.

been documented by Eckel and Grossman (2008) and Croson and Gneezy (2009), as well as in the meta-analysis by Charness and Gneezy (2012) and Dohmen et al. (2018).

Second, as in Dohmen et al. (2018) and Bucciol and Miniaci (2011), the willingness to pay for less risk increases with age and is reduced with education. The impact of education is particularly strong when comparing respondents with and without a university diploma or higher degree.

Third, we find that the coefficient on having children is significant at the 5% level across all specifications. Prior studies, such as Sunden and Surette (1998) and Bertocchi et al. (2011), document that married women have a higher propensity to invest in risky assets than single women, while no such marital-status effect is observed for men. However, once the indicator variable for having children is included, marital status loses significance, while the coefficient for having children is negative and significant. When the same regression (5) is run separately by gender, the coefficient for having children is insignificant for men (-0.187), but for women it becomes larger in magnitude (-0.567) and remains significant at the 5% level. Our findings refine the result that married women have a higher propensity to invest in risky assets than single women: it is the presence of children, rather than marital status per se, that appears to drive lower willingness to take risk—presumably because financial decisions are made jointly for the household once children are involved. This interpretation is supported by the regression results in column (5) with interaction terms for female $\times$ having children and male $\times$ having children: the coefficient for female remains positive, while the interaction term for female respondents with children is significantly negative.[30]

In columns (6) and (7), we include the stated risk aversion. The finding of a lower willingness to pay for risk among female respondents with children remains robust. However, once risk aversion is accounted for, the effects of age and education disappear, and the coefficient on financial literacy is reduced by more than half and remains significant only at the 5% level.

3.5 Comparing the determinants of WTP for ESG and less financial risk

To compare the main determinants of the willingness to pay for higher ESG ratings versus lower risk, we re-estimate regression (5) in Table 3 and regression (5) in Table 4, using standardized z-scores for all continuous variables (while keeping categorical and indicator variables unstandardized).

[30]These findings also align with an early study on gender differences in financial risk taking by Jianakoplos and Bernasek (1998), who find that the proportion of risky assets held by women decreases with the number of young dependents living in the same household, remains unaffected for men, and increases for married couples.

The bars in Figure 4 display the coefficient estimates, and the superimposed vertical lines indicate the 95% confidence intervals.

Six key results emerge. First, beliefs about the relationship between ESG ratings and firm value are a primary driver of WTP for higher ESG ratings, but unrelated to the WTP for less risk. Second, ESG preferences play a marginal role in explaining the WTP to pay for investments with higher ESG ratings. Third, environmental literacy and environmental behavior are positively associated with the WTP for higher ESG ratings, whereas financial literacy is negatively associated with the WTP for less risk. Fourth, the WTP for ESG gradually increases with age. While the coefficient for the age group 40-54 is positive and significant, the coefficient estimate doubles for the age group 55-65. In contrast, the WTP for less risk is positive only for the age group closer to retirement, and only marginally significant. Fifth, education is significantly related to risk taking behavior, but does not influence the WTP for better ESG ratings. Sixth, we document a gender effect: female respondents exhibit a significantly higher WTP for ESG, while the risk-taking results reaffirm the established finding that women are more risk averse. Additionally, we also find that this gender effect for risk taking is attenuated among female respondents with children, an effect that we do not observe for ESG considerations. Income does not appear to materially affect the WTP for both, better ESG ratings and less risk.

3.6 Equilibrium calibration

The estimated preference parameters can be used to calibrate the equilibrium model derived in Section 2.5. We consider an economy with five risky assets, one per globe rating ($g \in \{1, 2, 3, 4, 5\}$), equal market weights ($w_{m,j} = 1/5$), and a common 10-year variance of $\sigma_j^2 = (0.20\sqrt{10})^2 = 0.40$. For each respondent, the preference ratios $\alpha_{1,i}/\alpha_{2,i}$ and $\alpha_{3,i}/\alpha_{2,i}$ are computed from the belief-adjusted estimates (column 4 of Table 2), winsorized at the 1st and 99th percentiles, and restricted to respondents who are risk-averse in both specifications ($N = 2{,}731$). We assume equal wealth shares ($\Gamma_i = 1/N$).

Figure 5 reports the equilibrium expected returns under two scenarios. The baseline case sets beliefs to zero ($D_i = I$) and solves equation (10); the beliefs-adjusted case uses the estimated belief distortion matrix and solves equation (8).

Under preferences alone, funds with more globes earn higher returns than funds with fewer globes—the aggregate ESG taste $\bar{\alpha}_{3,2}$ is negative (-0.122), meaning investors on average require compensation for holding assets with better ESG ratings. This is consistent with the contour plots in Figure 3, which show that $\hat{\alpha}_3$ shifts negative for most respondents once beliefs are controlled for. When beliefs are introduced, the return spread compresses. Investors who expect high-globe funds to outperform bid up their prices, reducing required returns on high-globe assets and amplifying required returns on low-globe assets. Figure 5 shows deviations from the 3-globe benchmark. The annualized 5-to-1 globe spread is 4.30% under preferences alone and narrows to 3.10% in the structural model. The belief channel thus accounts for roughly one-quarter of the ESG return spread, with preferences driving the remainder. The equilibrium denominator A_{jj} is exponential in the globe rating: for 5-globe assets, A_{55} is roughly 3.6 times larger than A_{11} for 1-globe assets. This means that optimistic demand compresses returns of high-globe assets much more than it amplifies returns of low-globe assets, producing a concave return gradient across globe ratings in the structural model, compared to the linear gradient under preferences alone.

3.7 Belief dynamics

A natural question is whether the beliefs elicited in our survey would survive market experience, or whether realized returns would discipline them. We investigate this through a belief-updating exercise. Suppose that after observing equilibrium returns $\mu^{(k)}$, investors revise their belief gradient as a weighted average of their prior and the gradient implied by realized returns:

$$\phi_{1,i}^{(k+1)} = \lambda\, \phi_{1,i}^{(k)} + (1-\lambda)\, \hat{\phi}_1^{\text{data}}(\mu^{(k)}), \tag{11}$$

where $\hat{\phi}_1^{\text{data}}$ is the belief slope consistent with the realized return differential between 5-globe and 3-globe assets, and $\lambda \in [0,1]$ governs belief persistence.

Figure 6 displays the dynamics for several values of λ. All paths converge to a rational-expectations fixed point ϕ^* at which the belief slope investors hold is exactly consistent with the return gradient the equilibrium delivers. In our calibration, $\phi^* = 0.232$, compared to the survey mean of $\bar{\phi}_1 = 0.324$. The survey beliefs are directionally correct—ESG assets *do* earn higher returns in equilibrium due to the negative aggregate ESG taste $\bar{\alpha}_{3,2}$—but overshoot by roughly

one-third. Market experience would discipline this excess optimism downward, converging at a rate determined by λ.

The annualized 5-to-1 globe spread at the rational-expectations fixed point is 3.42%, between the preference-only value (4.30%) and the survey-belief value (3.10%). This confirms that the long-run equilibrium would partially self-correct through market experience. Importantly, the fixed point is not at $\phi^* = 0$. Setting beliefs to zero would be inconsistent with the equilibrium the preference-only model delivers.

3.8 Determinants of belief slopes

To explore the main economic channels driving beliefs about expected returns across globe ratings, we regress the estimated slope parameter $\hat{\phi}_{1,i}$ on the answers to the questions we asked about beliefs along with the same set of control variables for individual characteristics used in previous analyses. Table 5 reports regression estimates for several specifications. Column (1) includes only demographic characteristics, while column (2) adds measures of environmental literacy and pro-environmental behavior, and column (3) further incorporates financial literacy. Columns (4)–(8) sequentially include responses to individual belief questions, column (9) adds preferences for ESG, and column (10) combines all belief-related variables and ESG preferences jointly.

Regressing the gradient $\hat{\phi}_{1,i}$ on the set of demographic control variables, the results in column (1) show a positive and statistically significant association (at the 5% level) with holding a university degree (bachelor's or higher) and being female. This result aligns with Nilsson (2008), who documents that female investors and individuals with higher levels of education are significantly more likely to allocate a larger share of their portfolios to socially responsible investments. The coefficients for age and income are not statistically significant.[31] Giglio et al. (2021) note that observable characteristics explain only a small part of the heterogeneity in expectations about the performance of ESG investments. Adding environmental literacy and environmental behavior in column (2) shows a statistically significant positive association: respondents with higher environmental literacy, and to a lesser extent with stronger environmental behavior, tend to hold more

[31] Similarly, the coefficients for the additional control variables marital status and having children are insignificant. The only additional demographic variable that reaches statistical significance at the 5% level is a negative coefficient (relative to Ontario) for respondents residing in Québec.

favorable views toward ESG.[32] This finding is consistent with existing survey evidence indicating that limited knowledge of ESG issues remains a key barrier to ESG investing (Invesco, 2021). One channel through which environmental literacy may influence beliefs is trust. A survey conducted by the Ontario Securities Commission (OSC, 2025) documents a strongly inverse relationship between familiarity with ESG ratings and trust in ESG ratings. Our survey includes a treatment effect in which some respondents received additional information suggesting that Morningstar is a trustworthy rating agency. The estimated coefficient is indeed positive and significant at the 10% level in all specifications. When we include financial literacy in column (3), the coefficient on education becomes insignificant. Appendix G further decomposes financial literacy and analyzes the five individual questions separately. The main finding is that respondents who incorrectly answer the question on the inverse relationship between bond yields and prices are more optimistic about ESG returns (Andersen et al., 2019), whereas correct answers to the other financial literacy questions are associated with higher expected returns on ESG investments.

Next, we examine whether responses to individual questions about the perceived impact of various ESG-related factors are associated with respondents' beliefs about the expected future returns of ESG investments. The belief that stakeholders favor ESG (column 5) and that ESG enhances a firm's reputation (column 6) are positively and significantly associated with higher expected ESG investment returns. In contrast, respondents with a more skeptical stance toward ESG, those who view it as costly (column 7) or as merely a temporary trend (column 8), report significantly lower return expectations for sustainable investments.

In column (9), we include responses to the question of whether respondents prefer ESG investments and consider financial returns to be of secondary importance. The coefficient for this stated ESG preference is positive but insignificant. Thus, preferences for ESG investments are not associated with more favorable views on the future returns of funds with higher globe ratings.

Finally, in column (10), we include all five questions on respondents' views about the impact of ESG on firm value, along with the question on their ESG investment preferences. The key finding is that the views that stakeholders favor ESG and ESG boosts reputation remain significantly positive, and the view that ESG is a short-lived trend remains significantly negative.[33] The coefficient for

[32] Whenever both environmental and financial literacy are included, the coefficient on environmental literacy loses statistical significance, while the other coefficients remain largely unchanged.

[33] When we instead construct a single variable for ESG beliefs, defined as the average of responses to all five questions

preferences for ESG remains insignificant.

4 Conclusion

This paper develops and estimates a structural discrete-choice model of portfolio allocation with random effects that maps observed investment decisions into individual-level preferences for expected returns, financial risk, and sustainability. A central contribution of the framework is that it explicitly separates non-pecuniary preferences for sustainability from beliefs about the future financial performance of ESG investments (*values* versus *value*). Rather than imposing that investors derive positive utility from sustainability characteristics, the model allows willingness to pay for ESG attributes to vary across individuals, both in magnitude and sign. Using a large-scale survey with randomized mutual fund allocation scenarios and elicited expectations about future ESG returns, we recover investors' willingness to pay for sustainability and conventional financial risk while accounting for heterogeneous beliefs and preferences.

We find that investor demand for ESG investments is primarily driven by beliefs about future financial performance rather than by intrinsic sustainability preferences. Although the average willingness to pay for sustainability is modestly positive when estimated using historical return information, it becomes negative once subjective beliefs about future returns are incorporated into the model. Investments in highly rated ESG funds therefore appear to reflect optimistic expectations about future returns rather than a strong willingness to sacrifice financial performance for sustainability objectives.

The analysis further highlights important differences between environmental and financial literacy. Environmental literacy and pro-environmental behavior are both strongly associated with willingness to pay for ESG characteristics, whereas willingness to pay for lower financial risk is unrelated to environmental literacy, environmental behavior, or beliefs about the effect of ESG on firm value. Instead, aversion to financial risk is negatively associated with financial literacy. These patterns suggest that environmental and financial literacy capture distinct dimensions of investor knowledge. We also document meaningful heterogeneity across demographic groups, including a significant gender effect, with women placing greater weight on ESG considerations.

(with the scales of the last two questions inverted), the coefficient is 0.053 and statistically significant at the 1% level.

Taken together, the results underscore the importance of jointly modeling preferences, beliefs, and investor heterogeneity when studying demand for sustainable investments. More broadly, the findings suggest that flows into ESG assets may be sensitive to changes in investors' expectations about future performance. If ESG demand is primarily belief-driven rather than rooted in strong non-pecuniary preferences, shifts in return expectations could have important implications for the stability and long-run growth of sustainable investing.

References

AGARWAL, S., J. C. DRISCOLL, X. GABAIX, AND D. LAIBSON (2009): "The age of reason: Financial decisions over the lifecycle," *Brookings Papers on Economic Activity*, 51–101.

ALBUQUERQUE, R., Y. KOSKINEN, S. YANG, AND C. ZHANG (2020): "Resiliency of environmental and social stocks: An analysis of the exogenous COVID-19 market crash," *Review of Corporate Finance Studies*, 9, 593–621.

ALMENBERG, J. AND A. DREBER (2015): "Gender, stock market participation and financial literacy," *Economics Letters*, 137, 140–142.

AMEL-ZADEH, A. AND G. SERAFEIM (2018): "Why and how investors use ESG information: Evidence from a global survey," *Financial Analysts Journal*, 74, 87–103.

AMMANN, M., C. BAUER, S. FISCHER, AND P. MÜLLER (2019): "The impact of the Morningstar Sustainability Rating on mutual fund flows," *European Financial Management*, 25, 520–553.

ANDERSEN, S., D. CHEBOTAREV, F. Z. FILALI ADIB, AND K. M. NIELSEN (2024): "Rich and responsible: Is ESG a luxury good?" *SSRN Working Paper*.

ANDERSEN, S., T. HANSPAL, AND K. M. NIELSEN (2019): "Once bitten, twice shy: The power of personal experiences in risk taking," *Journal of Financial Economics*, 132, 97–117.

ANDERSON, A., F. BAKER, AND D. T. ROBINSON (2017): "Precautionary savings, retirement planning and misperceptions of financial literacy," *Journal of Financial Economics*, 126, 383–398.

ANDERSON, A. AND D. T. ROBINSON (2022): "Financial literacy in the age of green investment," *Review of Finance*, 26, 1551–1584.

ANDRIES, M., M. BIANCHI, K. K. HUYNH, AND S. POUGET (2025): "Return predictability, expectations, and investment: Experimental evidence," *Review of Financial Studies*, 38, 1687–1729.

ARON-DINE, S., J. BEUTEL, M. PIAZZESI, AND M. SCHNEIDER (2024): "Household climate finance: Theory and survey data on safe and risky green assets," *NBER Working Paper*.

AUZEPY, A., C. E. BANNIER, AND F. GÄRTNER (2024): "Looking beyond ESG preferences: The role of sustainable finance literacy in sustainable investing," *CFS Working Paper Series*.

BAKER, M. P., M. EGAN, AND S. SARKAR (2024): "Demand for ESG," *SSRN Working Paper*.

BAMBERG, S. AND G. MÖSER (2007): "Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour," *Journal of Environmental Psychology*, 27, 14–25.

BARBER, B. M., A. MORSE, AND A. YASUDA (2021): "Impact investing," *Journal of Financial Economics*, 139, 162–185.

BARBER, B. M. AND T. ODEAN (2000): "Trading is hazardous to your wealth: The common stock investment performance of individual investors," *Journal of Finance*, 55, 773–806.

BAUER, R., T. RUOF, AND P. SMEETS (2021): "Get real! Individuals prefer more sustainable investments," *Review of Financial Studies*, 34, 3976–4043.

BEN-DAVID, I., J. LI, A. ROSSI, AND Y. SONG (2022): "What do mutual fund investors really care about?" *Review of Financial Studies*, 35, 1723–1774.

BERTOCCHI, G., M. BRUNETTI, AND C. TORRICELLI (2011): "Marriage and other risky assets: A portfolio approach," *Journal of Banking & Finance*, 35, 2902–2915.

BERTRAND, M. AND S. MULLAINATHAN (2001): "Do people mean what they say? Implications for subjective survey data," *American Economic Review*, 91, 67–72.

BEUTEL, J. AND M. WEBER (2025): "Beliefs and portfolios: Causal evidence," *NBER Working Paper*.

BLACK, S. E., P. J. DEVEREUX, P. LUNDBORG, AND K. MAJLESI (2018): "Learning to take risks? The effect of education on risk-taking in financial markets," *Review of Finance*, 22, 951–975.

BOYER, M. M., P. D'ASTOUS, AND P.-C. MICHAUD (2022): "Tax-preferred savings vehicles: Can financial education improve asset location decisions?" *Review of Economics and Statistics*, 104, 541–556.

BROWN, M., J. GRIGSBY, W. VAN DER KLAAUW, J. WEN, AND B. ZAFAR (2016): "Financial education and the debt behavior of the young," *Review of Financial Studies*, 29, 2490–2522.

BUCCIOL, A. AND R. MINIACI (2011): "Household portfolios and implicit risk preference," *Review of Economics and Statistics*, 93, 1235–1250.

BUCHER-KOENEN, T., R. ALESSIE, A. LUSARDI, AND M. VAN ROOIJ (2025): "Fearless woman: Financial literacy, confidence, and stock market participation," *Management Science*, 71, 7414–7430.

BUCHER-KOENEN, T. AND A. LUSARDI (2011): "Financial literacy and retirement planning in Germany," *Journal of Pension Economics & Finance*, 10, 565–584.

BUCHER-KOENEN, T. AND M. ZIEGELMEYER (2014): "Once burned, twice shy? Financial literacy and wealth losses during the financial crisis," *Review of Finance*, 18, 2215–2246.

CARDAK, B. A. AND V. L. MARTIN (2023): "Household willingness to take financial risk: Stock-market movements and life-cycle effects," *Journal of Banking & Finance*, 149, 106752.

CECCARELLI, M., S. RAMELLI, AND A. F. WAGNER (2024): "Low carbon mutual funds," *Review of Finance*, 28, 45–74.

CHARNESS, G. AND U. GNEEZY (2012): "Strong evidence for gender differences in risk taking," *Journal of Economic Behavior & Organization*, 83, 50–58.

CHEVALIER, J. AND G. ELLISON (1997): "Risk taking by mutual funds as a response to incentives," *Journal of political economy*, 105, 1167–1200.

CHRISTELIS, D., D. GEORGARAKOS, AND M. HALIASSOS (2013): "Differences in portfolios across countries: Economic environment versus household characteristics," *Review of Economics and Statistics*, 95, 220–236.

CROSON, R. AND U. GNEEZY (2009): "Gender differences in preferences," *Journal of Economic Literature*, 47, 448–474.

DEL GUERCIO, D. AND P. A. TKAC (2002): "The determinants of the flow of funds of managed portfolios: Mutual funds vs. pension funds," *Journal of Financial and Quantitative Analysis*, 37, 523–557.

——— (2008): "Star power: The effect of Morningstar ratings on mutual fund flow," *Journal of Financial and Quantitative Analysis*, 907–936.

DOHMEN, T., A. FALK, D. HUFFMAN, AND U. SUNDE (2018): "On the relationship between cognitive ability and risk preference," *Journal of Economic Perspectives*, 32, 115–134.

D'HONDT, C., M. MERLI, AND T. ROGER (2022): "What drives retail portfolio exposure to ESG factors?" *Finance Research Letters*, 46, 102470.

ECKEL, C. C. AND P. J. GROSSMAN (2008): "Differences in the economic decisions of men and women: Experimental evidence," *Handbook of Experimental Economics Results*, 1, 509–519.

EGAN, M., A. MACKAY, AND H. YANG (2026): "What drives variation in investor portfolios? Estimating the roles of beliefs and risk preferences†," *Review of Financial Studies*, forthcoming.

EVANS, R. B. AND Y. SUN (2021): "Models or stars: The role of asset pricing models and heuristics in investor risk adjustment," *Review of Financial Studies*, 34, 67–107.

FILIPPINI, M., M. LEIPPOLD, AND T. WEKHOF (2024): "Sustainable finance literacy and the determinants of sustainable investing," *Journal of Banking & Finance*, 163, 107167.

FINKE, M. S., J. S. HOWE, AND S. J. HUSTON (2017): "Old age and the decline in financial literacy," *Management Science*, 63, 213–230.

FINRA (2009): "Financial capability in the United States," Report, FINRA Investor Education Foundation.

——— (2013): "Financial capability in the United States: Report of findings from the 2012 National Financial Capability Study," Report, FINRA Investor Education Foundation.

FRICK, J., F. G. KAISER, AND M. WILSON (2004): "Environmental knowledge and conservation behavior: Exploring prevalence and structure in a representative sample," *Personality and Individual Differences*, 37, 1597–1613.

GANTCHEV, N., M. GIANNETTI, AND R. LI (2024): "Sustainability or performance? Ratings and fund managers' incentives," *Journal of Financial Economics*, 155, 103831.

GEIGER, S. M., M. GEIGER, AND O. WILHELM (2019): "Environment-specific vs. general knowledge and their role in pro-environmental behavior," *Frontiers in Osychology*, 10, 718.

GEMMO, I., P.-C. MICHAUD, AND O. S. MITCHELL (2023): "Selection into financial education and effects on portfolio choice," *NBER Working Paper*.

GIFFORD, R. AND A. NILSSON (2014): "Personal and social factors that influence pro-environmental concern and behaviour: A review," *International Journal of Psychology*, 49, 141–157.

GIGLIO, S., M. MAGGIORI, J. STROEBEL, Z. TAN, S. UTKUS, AND X. XU (2025): "Four facts about ESG beliefs and investor portfolios," *Journal of Financial Economics*, 124, 103984.

GIGLIO, S., M. MAGGIORI, J. STROEBEL, AND S. UTKUS (2021): "Five facts about beliefs and portfolios," *American Economic Review*, 111, 1481–1522.

GREENWOOD, R. AND A. SHLEIFER (2014): "Expectations of returns and expected returns," *Review of Financial Studies*, 27, 714–746.

GRINBLATT, M., M. KELOHARJU, AND J. LINNAINMAA (2011): "IQ and stock market participation," *Journal of Finance*, 66, 2121–2164.

GUISO, L., M. HALIASSOS, AND T. JAPPELLI (2003): "Household stockholding in Europe: where do we stand and where do we go?" *Economic Policy*, 18, 123–170.

GUTSCHE, G., H. WETZEL, AND A. ZIEGLER (2023): "Determinants of individual sustainable investment behavior-A framed field experiment," *Journal of Economic Behavior & Organization*, 209, 491–508.

GUTSCHE, G. AND A. ZIEGLER (2019): "Which private investors are willing to pay for sustainable investments? Empirical evidence from stated choice experiments," *Journal of Banking and Finance*, 193–214.

HARTZMARK, S. M. AND A. B. SUSSMAN (2019): "Do investors value sustainability? A natural experiment examining ranking and fund flows," *Journal of Finance*, 74, 2789–2837.

HASTINGS, J. S., B. C. MADRIAN, AND W. L. SKIMMYHORN (2013): "Financial literacy, financial education, and economic outcomes," *Annual Review of Economics*, 5, 347–373.

HEEB, F., J. F. KÖLBEL, F. PAETZOLD, AND S. ZEISBERGER (2023): "Do investors care about impact?" *Review of Financial Studies*, 36, 1737–1787.

HINES, J. M., H. R. HUNGERFORD, AND A. N. TOMERA (1987): "Analysis and synthesis of research on responsible environmental behavior: A meta-analysis," *Journal of Environmental Education*, 18, 1–8.

JIANAKOPLOS, N. A. AND A. BERNASEK (1998): "Are women more risk averse?" *Economic Inquiry*, 36, 620–630.

KAISER, F. G. AND U. FUHRER (2003): "Ecological behavior's dependency on different forms of knowledge," *Applied Psychology*, 52, 598–613.

KLAPPER, L., A. LUSARDI, AND P. VAN OUDHEUSDEN (2015): "Financial literacy around the world: Insights from the Standard & Poor's ratings services global financial literacy survey." *Global Financial Literacy Excellence Center*, 11, 2023.

KOLLMUSS, A. AND J. AGYEMAN (2002): "Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior?" *Environmental Education Research*, 8, 239–260.

KÖNIG, P. D. (2021): "Citizen-centered data governance in the smart city: From ethics to accountability," *Sustainable Cities and Society*, 75, 103308.

KRUEGER, P., Z. SAUTNER, AND L. T. STARKS (2020): "The importance of climate risks for institutional investors," *Review of Financial Studies*, 33, 1067–1111.

LARCKER, D. F., A. SERU, AND B. TAYAN (2024): "Is ESG a Luxury Good?" *Rock Center for Corporate Governance at Stanford University*.

LIU, P., M. TENG, AND C. HAN (2020): "How does environmental knowledge translate into pro-environmental behaviors?: The mediating role of environmental attitudes and behavioral intentions," *Science of the Total Environment*, 728, 138126.

LUSARDI, A. AND O. S. MITCHELL (2007): "Baby boomer retirement security: The roles of planning, financial literacy, and housing wealth," *Journal of Monetary Economics*, 54, 205–224.

——— (2008): "Planning and financial literacy: How do women fare?" *American Economic Review*, 98, 413–417.

——— (2011): "Financial literacy around the world: an overview," *Journal of Pension Economics & Finance*, 10, 497–508.

LUSARDI, A., O. S. MITCHELL, AND V. CURTO (2010): "Financial literacy among the young," *Journal of Consumer Affairs*, 44, 358–380.

——— (2014): "Financial literacy and financial sophistication in the older population," *Journal of Pension Economics & Finance*, 13, 347–366.

LUSARDI, A. AND P. TUFANO (2015): "Debt literacy, financial experiences, and overindebtedness," *Journal of Pension Economics & Finance*, 14, 332–368.

M. WIERNIK, B., D. S. ONES, AND S. DILCHERT (2013): "Age and environmental sustainability: A meta-analysis," *Journal of Managerial Psychology*, 28, 826–856.

MITCHELL, O. S. AND A. LUSARDI (2011): *Financial literacy: Implications for retirement security and the financial marketplace*, Oxford University Press.

MORNINGSTAR (2026): "ESG funds: 2025 closes with continued outflows amid persistent headwinds," Report, Morningstar.

NILSSON, J. (2008): "Investment with a conscience: Examining the impact of pro-social attitudes and perceived financial performance on socially responsible investment behavior," *Journal of Business Ethics*, 83, 307–325.

OECD (2023): "How Green is Household Behaviour? Sustainable Choices in a Time of Interlocking Crises," .

OSC (2025): "ESG retail investors in Canada," Report, Ontario Securities Commission Investor Research.

PÁSTOR, L., R. F. STAMBAUGH, AND L. A. TAYLOR (2021): "Sustainable investing in equilibrium," *Journal of Financial Economics*, 142, 550–571.

——— (2022): "Dissecting green returns," *Journal of Financial Economics*, 146, 403–424.

PIAO, X. AND S. MANAGI (2024): "Determinants of pro-environmental behaviour: Effects of socioeconomic, subjective, and psychological well-being factors from 37 countries," *Humanities and Social Sciences Communications*, 11, 1–17.

REUTER, J. AND E. ZITZEWITZ (2021): "How much does size erode mutual fund performance? A regression discontinuity approach," *Review of Finance*, 25, 1395–1432.

RIEDL, A. AND P. SMEETS (2017): "Why do investors hold socially responsible mutual funds?" *Journal of Finance*, 72, 2505–2550.

ROSSI, M., D. SANSONE, A. VAN SOEST, AND C. TORRICELLI (2019): "Household preferences for socially responsible investments," *Journal of Banking & Finance*, 105, 107–120.

SCHWARTZBERG, P., J. STEVENS, K. ACTON, AND S. ELLIOTT (2022): "Canadians' perspectives on climate change & education: 2022," *Learning for a Sustainable Future*, 1–9.

SIALM, C., L. T. STARKS, AND H. ZHANG (2015): "Defined contribution pension plans: Sticky or discerning money?" *Journal of Finance*, 70, 805–838.

SIRRI, E. R. AND P. TUFANO (1998): "Costly search and mutual fund flows," *Journal of Finance*, 53, 1589–1622.

STARKS, L. T. (2023): "Presidential address: Sustainable finance and ESG issues—Value versus values," *Journal of Finance*, 78, 1837–1872.

STATISTICS CANADA (2023): "Individuals file, 2021 Census of population (public use microdata files)," `https://www150.statcan.gc.ca/n1/en/catalogue/98M0001X2021001`, catalogue no. 98M0001X2021001.

SUNDEN, A. E. AND B. J. SURETTE (1998): "Gender differences in the allocation of assets in retirement savings plans," *American Economic Review*, 88, 207–211.

VAN ROOIJ, M., A. LUSARDI, AND R. ALESSIE (2011): "Financial literacy and stock market participation," *Journal of Financial Economics*, 101, 449–472.

Figures

Figure 1: Expected excess returns for different ESG ratings

We elicited the conditional expectations of survey respondents for the future returns of a fund that had earned 50% over the past ten years, given different Morningstar globe ratings. The bars display the annualized median excess return (in %) relative to the historical return. Means and box plots are reported in Figure A2 in the Appendix.

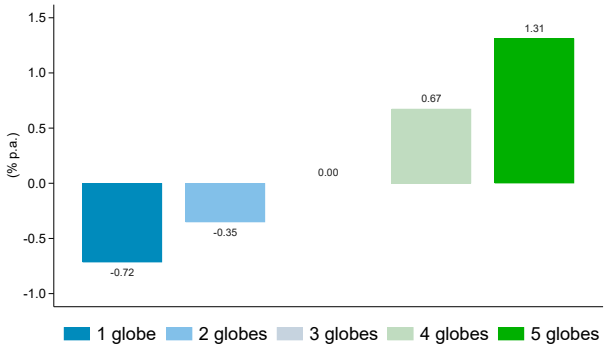


Figure 2: Distribution of the belief parameter ϕ_1

The histogram shows the distribution of parameter estimates for ϕ_1 for the 2,731 respondents in the sample who are risk-averse in both specifications, the baseline model and the beliefs-adjusted model.

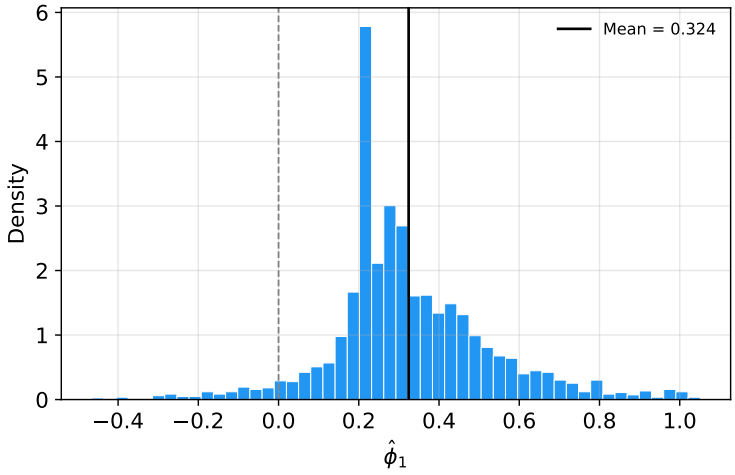
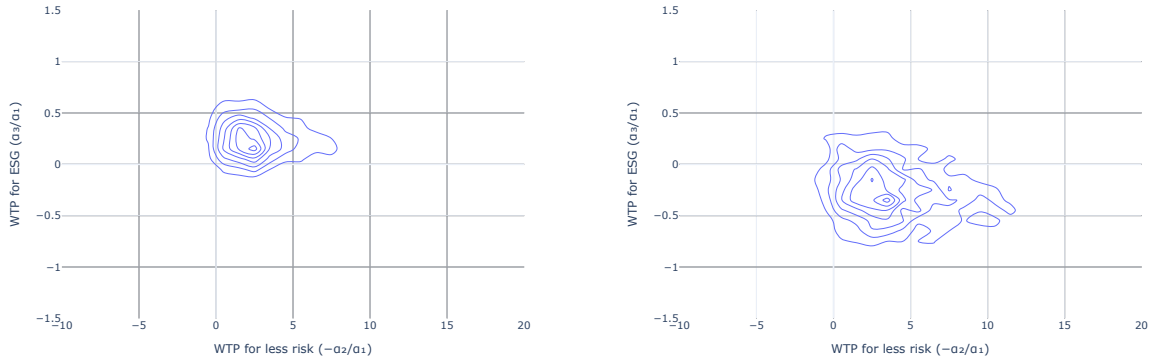


Figure 3: Heterogeneity in the willingness to pay for ESG and the willingness to pay for less risk

The histogram contour plot shows the density and distribution of the willingness to pay for ESG, $\hat{\alpha}_3/\hat{\alpha}_1$, on the vertical axis and the willingness to pay for less risk, $-\hat{\alpha}_2/\hat{\alpha}_1$, on the horizontal axis. Panel (a) plots the estimates for the baseline model with observed and unobserved heterogeneity, but without beliefs, and Panel (b) for the beliefs-adjusted model.



(a) Baseline

(b) Beliefs-adjusted

Figure 4: Heterogeneity in the willingness to pay for higher ESG ratings and less risk

The figure reports standardized z-scores for all continuous explanatory variables, while categorical and indicator variables remain unstandardized, from regressions of the willingness to pay for higher ESG ratings, $\hat{\alpha}_3/\hat{\alpha}_1$, and the willingness to pay for lower financial risk, $-\hat{\alpha}_2/\hat{\alpha}_1$, on the set of explanatory variables used in Tables 3 and 4. Additional controls included in both regressions but not displayed are marital status and province. Vertical lines denote 95% confidence intervals around the coefficient estimates.

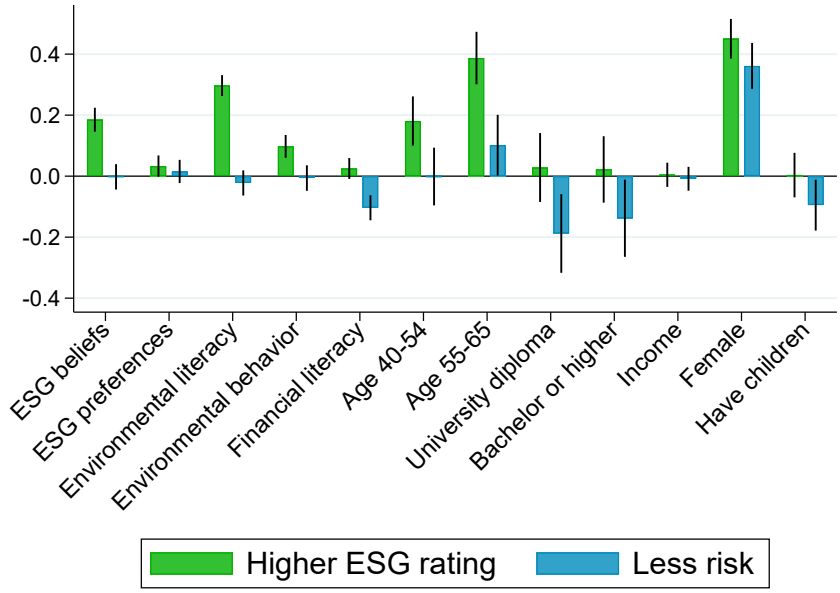


Figure 5: Equilibrium ESG premium by globe rating

This figure reports the deviation of equilibrium expected returns from the 3-globe benchmark (in percentage points, 10-year horizon) for five assets indexed by Morningstar globe rating. The baseline model "Preferences only" sets belief distortions to zero ($D_i = I$) and solves equation (10); The beliefs-adjusted model "Preferences + beliefs" uses the estimated belief distortion matrix D_i and solves equation (8). Preference parameters are from the belief-adjusted specification (column 4 of Table 2), with ratios $\alpha_{1,i}/\alpha_{2,i}$ and $\alpha_{3,i}/\alpha_{2,i}$ winsorized at the 1st and 99th percentiles. The sample is restricted to $N = 2{,}731$ respondents who are risk-averse in both specifications. Market weights are equal ($w_{m,j} = 1/5$) and the common 10-year variance is $\sigma_j^2 = 0.40$.

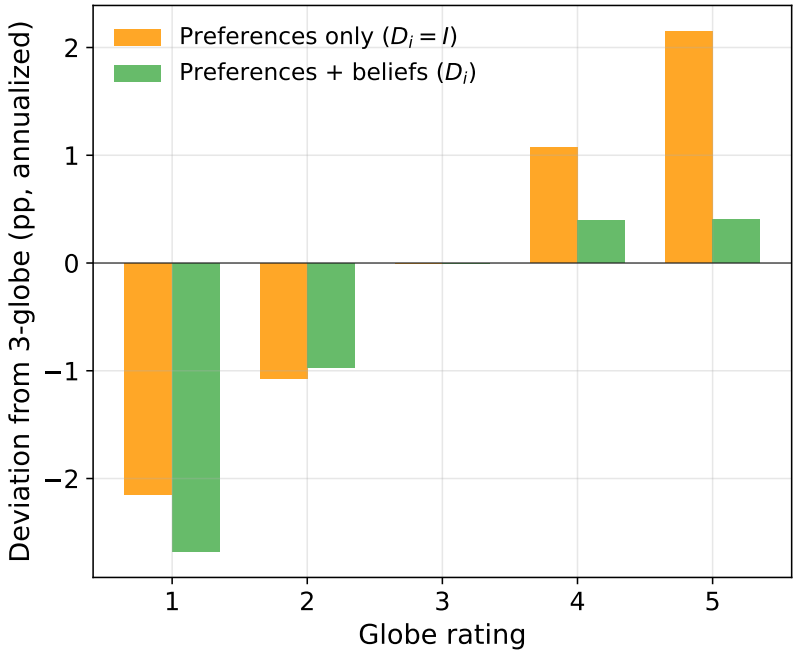
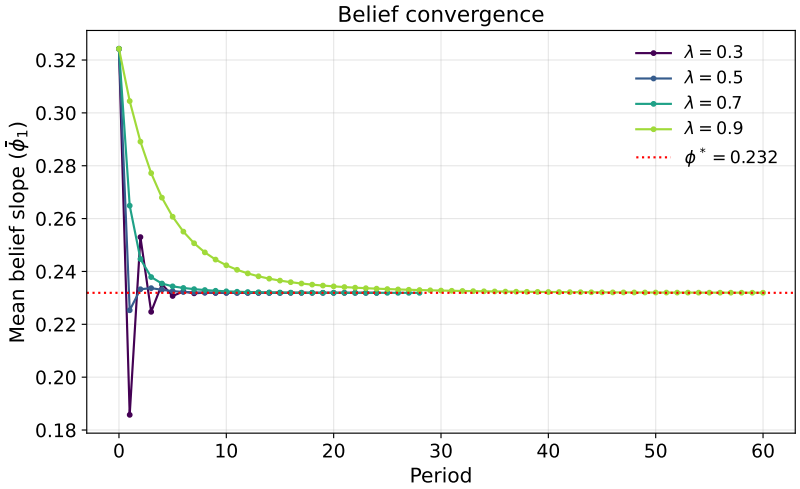


Figure 6: Belief convergence under Bayesian updating

This figure plots the mean belief slope $\bar{\phi}_1$ over successive periods under the updating rule $\phi_{1,i}^{(k+1)} = \lambda\,\phi_{1,i}^{(k)} + (1-\lambda)\,\hat{\phi}_1^{\text{data}}(\mu^{(k)})$, where $\hat{\phi}_1^{\text{data}}$ is the belief gradient implied by the realized equilibrium return differential between 5-globe and 3-globe assets (equation 4). Each line corresponds to a different persistence parameter λ. All paths start from the survey-estimated beliefs ($\bar{\phi}_1 = 0.324$) and converge to the rational-expectations fixed point $\phi^* = 0.232$ (dotted red line), at which subjective beliefs are consistent with equilibrium returns. At the fixed point, the annualized 5-to-1 globe spread is 3.42%, between the preference-only value (4.30%) and the survey-belief value (3.10%).



Tables

Table 1: Descriptive statistics

This table compares descriptive statistics of the Canadian population (age 25-65) with our survey sample. Population data is from the 2021 Canadian Census (Statistics Canada, 2023). The number of respondents to the survey is 3,000. We approximate the mean age of the population aged 25–65 (45.7 years) by multiplying the midpoint of each age group by the fraction that group represents in the total population; for age 65 that falls into the 65–69 age group, which accounts for 6.0% of the total population, we assume a uniform distribution and add $65 \times (6.0\%/5)$. The resulting weighted sum is then divided by the total population share of all included age groups. The education level "college" includes college, CEGEP, trade certificates, other non-university certificates or diplomas, and university certificates below the bachelor's level. For income, respondents could choose whether or not to provide an answer, and in cases of non-response, we used unfolding brackets. We have 2,166 observations for annual income and employ multiple imputation to assign missing values with information from the bracketing, conditional on basic sociodemographic covariates (education, age and age squared, female, and province).

	Population (N = 525,829)		Sample (N = 3,000)	
	Mean	Std. dev.	Mean	Std. dev.
Characteristics				
Age	45.7		49.0	10.5
Female (%)	50.9		41.7	
French survey (%)			18.4	
Has children (%)			51.9	
Education				
High school or less (%)	32.8		10.9	
College (%)	34.3		31.6	
Bachelor degree or more (%)	32.5		57.4	
Province				
Ontario (%)	38.9		42.0	
Quebec (%)	22.8		22.8	
British Columbia (%)	13.8		15.4	
Alberta (%)	11.8		10.8	
Other (%)	12.8		9.0	
Marital Status				
Married or common-law (%)	66.6		62.5	
Widowed, separated or divorced (%)	10.1		10.4	
Never married (%)	23.1		27.1	
Financials				
Annual household income (imputed) ('000 $)			118.7	156.5
Annual household income ('000 $)	124.3	70.6	123.0	177.9

Table 2: Preference estimates with heterogeneity

This table presents preference parameter estimates for two specifications, the baseline and the beliefs-adjusted models. For each specification, the odd columns presents the constant parameter estimates over our sample and the even columns allow for observed and unobserved heterogeneity.

	Baseline		Beliefs-adjusted	
	(1)	(2)	(3)	(4)
Returns $\alpha_{1,i}$				
Constant	2.97	11.80	1.66	6.49
	(0.07)	(0.51)	(0.05)	(0.34)
40 to 54		0.81		0.65
		(0.34)		(0.23)
55 to 65		-1.22		-0.37
		(0.33)		(0.23)
Female		-1.68		-0.81
		(0.25)		(0.18)
Fin. Literacy		0.50		0.21
		(0.10)		(0.07)
Variance $\alpha_{2,i}$				
Constant	-5.82	-59.07	-4.74	-43.66
	(0.09)	(2.41)	(0.08)	(2.06)
40 to 54		0.23		-1.44
		(1.22)		(1.11)
55 to 65		4.95		4.26
		(1.24)		(1.10)
Female		-1.82		-3.78
		(0.98)		(0.92)
Risk Aversion 1		0.69		-0.20
		(1.73)		(1.51)
Risk Aversion 2		15.09		14.17
		(1.31)		(1.22)
Risk Aversion 3		29.99		26.12
		(1.44)		(1.33)
Risk Aversion 4		44.70		33.81
		(1.89)		(1.62)
Fin. Literacy		1.15		0.37
		(0.49)		(0.41)
Sustainability Rating $\alpha_{3,i}$				
Constant	0.75	-1.21	0.26	-2.37
	(0.75)	(0.20)	(0.03)	(0.18)
40 to 54		0.21		0.003
		(0.11)		(0.11)
55 to 65		0.30		0.37
		(0.11)		(0.12)
Female		0.41		0.51
		(0.09)		(0.09)
Green Literacy		1.60		1.09
		(0.17)		(0.16)
Green Behaviors		0.97		0.83
		(0.30)		(0.28)
ESG Preference		0.21		0.08
		(0.05)		(0.05)
Heterogeneity Ω				
$\ln \sigma_{2,2}$		7.10		6.64
		(0.03)		(0.03)
$\rho_{3,2}$		0.15		0.21
		(0.04)		(0.04)
$\ln \sigma_{3,3}$		0.52		0.44
		(0.08)		(0.09)

Table 3: Willingness to pay for better ESG ratings

This table presents linear regressions of the willingness to pay for ESG, $\hat{\alpha}_3/\hat{\alpha}_1$, on preferences for ESG, positive beliefs about ESG, environmental and financial literacy, and environmental behavior. These variables are based on responses to survey questions and their construction is explained in Appendices C and D. The control variables include categorical variables for age (the omitted base category is shown in parenthesis), education, and risk aversion, income measured in $100,000s, and indicator variables for gender and a treatment capturing whether respondents were reassured that Morningstar is a reliable data source. See the caption of Table 1 for further details on the socio-demographic variables. Additional control variables not reported in the table are categorical variables for marital status and province, and an indicator variable for whether respondents have children. Table O2 in the Online Appendix reports the full set of parameter estimates. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively. Robust standard errors are reported in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Preference for ESG				0.045***		0.022*	0.022*
				(0.012)		(0.012)	(0.012)
Positive ESG beliefs					0.101***	0.097***	0.095***
					(0.010)	(0.011)	(0.011)
Environmental literacy		0.082***	0.079***	0.078***	0.070***	0.070***	0.070***
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Environmental behavior		0.072***	0.073***	0.061***	0.043***	0.039***	0.040***
		(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
Financial literacy			0.010**	0.009**	0.007	0.006	0.008*
			(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Risk aversion (average)							
Below average							-0.031***
							(0.012)
Above average							0.010
							(0.014)
Age (25-39)							
40-54	0.052***	0.062***	0.061***	0.059***	0.058***	0.057***	0.055***
	(0.014)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
55-65	0.152***	0.133***	0.130***	0.129***	0.122***	0.122***	0.116***
	(0.015)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Education (high school or less)							
University diploma	0.038*	0.009	0.006	0.007	0.009	0.009	0.013
	(0.020)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Bachelor or higher	0.079***	0.011	0.006	0.007	0.006	0.007	0.013
	(0.019)	(0.017)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Income ('000 $)	0.003	0.001	0.000	0.000	0.001	0.001	0.001
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Female	0.133***	0.156***	0.157***	0.157***	0.142***	0.142***	0.136***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.010)	(0.010)	(0.011)
Treatment	0.006	0.007	0.007	0.006	0.007	0.006	0.007
	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)

Table 4: Willingness to pay for less risk

This table presents linear regressions of the willingness to pay for less risk, $-\hat{\alpha}_2/\hat{\alpha}_1$, on preferences for ESG, positive beliefs about ESG, financial and environmental literacy, and environmental behavior. The control variables include categorical variables for age, education, marital status, and risk aversion, and an indicator variable for gender. The last two lines show interaction terms for female respondents having children, and male respondents having children. The parameters estimates for the indicator variables for provinces are reported in Table O3 in the Online Appendix. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively. Robust standard errors are reported in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Preference for ESG			0.102	0.117	0.117	0.124	0.124
			(0.139)	(0.148)	(0.148)	(0.140)	(0.140)
Positive ESG beliefs			-0.052	-0.014	-0.015	-0.107	-0.108
			(0.124)	(0.130)	(0.130)	(0.122)	(0.122)
Financial literacy		-0.331***	-0.330***	-0.306***	-0.306***	-0.131**	-0.131**
		(0.057)	(0.058)	(0.062)	(0.062)	(0.059)	(0.059)
Environmental literacy				-0.061	-0.061	-0.014	-0.014
				(0.057)	(0.057)	(0.054)	(0.054)
Environmental behavior				-0.027	-0.026	0.091	0.092
				(0.098)	(0.098)	(0.093)	(0.093)
Risk aversion (average)							
Below average						-1.871***	-1.869***
						(0.129)	(0.128)
Above average						1.565***	1.567***
						(0.197)	(0.197)
Age (25-39)							
40-54	-0.037	0.000	0.001	-0.004	-0.006	-0.164	-0.165
	(0.176)	(0.176)	(0.176)	(0.177)	(0.177)	(0.166)	(0.166)
55-65	0.227	0.364**	0.367**	0.370**	0.369**	-0.104	-0.105
	(0.182)	(0.184)	(0.185)	(0.186)	(0.186)	(0.175)	(0.175)
Education (high school or less)							
University diploma	-0.812***	-0.704***	-0.704***	-0.694***	-0.701***	-0.300	-0.307
	(0.241)	(0.241)	(0.241)	(0.241)	(0.241)	(0.231)	(0.231)
Bachelor or higher	-0.799***	-0.531**	-0.529**	-0.508**	-0.521**	-0.023	-0.035
	(0.232)	(0.235)	(0.236)	(0.237)	(0.237)	(0.226)	(0.226)
Income ('000 $)	-0.042	-0.023	-0.023	-0.021	-0.021	0.015	0.015
	(0.057)	(0.048)	(0.047)	(0.047)	(0.047)	(0.028)	(0.028)
Female	1.461***	1.340***	1.343***	1.324***	1.458***	0.863***	0.982***
	(0.138)	(0.139)	(0.140)	(0.141)	(0.202)	(0.134)	(0.188)
Maritial status (married)							
Divorced/separated	-0.314	-0.314	-0.314	-0.315	-0.305	-0.238	-0.229
	(0.226)	(0.226)	(0.226)	(0.226)	(0.226)	(0.211)	(0.211)
Single	0.238	0.187	0.190	0.185	0.187	0.106	0.108
	(0.184)	(0.182)	(0.182)	(0.182)	(0.182)	(0.171)	(0.171)
Have children	-0.340**	-0.342**	-0.345**	-0.350**		-0.331**	
	(0.157)	(0.156)	(0.156)	(0.156)		(0.148)	
Female × children					-0.502**		-0.466**
					(0.240)		(0.228)
Male × children					-0.240		-0.234
					(0.177)		(0.167)

Table 5: Explaining belief slopes ($\hat{\phi}_1$)

This table presents linear regressions of the slope parameter estimates $\hat{\phi}_1$ on respondents beliefs about ESG issues. Positive (negative) values for $\hat{\phi}_1$ indicate higher (lower) expected returns for funds with better ESG ratings (more Morningstar globes). The individual survey questions on beliefs are coded on a scale from 1 ("strongly disagree") to 5 ("strongly agree") and the exact wording of the question is reported in Table A5 of the Appendix. The variables for preferences for ESG, environmental and financial literacy, and environmental behavior are based on responses to survey questions and their construction is explained in Appendices C and D, and respondents characteristics in the caption of Table 1. We also include a treatment capturing whether respondents were reassured that Morningstar is a reliable data source. Table O4 in the Online Appendix reports the full set of parameter estimates. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively. Robust standard errors are reported in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Survey questions on beliefs										
Regulations harm polluters				0.008						0.005
				(0.008)						(0.008)
Stakeholders favor ESG					0.045***					0.026***
					(0.008)					(0.010)
ESG boosts reputation						0.047***				0.032***
						(0.008)				(0.010)
ESG practices are costly							-0.029***			-0.016*
							(0.008)			(0.010)
ESG overvalued trend								-0.037***		-0.025**
								(0.009)		(0.010)
Preference for ESG									0.005	-0.010
									(0.008)	(0.009)
Environmental literacy		0.008***	0.004	0.004	0.001	0.001	0.003	0.003	0.004	-0.000
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Environmental behavior		0.011**	0.011**	0.011**	0.002	0.002	0.010**	0.010**	0.010*	0.000
		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
Financial literacy			0.010***	0.010***	0.009***	0.008**	0.011***	0.011***	0.010***	0.009**
			(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Age (25-39 omitted)										
40-54	-0.000	0.001	0.000	0.001	-0.001	-0.002	-0.001	0.000	0.000	-0.002
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
55-65	0.008	0.006	0.003	0.003	0.001	-0.000	0.001	0.001	0.003	-0.003
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Education										
(high school or less omitted)										
University diploma	0.022*	0.018	0.016	0.016	0.015	0.016	0.016	0.016	0.016	0.015
	(0.013)	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Bachelor or higher	0.029**	0.022*	0.016	0.016	0.017	0.016	0.015	0.015	0.016	0.016
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Income ('000 $)	0.003	0.003	0.002	0.002	0.003	0.003	0.003	0.002	0.002	0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Female	0.015**	0.017**	0.019**	0.019**	0.014*	0.014*	0.016**	0.016**	0.019**	0.010
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Treatment		0.012*	0.012*	0.012*	0.012	0.013*	0.013*	0.012*	0.012*	0.013*
		(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)

Appendix

A Estimation

Estimation. Let $\mathbf{x}_i$ represent all the shifters for a given respondent and $\theta = (\alpha_1', \alpha_2', \alpha_3', \mathbf{vech}\Omega_\nu')'$ be the vector of all parameters to be estimated. Also, let $\mathbf{c}_i = (c_{i1}, \cdots, c_{iT})'$ be the vector of choices. Conditional on ν_i, the probability of observing $c_{it} = c$ is given by

$$p_{it}(\mathbf{x}_i, \nu_i, \theta) = \Pr(c_{it} = c|\mathbf{x}_i, \nu_i, \theta) = \frac{\exp(V_{it,c}(\mathbf{x}_i, \nu_i, \theta))}{\sum_{c'} \exp(V_{it,c'}(\mathbf{x}_i, \nu_i, \theta))}. \tag{12}$$

Given the independence of $\epsilon_{it,c}$ over choice situations, we have

$$p_i(\mathbf{x}_i, \nu_i, \theta) = \Pr(c_i|\mathbf{x}_i, \nu_i, \theta) = \prod_{t=1}^{T} p_{it}(\mathbf{x}_i, \nu_i, \theta) \tag{13}$$

Since ν_i is multivariate normal,

$$p_i(\mathbf{x}_i, \theta) = \int_\nu p_i(\mathbf{x}_i, \nu_i, \theta)\phi_3(\nu_i)d\nu \tag{14}$$

where $\phi_3(\cdot)$ is the trivariate normal density with covariance matrix Ω_ν.

Instead of solving this integral by quadrature, we use an unbiased simulator of this probability. We take S draws, $\{\tilde{\nu}_{i,s}\}_{s=1}^{S}$ from the $N(0, \Omega_\nu)$ distribution and compute

$$\tilde{p}_i(\mathbf{x}_i, \theta) = \frac{1}{S}\sum_s p_i(\mathbf{x}_i, \tilde{\nu}_{i,s}, \theta). \tag{15}$$

$\tilde{p}_i(\cdot)$ is unbiased for fixed S and consistent for $S \to \infty$.[34] The maximum likelihood estimator resulting from replacing $p_i(\cdot)$ with $\tilde{p}_i(\cdot)$ is biased because the simulator is not an unbiased estimator of $\log p_i(\cdot)$ due to Jensen's inequality. However, the bias of the maximum simulated likelihood is known to be small in most applications. We minimize this bias by using a large S. The estimator is given by

$$\hat{\theta}_{MSL} = \arg\max_\theta \frac{1}{N}\sum_i \log \tilde{p}_i(\mathbf{x}_i, \theta) \tag{16}$$

[34] Technically, we draw a set of $N(0,1)$ draws $\tilde{\eta}_{i,s}$ for each respondent, $s = 1, ...S$. We keep those fixed in the estimation. If L_ν is the Choleski decomposition of Ω_ν, then $\tilde{\nu}_{i,s} = L_\nu\tilde{\eta}_{i,s}$ are drawn from $N(0, \Omega_\nu)$.

The covariance matrix of the estimates is estimated using the outer product of the gradient (OPG) formula and numerical gradients.

Recovering preferences. To evaluate the choices that respondents make, marginal rates of substitution are central. A natural way to express preferences is in terms of expected returns, i.e., the additional expected return a respondent requires, or is willing to forgo, in order to increase another attribute. Under the linear utility specification we adopt, marginal rates of substitution are constant. Specifically, by dividing the negative of each shifter, $\alpha_{2,i}$ and $\alpha_{3,i}$, by $\alpha_{1,i}$, we obtain a measure of willingness to pay. Allowing for unobserved heterogeneity in the denominator of this ratio would produce highly unstable distributions. We therefore fix $\Omega_{1,1} = 0$, restricting unobserved heterogeneity to the other two attributes (variance and sustainability ratings), while still allowing for observed heterogeneity in $\alpha_{1,i}$.

For each respondent, we seek estimates of $\alpha_i = (\alpha_{1,i}, \alpha_{2,i}, \alpha_{3,i})$. Given the observables, $(\mathbf{c}_i, \mathbf{x}_i)$, an unbiased estimate of these preference loadings is given by

$$E(\alpha_{a,i}|\mathbf{c}_i, \mathbf{x}_i) = \mathbf{x}_{a,i}\hat{\alpha}_a + E(\nu_{a,i}|\mathbf{c}_i, \mathbf{x}_i) \tag{17}$$

The last term can be estimated using Bayes Rule since,

$$E(\nu_{a,i}|\mathbf{c}_i, \mathbf{x}_i) = \int \nu_{a,i} \frac{p_i(\mathbf{x}_i, \nu_i, \theta)}{p_i(\mathbf{x}_i, \theta)} \phi_3(\nu_i) d\nu \tag{18}$$

One can replace the integral with a simulator,

$$\hat{\nu}_{a,i} = \frac{1}{S} \sum_s \tilde{\nu}_{ai,s} \frac{p_i(\mathbf{x}_i, \tilde{\nu}_{i,s}, \theta)}{\tilde{p}_i(\mathbf{x}_i, \theta)} \tag{19}$$

using the estimated covariance matrix $\hat{\Omega}_\nu$. We obtain a tuple $(\hat{\alpha}_{1,i}, \hat{\alpha}_{2,i}, \hat{\alpha}_{3,i})$ with distribution $F_N(\alpha_i)$ in the sample.

B Equilibrium model derivations

Derivation of Proposition 1. Investor i maximizes

$$V_i = \alpha_{1,i}\,\omega_i' D_i \mu - \frac{\alpha_{2,i}}{2}\,\omega_i' \Sigma \omega_i + \alpha_{3,i}\,\omega_i' g \tag{20}$$

over portfolio weights ω_i, where $D_i = \mathrm{diag}(\exp(\hat{\pi}_{i,g_1}), \ldots, \exp(\hat{\pi}_{i,g_J}))$ is the belief distortion matrix from equation (6). The first-order condition is

$$\alpha_{1,i}\, D_i \mu - \alpha_{2,i}\, \Sigma \omega_i + \alpha_{3,i}\, g = 0, \tag{21}$$

yielding

$$\omega_i = \frac{1}{\alpha_{2,i}}\, \Sigma^{-1}\Big(\alpha_{1,i}\, D_i \mu + \alpha_{3,i}\, g\Big). \tag{22}$$

Market clearing requires $\sum_i \Gamma_i\, \omega_i = w_m$. Substituting and premultiplying by Σ:

$$\underbrace{\left(\sum_i \Gamma_i\, \frac{\alpha_{1,i}}{\alpha_{2,i}}\, D_i\right)}_{\equiv A} \mu \;+\; \underbrace{\left(\sum_i \Gamma_i\, \frac{\alpha_{3,i}}{\alpha_{2,i}}\right)}_{\equiv \bar{\alpha}_{3,2}} g \;=\; \Sigma\, w_m. \tag{23}$$

Since Σ and each D_i are diagonal, A is diagonal with entries

$$A_{jj} = \sum_i \Gamma_i\, \frac{\alpha_{1,i}}{\alpha_{2,i}}\, \exp(\hat{\pi}_{i,g_j}). \tag{24}$$

Solving asset by asset:

$$\mu_j = \frac{\sigma_j^2\, w_{m,j} - \bar{\alpha}_{3,2}\, g_j}{A_{jj}}, \qquad j = 1, \ldots, J. \qquad \square \tag{25}$$

C Environmental literacy, environmental behavior, and financial literacy

We construct indices from survey responses to measure environmental literacy and environmental behavior. We then examine the main determinants of environmental literacy and the factors

influencing environmental behavior. For comparison, we also analyze the results of a financial literacy index based on the Big Five questions introduced by (Lusardi and Mitchell, 2008, 2011) and complemented with two additional questions that have been used in the 2009 and 2012 U.S. National Financial Capability Study (FINRA, 2009, 2013).

Environmental literacy. To assess environmental literacy, we designed a set of five questions that cover key topics related to environmental issues: knowledge of the commitment under the Paris Agreement to limit global warming to 2°C above pre-industrial levels, the greenhouse effect, different types of greenhouse gases, the definition of a company's carbon footprint, and the functioning of the cap-and-trade carbon market.[35] Table A1 reports the full wording of the questions. From the answers to the five multiple choice questions, we then create an index of environmental literacy (on a scale from 0 to 5) by counting the number of correct answers. The responses to the individual questions are heterogeneous, with an average success rate of 52%. The questions also vary in difficulty, with the proportions of correct answers ranging from 21% to 76%.

The heat map in Figure A3(a) illustrates that environmental literacy is related to financial literacy, despite the considerable dispersion. The financial literacy index (on a scale from 0 to 5) corresponds to the number of correct answers to the Big Five financial literacy questions.[36] The strength of association between the two categorical variables, Cramér's V is 0.239, and the corresponding chi-square test rejects independence (highly significant with a p-value = 0.000).

To further examine the determinants of environmental literacy, Table A4 presents the results of the regression analysis. We find that the youngest group, aged 25 to 39, consistently demonstrates a level of environmental literacy comparable to that of respondents in age group 40-54. Only the oldest group in our sample shows a significantly higher level of environmental knowledge than respondents in their late 20s. The coefficient in column (1) for individuals aged 55 to 65 years is significantly higher, whereas the coefficient for the age group 40 to 54 is positive but insignificant compared to the age group 25-39. Notably, this pattern also holds when we use a more granular

[35] Whereas Anderson and Robinson (2022) asked five questions to assess the knowledge regarding the cost efficiency of low-energy light bulbs, the ozone layer, food waste, energy consumption on heating and cooling homes, and the fauna in polar regions, our questions focus on carbon emissions. Filippini et al. (2024) survey the knowledge and skills of the respondents to identify and evaluate financial products based on their reported sustainability characteristics.

[36] The Big Five questions assess understanding of interest compounding, inflation, risk diversification, bond pricing, and mortgages.

age breakdown. We therefore do not observe the inverse U-shaped relationship with age that is well-established for financial literacy (Agarwal et al., 2009, Lusardi et al., 2010, Lusardi and Mitchell, 2011, Lusardi et al., 2014, Lusardi and Tufano, 2015, Finke et al., 2017). Since our sample excludes individuals older than 65 years, we do not capture the potential decline in knowledge among the elderly, often attributed to age-related cognitive decline and the reduced capacity to process complex information, or reduced involvement in financial matters.

The results in column (1) also show the expected positive relationship between environmental literacy and education. The coefficients for both "university diploma" and "bachelor or higher" are statistically significant at the 1% level.[37] The coefficient of household income is also positive, but significant only at the 10% level.[38,39] Furthermore, female respondents have significantly lower levels of environmental literacy.[40] Similar gender differences have been documented for financial literacy (e.g., Lusardi and Mitchell, 2008, Bucher-Koenen and Ziegelmeyer, 2014, Almenberg and Dreber, 2015). Anderson et al. (2017) and Bucher-Koenen et al. (2025) suggest that part of the gender gap in financial literacy may be attributed to women's lower confidence in financial matters, as reflected in their disproportionately frequent selection of the response "I don't know". We observe a similar pattern in our data for environmental literacy questions: female respondents select "I don't know" 54% more often than male respondents. However, this gender difference is smaller than that observed for financial literacy questions (discussed below), where female respondents choose this option more than twice as often. This suggests that women respond with relatively greater confidence to environmental questions compared to financial ones.[41]

The significance of the coefficients for higher environmental literacy among individuals with more education and the negative coefficient for female respondents remains, and the coefficient

[37] The proportion of respondents with four or five correct answers is more than twice as high among those with a Bachelor's degree (30.2%) compared to those with a high school diploma or less (14.6%).

[38] Because income is correlated with age and education, the coefficient from regressing environmental literacy on income alone is somewhat larger (0.080), though it remains only marginally significant at the 10% level. When we include additional controls in columns (2) and (3), the coefficient on income decreases in magnitude and becomes statistically insignificant.

[39] Filippini et al. (2024) observe similar relationships for their measures of sustainable finance literacy with the financial literacy measure of Lusardi and Mitchell (2008), university education, and income. The results align also with the findings for the relation of financial literacy with education (Lusardi and Mitchell, 2011, Lusardi et al., 2014, Klapper et al., 2015, Brown et al., 2016) and income (Bucher-Koenen and Lusardi, 2011).

[40] The share of male respondents answering four or five questions correctly is nearly double that of female respondents (31.7% versus 16.6%).

[41] Bucher-Koenen et al. (2025) further show that when applying a scoring method that penalizes incorrect answers (assigning 1 point for correct, 0 for "I don't know", and –1 for incorrect responses), the gender gap in financial literacy widens, indicating that women's greater reluctance to guess may mask underlying knowledge differences.

estimates are largely unaffected when controlling for a range of socioeconomic and demographic characteristics in column (2), including marital status, parenthood, and province of residence.[42] These results also persist in column (3) when we add environmental behavior and financial literacy as explanatory variables.[43] Environmental literacy is positively related to both environmental behavior and financial literacy. Since financial literacy is positively associated with age and education and also exhibits a gender gap, the coefficients for these variables become smaller once financial literacy is included in the regression.

Environmental behavior. Next, we examine responses to the questions on environmental behavior. We construct again an index (on a scale from 1 to 5) based on responses to five questions about whether individuals recycle, prioritize low-emission mobility options, actively seek to reduce waste, consider ethical or sustainability factors when making purchases, take into account the carbon impact of air travel, or have adjusted their diet due to environmental or social concerns.[44] A usual caveat is that we cannot rule out that respondents' stated attitudes in the survey diverge from actual behavior (Bertrand and Mullainathan, 2001). Figure A4(a) shows the cumulative percentages of respondents answering from "strongly disagree" to "strongly agree" to the five individual questions. Although most of the respondents report recycling and avoiding single use items (with a mean = 3.97), only a minority consider emissions when selecting air fares (mean = 2.89), and even fewer have modified their diet in response to environmental or social concerns (mean = 2.74).

Figure A3(b) illustrates the relationship between environmental behavior and environmental literacy. The link is weaker than between environmental and financial literacy, with Cramer's V = 0.107. This finding supports the knowledge–action gap documented in the psychology literature, in which individuals may possess substantial environmental knowledge but fail to adopt corresponding behaviors (e.g., Kaiser and Fuhrer, 2003, Frick et al., 2004, Geiger et al., 2019, Liu et al., 2020), also shown in literature reviews and meta-studies (e.g., Hines et al., 1987, Kollmuss and Agyeman, 2002, Bamberg and Möser, 2007, M. Wiernik et al., 2013, Gifford and Nilsson, 2014).

[42] Of these additional controls, only one shows a statistically highly significant relationship: respondents from the province of Québec exhibit significantly higher environmental literacy. This is consistent with the findings of the national survey on climate change conducted by Schwartzberg et al. (2022), where Québec respondents registered the highest percentage of correct responses overall, and for each of the ten individual questions.

[43] The only change is the coefficient for the marital status single, which is negative and statistically significant at the 10% level in column (2), but becomes insignificant once financial literacy is included in column (3).

[44] We take the average of the responses on Likert scales ranging from 1 ("strongly disagree") to 5 ("strongly agree").

Columns (4)-(6) of Table A4 summarize the results of the regression analysis to assess which factors are related to environmental behavior. Younger respondents tend to report more positive attitudes and behaviors in response to environmental behavior questions (the coefficients for age groups 40-54 and 55-65 are negative and significant at the level 1% in all specifications). Similarly, holding a bachelor's degree or higher is positively associated with environmental behavior.[45] Women also score significantly higher on environmental behavior.[46] Income is negatively related in column (4), but loses its significance once marital status, an indicator variable for having children, or province are included in columns (5) and (6).[47] In column (6), environmental behavior is positively associated with environmental literacy, but negatively with financial literacy (at the 1% and 5% levels, respectively). Thus, controlling for other socioeconomic factors, younger respondents with higher levels of education but lower levels of financial literacy are more likely to engage in pro-environmental behavior.[48] These results align with the large-scale cross-country analysis of Piao and Managi (2024), who use quantile regression on data from 37 countries to examine how socioeconomic, demographic, subjective, and psychological well-being characteristics influence the pro-environmental behavior of individuals.[49]

Financial literacy. Finally, we report the regression results for the financial literacy score using the established Big Five questions from Mitchell and Lusardi (2011) and the 2009 and 2012 U.S. National Financial Capability Study (FINRA, 2009, 2013). The results in columns (7) and (8) of Table A4 reflect the established findings in the literature showing that financial literacy increases with age, excluding the decline typically observed among individuals older than 65, who are not included in our survey sample. In contrast to environmental literacy, financial literacy is significantly lower among the youngest age group and increases with age. Financial literacy is

[45] The coefficient for "college" is only marginally significant in column (4), but no longer when other controls are included in columns (5) and (6).

[46] The mean score for female respondents is 3.35, compared to 3.18 for non-female respondents, and the difference is statistically significant at the 1% level based on a *t*-test.

[47] The inclusion of each of the three control variables individually renders the coefficient statistically insignificant, although its magnitude remains largely unchanged.

[48] There are also notable provincial effects. The coefficients for Alberta, a province with a resource-dependent economy centered on oil and gas and a predominantly conservative political orientation, and to a lesser extent British Columbia, are significantly negative (at the 1% and 5% levels, respectively).

[49] Large-scale survey evidence from the OECD (2023), covering nine countries, indicates that organic food consumption is inversely related to age but positively associated with household income. In contrast, no clear age-related pattern is observed for recycling behavior.

positively and significantly associated with the level of education and, to a lesser extent, with income, while the coefficient for female respondents is negative and significant at the 1% level. Unlike environmental literacy, we find no significant provincial differences in column (8). Finally, column (9) again shows that financial literacy is positively associated with environmental literacy but negatively (albeit to a lesser extent) with pro-environmental behavior.[50]

D ESG beliefs and ESG preferences

ESG beliefs. Similarly to environmental behavior, we construct an index of ESG beliefs based on five questions that assess whether respondents view ESG as positively or negatively affecting firm value. More specifically, we asked respondents their views on whether future regulatory changes will likely reduce the profits of polluting firms, whether ESG commitments increase firm value by appealing to sustainability-minded stakeholders or by enhancing a firm's reputation; or conversely, whether ESG initiatives are costly and reduce firm value, and whether ESG is merely a short-lived trend and firms with strong ESG ratings are overvalued. Figure A4(b) summarizes the cumulative percentages of respondents who responded from "strongly disagree" to "strongly agree". The two statements that received the least support were those critical of ESG: the view that ESG is a short-lived trend (with a mean = 2.85 on a scale of 1–5) and that ESG is costly and reduces firm value (mean = 3.04). In contrast, the responses to the other three statements were more favorable, indicating that ESG practices are perceived to enhance firm value, with an average score of 3.59.

Based on the five questions, we construct an index capturing the positivity of respondents' beliefs about ESG. The responses are coded from 1 ("strongly disagree") to 5 ("strongly agree"), but we invert the scale for the two negatively framed statements, namely, that ESG is costly and that it is a short-lived trend. The index is then defined as the average of the five scores. Column (1) of Table A5 presents regression results that analyze the respondent characteristics associated with positive ESG beliefs. In column (2) we additionally include environmental literacy and environmental behavior, and in column (3) financial literacy.[51] The findings that stand out are

[50] Financial literacy is also positively associated with respondents' willingness to take financial risks (not reported). This finding aligns with Lusardi and Mitchell (2007) for the U.S. and Van Rooij et al. (2011) for the Netherlands, both of which show that individuals with higher financial literacy are more likely to invest in stocks and other risky assets.

[51] Strictly speaking, it is still a categorical variable bounded between 0-5 with increments of 0.2. However, we treat the variable as a proxy for a continuous variable and use OLS regressions with robust standard errors. The distribution

that older respondents in the age group 55-65 and female respondents have more positive views on the impact of ESG issues on firm value. Furthermore, respondents with a bachelor's degree or higher in column (1) express more positive views. Income does not appear to systematically influence perceptions of the impact of ESG on firm value. Overall, older respondents, women, and those with higher education tend to view ESG issues more positively. Coefficients for additional control variables (marital status, parenthood, and province) are provided in Table O5 of the Online Appendix.[52] When environmental literacy and environmental behavior are added as explanatory variables in column (2), both are positively and significantly associated with more favorable views of the impact of ESG issues on firm value. Once environmental literacy is included, the coefficient on education becomes statistically insignificant. In column (3), financial literacy is also positively associated with ESG beliefs and significant at the 1% level; however, its coefficient is substantially smaller than those of both environmental literacy and environmental behavior.

ESG preferences. To assess the preferences of the respondents for ESG investing, we directly asked if they prioritize ESG considerations over financial returns (on a Likert scale from "strongly disagree" to "strongly agree").[53] Columns (4)–(6) of Table A5 present regression results using this measure as the dependent variable. The results indicate that the younger respondents express significantly stronger preferences for ESG, particularly compared to the middle age group (40–54). In their 2022 survey, Larcker et al. (2024) find that Generation X (43%) and Boomers (59%) are unwilling to sacrifice retirement savings to hold shares in companies with lower emissions. In contrast, the willingness to forgo financial returns is substantially higher among Millennials (78%). In addition, being female is associated, on average, with a significantly stronger preference for ESG investing.[54]

Two key findings emerge in column (5), where environmental literacy and environmental

across all 3,000 respondents resembles a normal distribution centered around a mean of 3.37 (median = 3.40). The results remain qualitatively unchanged when using ordered logistic regressions.

[52]None of the coefficients for the categorical marital status variable or the indicator variable for parenthood are significant. In column (1), the coefficient for Alberta (relative to Ontario) is negative (-0.110) and significant at the 1% level. After environmental behavior is included in columns (2) and (3), the magnitude of this coefficient is reduced by about half but remains significant at the 10% level.

[53]Figure A4(c) summarizes the cumulative percentages of respondents who responded from "strongly disagree" to "strongly agree" with the statement that they prefer mutual funds that invest in companies that have a lower environmental impact and are committed to social justice and ethical business practices because this is in line with their personal values; and because financial returns are of secondary importance to them.

[54]There is also a notable provincial effect: respondents from Alberta report significantly lower ESG preferences.

behavior are added as explanatory variables. First, environmental behavior is strongly related to ESG preferences, whereas environmental literacy is not. Second, once environmental behavior is included, the differences between age groups disappear, the coefficient for bachelor's degree or higher becomes significantly negative, and the gender effect for female respondents loses significance. Adding financial literacy in column (6) does not materially alter the other coefficient estimates. Its own coefficient is significantly negative, indicating that individuals with higher financial literacy express weaker preferences for ESG investing. Taken together, the results suggest that the younger, female respondents who engage more actively in pro-environmental behavior are the most likely to favor ESG investments.

E Willingness to pay for lower-emission flights

To assess the willingness of respondents to pay for ESG-related attributes, we asked how much more they would be willing to pay for a transatlantic flight with a 20% lower carbon footprint. We first examine the extensive margin. About two out of five respondents (41.2%) indicate that they are not willing to pay more for a less polluting flight. This substantial fraction is not particularly surprising, since the OECD (2023) survey finds that only one third of respondents support a tax on airline tickets or kerosene fuel.[55] The willingness to pay (WTP) more for a flight with lower emissions is closely related to the pro-environmental behavior of the respondents. Table A6 reports the responses to individual questions on environmental behavior along with the mean price respondents are willing to pay. Those who "strongly agree" that they consider the carbon impact of air travel are willing to pay a higher ticket price ($1,575.6) compared to those who "strongly disagree" ($1,274.8). Overall, the table shows a gradual increase in the mean ticket price as the agreement with pro-environmental behavior strengthens.

Table A7 shows in columns (1)-(3) the results of Poisson regressions to analyze the extensive margin of WTP for a flight with lower emissions, and in columns (4)-(6) the results from OLS regressions for the intensive margin. In the basic specification in column (1) none of the explanatory variables shows a significant coefficient; thus, age, education, income, or gender do not impact

[55] In contrast, approximately two thirds of the respondents from the OECD (2023) survey favor investing in research to develop cleaner air travel technologies and improving services for alternative modes of transportation.

the willingness to pay a premium for a less polluting flight.[56] When environmental behavior is included in column (2), its coefficient is significantly positive. With the inclusion of environmental behavior, the coefficient for the 55–65 age group becomes significantly positive. This indicates that respondents in this age group, despite reporting fewer pro-environmental attitudes on average, are more willing to pay a premium for a lower-emission flight. One possible explanation is that older individuals may face fewer financial constraints, enabling them to act more consistently with their environmental preferences when making purchasing decisions. In column (3), we include measures of environmental and financial literacy. Both coefficients are negative and statistically significant at the 1% level, but the magnitude of the coefficient for environmental behavior remains considerably larger.

In columns (4)-(6) of Table A7 we test the intensive margin. We find that the youngest respondent group (age 25-39), which is the omitted base category, has a significantly higher WTP than the older respondents. Similarly, respondents with more education (bachelor's degree and higher) and female respondents exhibit a lower WTP. In all three specifications, income is negatively related and marginally significant (at the 10% level), indicating that respondents with higher income are less inclined to pay more for a lower-emission flight ticket.

In sum, the willingness to pay more for a flight with lower emissions (extensive margin) is not associated with sociodemographic variables (apart from a negative coefficient for Alberta residents). Among those willing to pay more (intensive margin), younger, male respondents, and individuals with pro-environmental behaviors are willing to pay a higher price.[57]

F Stock market participation and ESG investments

Panel (a) of Figure A5 compares investments in the stock market and ESG products for different age groups, and Panel (b) for different income brackets. Stock market participation varies between less than 15% for the age group 25-30 to about 25% for the age group 60-65. This aligns with evidence from other OECD countries, where direct stock market participation is typically 10–20%, increasing

[56] Only one additional control variable (reported in Table O6 of the Online Appendix) is statistically significant: the coefficient for respondents from the province of Alberta is negative (-0.200 with a p-value = 0.001).

[57] In all three specifications (4)-(6), the coefficient for British Columbia (relative to Ontario) is positive and significant (at the 1% level).

to 30–50% with indirect holdings (Guiso et al., 2003, Christelis et al., 2013).[58]

The most pronounced pattern is the negative relationship between age and ESG investment in Panel (a). Conditional on stock market participation, the age groups 25-40 invest between 40-35% in ESG investments. This fraction is about half for respondents close to retirement age (age group 60-65). On the other hand, in Panel (b), we observe that the fraction of ESG investments is relatively stable across all income categories, with only a marginal decline with more income. However, stock market participation increases from 30% for the lowest income group to almost 80% for the highest income category >500K. Taken together, although younger respondents have a higher propensity to invest in ESG, older and richer investors participate more in the stock market, and despite their lower propensity to invest in ESG, they still allocate more to ESG investments. For example, take the highest income group: this group has a stock market participation of 73% and a fraction of 0.15 invested in ESG: $0.73 \times 0.15 = 11.0\%$. This is more than the lowest income group with $0.30 \times 0.33 = 9.9\%$. Furthermore, the younger age groups have lower income and thus do not allocate as much in absolute terms to ESG investments, despite their higher propensity.

G Belief slopes and financial literacy

Andersen et al. (2019) argue that misunderstanding of the inverse relationship between bond prices and yields is systematically related to biased and overly optimistic return expectations. Table A8 examines how our estimates of expected return beliefs relate to this specific dimension of financial literacy. Column (1) includes the variable *Positive ESG beliefs*, defined as the sum of respondents' agreement with three positive statements about the impact of ESG on firm value, and the scores from inverted Likert scales for two negative statements. Columns (2)–(6) then include responses to the individual financial literacy questions. Consistent with the findings of Andersen et al. (2019), the coefficient on the question assessing knowledge of the relationship between bond yields and bond prices is negative and statistically significant at the 1% level, whereas the coefficients on the other four financial literacy questions are positive. Thus, respondents with a better understanding of interest and mortgage payments, inflation, diversification, and risk exhibit higher expected

[58] Furthermore, women consistently have 5–15 percentage points lower participation than men, even after controlling for wealth and income (Bucher-Koenen and Lusardi, 2011). Almenberg and Dreber (2015) show that the gender gap vanishes once financial literacy is considered.

return beliefs, while respondents who answer the bond yield–price question incorrectly are more optimistic about future returns. The finding persists when all five financial literacy questions are included simultaneously in column (7).

Appendix Figures

Figure A1: Eliciting beliefs about expected returns of sustainable investments

The figure shows a screenshot of the survey question to elicit the beliefs about the future returns of mutual funds with different Morningstar globe ratings. The survey question was: "Imagine that the historical total return of a mutual fund has been 50% over the past 10 years. What would be your expectations for the total return over the next 10 years of this mutual fund if it had the following ESG ratings? Please use the slider to give us your expectations for the total return over the next 10 years of this mutual fund for each of the following ESG ratings. You can use the mouse and/or your right and left buttons in your keyboard to move the slider."

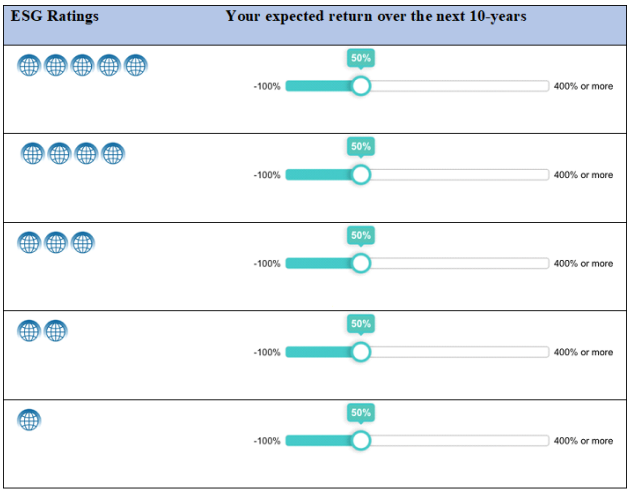
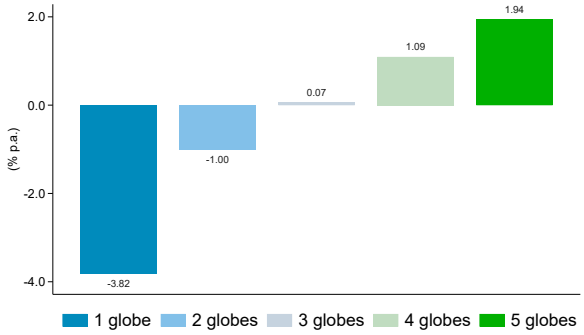


Figure A2: Expected excess returns for different ESG ratings

We elicited the conditional expectations of survey respondents for the future returns of a fund that had earned 50% over the past ten years, given different Morningstar globe ratings. Panel (a) displays the annualized mean excess return (in %) relative to the historical return, while Panel (b) presents the corresponding box plot. The box represents the interquartile range, with the horizontal line indicating the median, and the whiskers delineating the 2.5th and 97.5th percentiles.

(a) Means



(b) Box plot

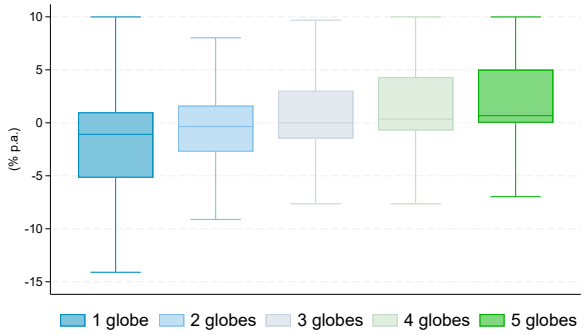
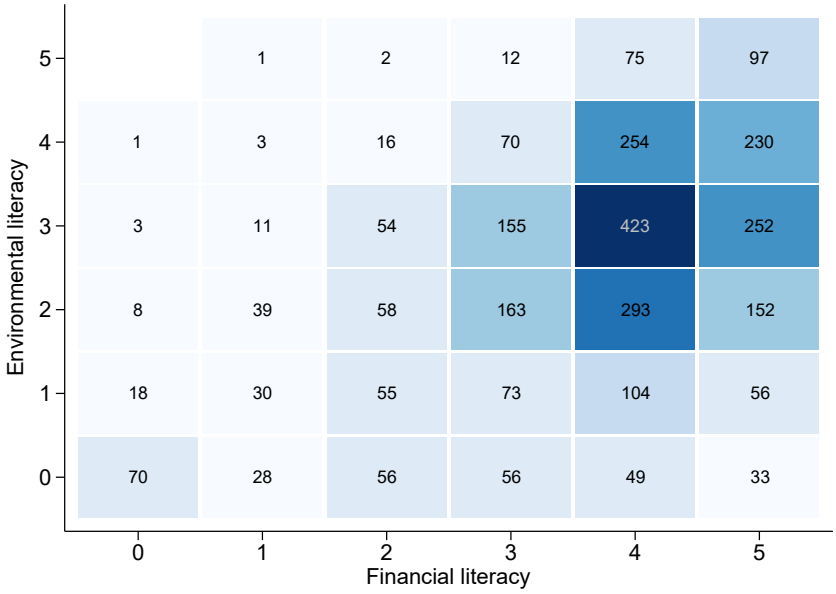


Figure A3: Environmental literacy, environmental behavior, and financial literacy

The figure presents heat maps illustrating the relationship between environmental literacy, environmental behavior, and financial literacy. Darker blue shading indicates a higher concentration of respondents at the intersection of the two variables. The environmental literacy is constructed from the number of correct answers to five multiple choice questions on environmental issues. Financial literacy is based on the number of correct answers to the Big Five questions from Mitchell and Lusardi (2011) and the 2009 and 2012 U.S. National Financial Capability Study (FINRA, 2009, 2013). Environmental behavior is the measured by averaging the responses (from "strongly disagree" = 1 to "strongly agree" = 5) to five questions about personal environmental behavior. In this graph, the environmental behavior index is then transformed into a categorical variable by dividing respondents' scores into quintiles. The wording of the questions on environmental literacy and environmental behavior, and the frequency and percentage of respondents selecting each option, are reported in Tables A1 and A2 of the Appendix and for the Big Five financial literacy questions in Table O1 of the Online Appendix. The total number of survey responses is 3,000.

(a) Environmental literacy and financial literacy



(b) Environmental literacy and environmental behavior

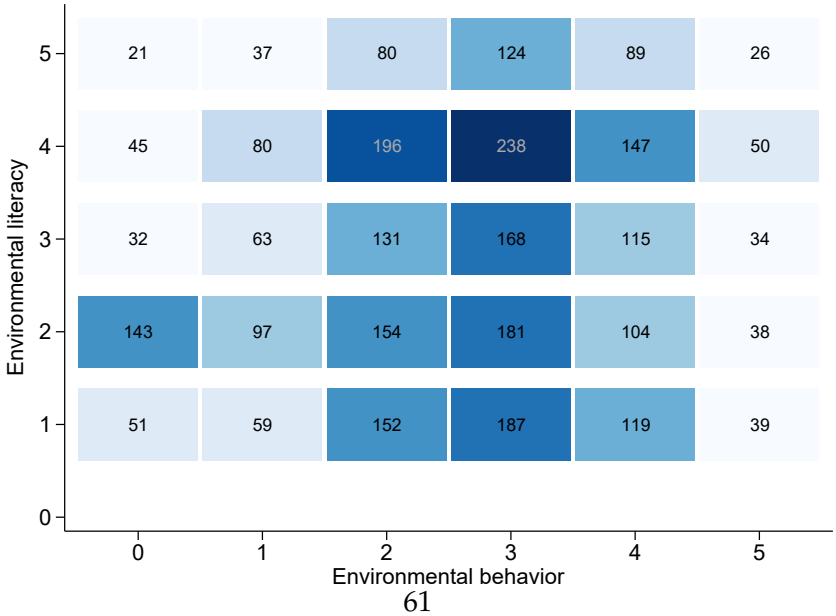
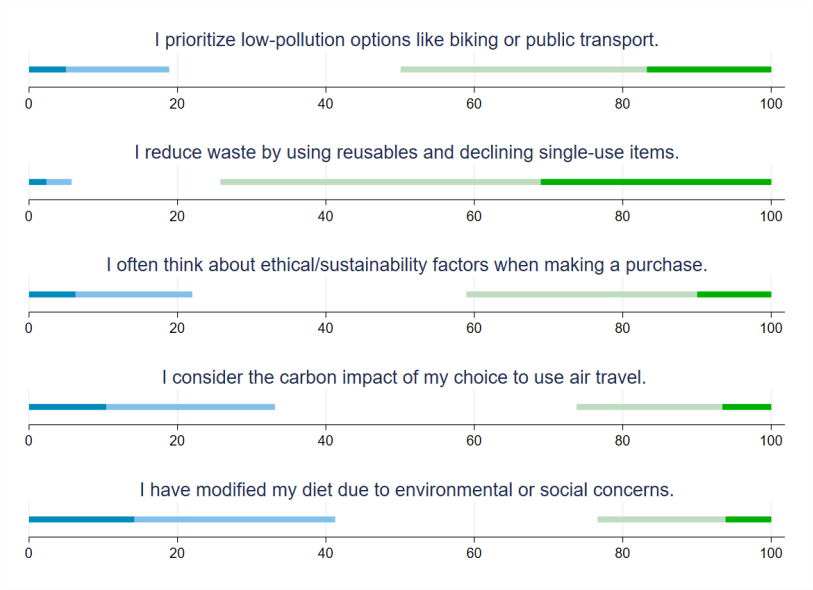


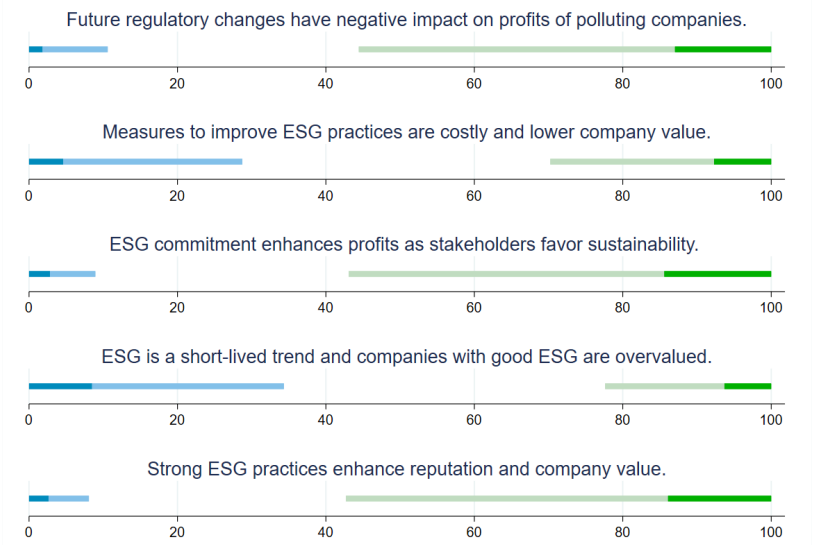
Figure A4: Survey answers on environmental behavior, ESG beliefs, and ESG preferences

The bars illustrate the cumulative distribution of responses to questions on (a) environmental behavior, (b) ESG beliefs, and (c) ESG preferences, along a five-point Likert scale, ranging from "strongly disagree" (blue) to "strongly agree" (green). Intermediate categories (disagree and agree) are shown in lighter shades, and the category "neutral" has no color. The complete wording of the survey questions is reported in Tables A2 and A3 of the Appendix.

(a) Environmental behavior



(b) ESG beliefs

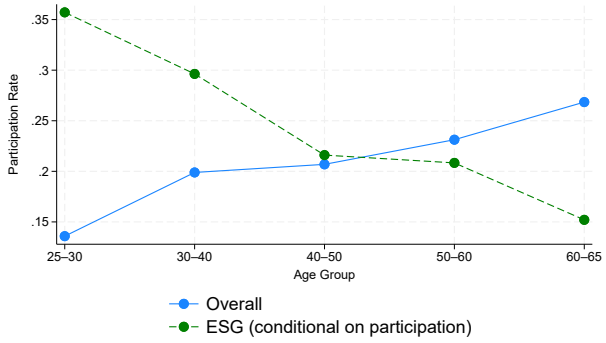


(c) ESG Preferences

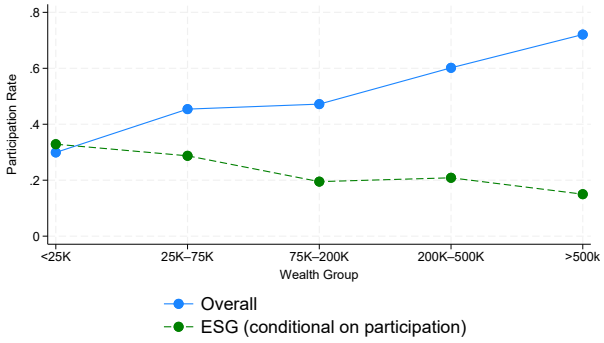
Figure A5: Stock market participation and ESG investments

The figure shows the stock market participation in percentage (solid blue line) and the holdings in ESG investments in percentage, conditional on participating in the stock market (dotted green line), for the 3,000 survey respondents. Panel (a) breaks down by different age groups and Panel (b) by income groups.

(a) By age



(b) By wealth



Appendix Tables

Table A1: Answers to environmental literacy questions

The table reports the exact wording of the five multiple-choice questions on environmental literacy, with correct answers underlined, as well as the frequency and percentage distribution of responses.

	Frequency	Percent
Q1. The long-term temperature goal of the Paris Agreement is to limit the rise in mean global temperature to well below _____ (relative to pre-industrial levels).		
a) 0 °C (1.8 °F)	124	4.13
b) 2 °C (3.6 °F)	1,388	46.27
c) 4 °C (5.4 °F)	206	6.87
d) 6 °C (7.2 °F)	70	2.33
Don't Know	1,184	39.47
Refuse to answer	28	0.93
Q2. Which of the following statements best describes the greenhouse effect?		
a) The use of greenhouses in the agriculture sector leads to an increase in global temperatures.	149	4.97
b) The rotation of the Earth around the sun leads to an increase in global temperatures.	127	4.23
c) Greenhouse gases trap heat in the atmosphere and lead to an increase in global temperatures.	2,291	76.37
d) Natural gas has no effect on global temperatures and is considered green.	83	2.77
Don't Know	316	10.53
Refuse to answer	34	1.13
Q3. What is the carbon footprint of a company?"		
a) The total coal production of a company (tons per year).	112	3.73
b) The total amount of CO2 emitted by a company.	2,269	75.63
c) A company's total CO2 emissions from coal combustion.	209	6.97
d) A company's total direct and indirect coal mining revenues.	64	2.13
Don't Know	317	10.57
Refuse to answer	29	0.97
Q4. Carbon dioxide (CO2) is the main man-made contribution to the greenhouse effect. But there are many other heat-trapping gases. Which of the following is not a greenhouse gas?		
Oxygen	1,114	37.13
Water vapor	728	24.27
Laughing gas (nitrous oxide)	429	14.30
Natural gas (methane)	217	7.23
Don't Know	485	16.17
Refuse to answer	27	0.90
Q5. Which of the following statements about a cap-and-trade system is not true?		
a) The government sets an emissions cap and issues a quantity of emission allowances consistent with that cap.	274	9.13
b) Emitters must hold allowances for every ton of greenhouse gas they emit.	314	10.47
c) Companies may buy and sell allowances, and the market establishes an emissions price.	632	21.07
d) Companies that reduce their emissions receive a tax rebate.	625	20.83
Don't Know	1,126	37.53
Refuse to answer	29	0.97

Table A2: Answers to questions on environmental behavior

This table reports the wording of the five questions on environmental behavior, and presents the frequency and percentage of respondents selecting each option along a five-point Likert scale.

	Frequency	Percent
Q1. When available and accessible, I always prioritize less polluting mobility choices such as walking, riding a bike, electric vehicle, or public transportation over individual fossil-fuel car use.		
Strongly agree	502	16.73
Agree	996	33.20
Neither agree or disagree	936	31.20
Disagree	417	13.90
Strongly disagree	149	4.97
Q2. I am actively trying to reduce my waste (e.g., carrying a reusable shopping bag, declining single use bags/utensils/straws, or taking a reusable to-go container).		
Strongly agree	931	31.03
Agree	1,295	43.17
Neither agree or disagree	602	20.07
Disagree	101	3.37
Strongly disagree	71	2.37
Q3. I often think about ethical or sustainability factors when making a purchase (e.g., labor rights, packaging, local businesses, fair trade, or animal cruelty).		
Strongly agree	299	9.97
Agree	933	31.10
Neither agree or disagree	1,108	36.93
Disagree	472	15.73
Strongly disagree	188	6.27
Q4. I consider the carbon impact of my choice to use air travel.		
Strongly agree	197	6.57
Agree	590	19.67
Neither agree or disagree	1,219	40.63
Disagree	682	22.73
Strongly disagree	312	10.40
Q5. I have modified my diet due to environmental or social concerns.		
Strongly agree	235	7.83
Agree	842	28.07
Neither agree or disagree	1,275	42.50
Disagree	434	14.47
Strongly disagree	214	7.13

Table A3: Answers to questions on ESG beliefs and preferences

This table reports the wording of the five questions on ESG beliefs and preferences, and presents the frequency and percentage of respondents selecting each option along a five-point Likert scale.

	Frequency	Percent
Q1. Future regulatory changes and policy shifts are aimed at reducing emissions. This will have a negative impact on the profits of polluting companies.		
Strongly agree	389	12.97
Agree	1,278	42.60
Neither agree or disagree	1,015	33.83
Disagree	263	8.77
Strongly disagree	55	1.83
Q2. Measures to improve ESG practices are costly and lower company value.		
Strongly agree	231	7.70
Agree	662	22.07
Neither agree or disagree	1,245	41.50
Disagree	724	24.13
Strongly disagree	138	4.60
Q3. Consumers, employees, and investors increasingly favor companies that demonstrate a commitment to sustainability and social responsibility. This will have a positive impact on the profits of firms with strong ESG practices.		
Strongly agree	432	14.40
Agree	1,276	42.53
Neither agree or disagree	1,024	34.13
Disagree	183	6.10
Strongly disagree	85	2.83
Q4. ESG is a short-lived trend and companies with good ESG practices are overvalued.		
Strongly agree	189	6.30
Agree	482	16.07
Neither agree or disagree	1,299	43.30
Disagree	775	25.83
Strongly disagree	255	8.50
Q5. I prefer mutual funds that invest in companies that have a lower environmental impact and are ommitted to social justice and ethical business practices because this is in line with my personal values. Financial returns are of secondary importance to me.		
Strongly agree	235	7.83
Agree	842	28.07
Neither agree or disagree	1,275	42.50
Disagree	434	14.47
Strongly disagree	214	7.13
Q6. Strong ESG practices contribute to a positive reputation that enhances company value.		
Strongly agree	417	13.90
Agree	1,302	43.40
Neither agree or disagree	1,039	34.63
Disagree	163	5.43
Strongly disagree	79	2.63

Table A4: Determinants of environmental literacy and environmental behavior

This table presents linear regressions of environmental literacy, environmental behavior, and financial literacy on a set of variables including categorical variables for age, education, marital status and province (the omitted base category is shown in parenthesis), indicator variables for gender and parenthood (having children or not), and income. The environmental literacy index is constructed from the number of correct answers to five multiple choice questions on environmental issues, environmental behavior by averaging the responses (from "strongly disagree" = 1 to "strongly agree" = 5) to five questions about personal environmental behavior using, and financial literacy based on the number of correct answers to the the Big Five questions from Mitchell and Lusardi (2011) and the 2009 and 2012 U.S. National Financial Capability Study (FINRA, 2009, 2013). Income is self-reported or imputed, and is measured in $100,000s. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively. Robust standard errors are reported in brackets.

	Environmental Literacy			Environmental Behavior			Financial Literacy		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Environmental literacy						0.066***			0.362***
						(0.013)			(0.018)
Environmental behavior			0.151***						-0.065**
			(0.029)						(0.025)
Financial literacy			0.435***			-0.034**			
			(0.018)			(0.013)			
Age (25-39 omitted)									
40-54	0.054	0.026	0.002	-0.156***	-0.169***	-0.167***	0.141**	0.114*	0.094
	(0.063)	(0.063)	(0.059)	(0.038)	(0.040)	(0.039)	(0.062)	(0.063)	(0.059)
55-65	0.333***	0.310***	0.145**	-0.075*	-0.096**	-0.103***	0.449***	0.414***	0.295***
	(0.063)	(0.064)	(0.061)	(0.039)	(0.039)	(0.040)	(0.060)	(0.062)	(0.059)
Education									
(high school or less omitted)									
University diploma	0.324***	0.292***	0.139*	0.085*	0.069	0.061	0.324***	0.326***	0.225***
	(0.081)	(0.082)	(0.073)	(0.051)	(0.049)	(0.049)	(0.087)	(0.087)	(0.078)
Bachelor or higher	0.669***	0.668***	0.290***	0.179***	0.176***	0.159***	0.813***	0.809***	0.578***
	(0.078)	(0.079)	(0.071)	(0.048)	(0.048)	(0.049)	(0.084)	(0.084)	(0.075)
Income ('000 $)	0.056*	0.052	0.030	-0.022**	-0.024	-0.026	0.064*	0.058	0.038
	(0.033)	(0.033)	(0.021)	(0.009)	(0.020)	(0.021)	(0.038)	(0.036)	(0.023)
Female	-0.426***	-0.422***	-0.289***	0.167***	0.171***	0.187***	-0.368***	-0.366***	-0.202***
	(0.048)	(0.048)	(0.044)	(0.029)	(0.029)	(0.029)	(0.044)	(0.045)	(0.043)
Marital status (married omitted)									
Divorced/separated		-0.019	-0.024		0.027	0.029		0.001	0.010
		(0.079)	(0.070)		(0.050)	(0.049)		(0.072)	(0.064)
Single		-0.125*	-0.052		-0.036	-0.033		-0.155**	-0.112**
		(0.066)	(0.059)		(0.041)	(0.041)		(0.063)	(0.057)
Have children		-0.077	-0.078		0.026	0.031		-0.006	0.024
		(0.056)	(0.051)		(0.035)	(0.034)		(0.052)	(0.047)
Province (Ontario omitted)									
British Columbia		0.041	0.040		-0.089**	-0.090**		0.034	0.013
		(0.069)	(0.065)		(0.042)	(0.042)		(0.065)	(0.061)
Alberta		0.141*	0.133*		-0.226***	-0.232***		0.097	0.031
		(0.081)	(0.074)		(0.051)	(0.050)		(0.074)	(0.067)
Quebec		0.340***	0.346***		0.063*	0.039		-0.036	-0.155***
		(0.061)	(0.055)		(0.037)	(0.037)		(0.055)	(0.051)
Other		0.067	0.072		-0.043	-0.047		0.005	-0.022
		(0.087)	(0.079)		(0.052)	(0.052)		(0.079)	(0.073)

Table A5: Determinants of ESG beliefs and ESG preferences

This table presents linear regressions of positive ESG beliefs and ESG preferences on a set of control variables. The variable *Positive ESG beliefs* is constructed as the average response to five questions assessing whether respondents view ESG as positively or negatively affecting firm value. The categorical variable *ESG preferences* is based on responses to a survey question asking whether respondents prioritize ESG considerations over financial returns, coded on a scale from 1 ("strongly disagree") to 5 ("strongly agree"). All regressions additionally control for marital status, parenthood, and province, with the corresponding coefficients reported in Table O5 of the Online Appendix. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively. Robust standard errors are reported in brackets.

	Positive ESG Beliefs			ESG Preferences		
	(1)	(2)	(3)	(4)	(5)	(6)
Environmental literacy		0.101***	0.090***		-0.019	-0.007
		(0.007)	(0.008)		(0.012)	(0.013)
Environmental behavior		0.292***	0.294***		0.659***	0.657***
		(0.015)	(0.015)		(0.022)	(0.022)
Financial literacy			0.029***			-0.033**
			(0.008)			(0.013)
Age (25-39 omitted)						
40-54	-0.012	0.034	0.032	-0.127***	-0.015	-0.012
	(0.030)	(0.026)	(0.026)	(0.048)	(0.040)	(0.040)
55-65	0.092***	0.088***	0.080***	-0.077	-0.008	0.002
	(0.030)	(0.027)	(0.027)	(0.050)	(0.043)	(0.043)
Education						
(high school or less omitted)						
College	0.034	-0.015	-0.022	-0.015	-0.055	-0.048
	(0.037)	(0.032)	(0.032)	(0.062)	(0.056)	(0.056)
Bachelor or higher	0.130***	0.011	-0.006	-0.048	-0.152***	-0.133**
	(0.036)	(0.031)	(0.032)	(0.061)	(0.055)	(0.055)
Income ('000 $)	-0.006	-0.004	-0.005	-0.026	-0.009	-0.008
	(0.006)	(0.006)	(0.005)	(0.025)	(0.012)	(0.012)
Female	0.154***	0.147***	0.153***	0.169***	0.049	0.042
	(0.022)	(0.020)	(0.019)	(0.036)	(0.032)	(0.032)

Table A6: Willingness to pay for a flight with lower emissions and environmental behavior

This table reports the average price respondents are willing to pay for a transatlantic flight with 20% lower CO_2 emissions than a regular flight priced at $1,200, broken down by level of agreement (from "strongly agree" to "strongly disagree") with statements on environmental behavior. The ticket price question specifies that both flight options are otherwise identical in service quality, including travel time and seat space. The complete wording of the survey questions on environmental behavior is reported in Table A2 of the Appendix.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Prioritize eco-friendly mobility when possible	1,450.34	1,446.72	1,483.08	1,313.88	1,261.98
Actively minimizing waste: using reusables	1,398.22	1,401.34	1,560.14	1,446.14	1,286.62
Consider ethics and sustainability when shopping	1,498.71	1,466.10	1,454.68	1,330.25	1,262.95
Factor in the carbon impact of air travel	1,575.63	1,511.92	1,471.99	1,317.53	1,274.84
Adapted diet for environmental, social reasons	1,595.73	1,523.38	1,495.24	1,330.25	1,279.60

Table A7: Willingness to pay for a flight with lower emissions

This table reports Poisson regressions in columns (1)–(3) of respondents' willingness to pay more than the $1,200 baseline ticket for a flight with 20% lower CO_2 emissions (extensive margin). Columns (4)–(6) present linear regressions of the premium respondents are willing to pay for a lower-emission flight, expressed as a percentage of the $1,200 baseline ticket and conditional on being willing to pay more (intensive margin). The number of observations is 3,000 in columns (1)–(3) and 1,758 in columns (4)–(6). All regressions additionally control for marital status, parenthood, and province, with the corresponding coefficients reported in Table O6 of the Online Appendix. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively. Robust standard errors are reported in brackets.

	Extensive Margin			Intensive Margin		
	(1)	(2)	(3)	(4)	(5)	(6)
Environmental literacy			-0.042***			-0.187***
			(0.012)			(0.021)
Environmental behavior		0.364***	0.372***		0.053	0.135***
		(0.020)	(0.020)		(0.037)	(0.035)
Financial literacy			-0.091***			-0.216***
			(0.012)			(0.024)
Age (25-39 omitted)						
40-54	-0.015	0.042	0.056	-0.354***	-0.347***	-0.264***
	(0.043)	(0.041)	(0.040)	(0.080)	(0.080)	(0.074)
55-65	0.040	0.080*	0.135***	-0.605***	-0.600***	-0.356***
	(0.043)	(0.041)	(0.041)	(0.079)	(0.079)	(0.074)
Education						
(high school or less omitted)						
University diploma	0.037	0.012	0.056	-0.109	-0.118	0.022
	(0.053)	(0.052)	(0.052)	(0.101)	(0.101)	(0.093)
Bachelor or higher	0.002	-0.065	0.038	-0.291***	-0.306***	0.024
	(0.053)	(0.051)	(0.051)	(0.096)	(0.097)	(0.089)
Income ('000 $)	-0.026	-0.010	-0.001	-0.035*	-0.034*	-0.017*
	(0.034)	(0.017)	(0.008)	(0.020)	(0.019)	(0.009)
Female	0.046	-0.010	-0.057*	-0.152***	-0.156***	-0.291***
	(0.031)	(0.030)	(0.030)	(0.052)	(0.052)	(0.049)

Table A8: Beliefs about expected returns and financial literacy

This table presents regressions of the slope parameter $\hat{\phi}_1$ on the survey questions on financial literacy. The individual survey questions are indicator variables, with 1 for a correct answer and 0 otherwise (false, "don't know", or "refuse to answer"). The exact wording of the questions and the average percentage of correct answers is reported in Table O1 in the Online Appendix. All regressions additionally control for marital status, parenthood, and province, with the corresponding coefficients reported in Table O7 of the Online Appendix. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively. Robust standard errors are reported in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Survey questions on financial literacy							
Yield and bond price		-0.025***					-0.030***
		(0.008)					(0.008)
Interest payments			0.041***				0.025*
			(0.012)				(0.013)
Inflation				0.048***			0.037***
				(0.011)			(0.012)
Diversification and risk					0.016*		0.006
					(0.009)		(0.009)
Mortgage						0.032***	0.021**
						(0.010)	(0.010)
Positive ESG beliefs	0.052***	0.052***	0.052***	0.050***	0.053***	0.052***	0.047***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Preference for ESG	-0.008	-0.007	-0.008	-0.007	-0.008	-0.008	-0.007
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Environmental literacy	-0.001	0.004	-0.000	-0.001	0.001	0.000	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Environmental behavior	-0.002	-0.003	-0.002	-0.000	-0.003	-0.002	0.000
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Financial literacy	0.009***						
	(0.003)						
Age (25-39 omitted)							
40-54	-0.001	-0.001	-0.001	-0.003	-0.000	-0.001	-0.003
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
55-65	-0.001	0.003	0.000	-0.003	0.001	0.000	-0.003
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Education							
(high school or less omitted)							
University diploma	0.017	0.020	0.017	0.016	0.018	0.018	0.015
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Bachelor or higher	0.016	0.024**	0.016	0.015	0.019	0.018	0.015
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Income ('000 $)	0.003	0.003*	0.003	0.002	0.003	0.003	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Female	0.011	0.006	0.010	0.010	0.010	0.009	0.007
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Treatment	0.012*	0.012*	0.012	0.013*	0.012	0.013*	0.014*
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)

Table A9: Stock market participation and ESG investments

This table reports Poisson regression results, with stock market participation as the dependent variable in columns (1) and (2), and having ESG investments conditional on stock market participation in columns (3) and (4). Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively. Robust standard errors are reported in brackets.

	(1)	(2)	(3)	(4)
Positive ESG beliefs	0.311***	0.290***	0.394***	0.398***
	(0.064)	(0.061)	(0.127)	(0.125)
Preference for ESG	-0.300***	-0.306***	0.607***	0.592***
	(0.076)	(0.074)	(0.161)	(0.159)
Risk aversion (average)				
Below average		0.490***		0.642***
		(0.071)		(0.172)
Above average		-0.955***		-0.386
		(0.157)		(0.286)
Age (25-39)				
40-54	0.062	0.116	-0.208	-0.162
	(0.099)	(0.098)	(0.203)	(0.205)
55-65	0.306***	0.446***	-0.253	-0.108
	(0.097)	(0.097)	(0.207)	(0.210)
Education (high school or less)				
University diploma	0.178	0.022	0.465	0.353
	(0.152)	(0.147)	(0.336)	(0.333)
Bachelor or higher	0.616***	0.386***	0.581*	0.403
	(0.142)	(0.137)	(0.323)	(0.323)
Female	-0.569***	-0.401***	-0.712***	-0.541***
	(0.076)	(0.075)	(0.170)	(0.174)
Maritial status (married)				
Divorced/separated	0.021	-0.007	-0.228	-0.246
	(0.112)	(0.108)	(0.284)	(0.284)
Single	-0.264***	-0.236**	-0.142	-0.108
	(0.099)	(0.096)	(0.220)	(0.221)
Have children	-0.049	-0.065	0.229	0.217
	(0.078)	(0.076)	(0.185)	(0.188)
Province (Ontario)				
British Columbia	0.001	-0.007	-0.148	-0.145
	(0.099)	(0.097)	(0.237)	(0.236)
Alberta	-0.052	-0.058	-0.403	-0.408
	(0.117)	(0.116)	(0.318)	(0.322)
Quebec	0.106	0.202**	0.137	0.218
	(0.082)	(0.080)	(0.180)	(0.180)
Other	-0.359**	-0.265*	0.055	0.145
	(0.150)	(0.145)	(0.266)	(0.266)
Income (100,000s)	0.029**	0.028**	0.022	0.025
	(0.014)	(0.014)	(0.017)	(0.018)
Treatment	-0.006	-0.021	0.132	0.108
	(0.066)	(0.065)	(0.150)	(0.150)

B Online appendix

Table O1: Answers to financial literacy questions

The table reports the exact wording of the five multiple-choice questions on financial literacy questions, with correct answers underlined, as well as the frequency and percentage distribution of responses.

	Frequency	Percent
Q1. Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow during these 5 years?		
More than $102	2,646	88.23
Exactly $102	143	4.77
Less than $102	98	3.27
Don't Know	96	3.20
Refuse to answer	16	0.53
Q2. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, with the money in this account, would you be able to buy...		
More than today	136	4.53
Exactly the same as today	167	5.57
Less than today	2,541	84.70
Don't Know	135	4.50
Refuse to answer	21	0.70
Q3. Do you think the following statement is true or false? "Buying a single company's stock usually provides a safer return than a stock mutual fund."		
True.	159	5.30
False	2,309	76.97
Don't Know	513	17.10
Refuse to answer	19	0.63
Q4. Do you think the following statement is true or false? "A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less."		
True	2,446	81.53
False.	315	10.50
Don't Know	221	7.37
Refuse to answer	18	0.60
Q5. If interest rates fall, what should happen to bond prices? Please select one.		
They will rise	1,131	37.70
They will fall	922	30.73
They will stay the same	288	9.60
Don't Know	639	21.30
Refuse to answer	20	0.67

Table O2: Willingness to pay for better ESG ratings

This table includes the coefficient estimates for the additional control variables for marital status, whether respondents have children, and province for the linear regressions in Table 3 to explain the willingness to pay for ESG, $-\hat{\alpha}_2/\alpha_1$. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively. Robust standard errors are reported in brackets

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Preference for ESG				0.045***		0.022*	0.022*
				(0.012)		(0.012)	(0.012)
Positive ESG beliefs					0.101***	0.097***	0.095***
					(0.010)	(0.011)	(0.011)
Environmental literacy		0.082***	0.079***	0.078***	0.070***	0.070***	0.070***
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Environmental behavior		0.072***	0.073***	0.061***	0.043***	0.039***	0.040***
		(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
Financial literacy			0.010**	0.009**	0.007	0.006	0.008*
			(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Risk aversion (average)							
Below average							-0.031***
							(0.012)
Above average							0.010
							(0.014)
Age (25-39)							
40-54	0.052***	0.062***	0.061***	0.059***	0.058***	0.057***	0.055***
	(0.014)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
55-65	0.152***	0.133***	0.130***	0.129***	0.122***	0.122***	0.116***
	(0.015)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Education (high school or less)							
University diploma	0.038*	0.009	0.006	0.007	0.009	0.009	0.013
	(0.020)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Bachelor or higher	0.079***	0.011	0.006	0.007	0.006	0.007	0.013
	(0.019)	(0.017)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Income ('000 $)	0.003	0.001	0.000	0.000	0.001	0.001	0.001
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Female	0.133***	0.156***	0.157***	0.157***	0.142***	0.142***	0.136***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.010)	(0.010)	(0.011)
Treatment	0.006	0.007	0.007	0.006	0.007	0.006	0.007
	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Maritial status (married)							
Divorced/separated	0.008	0.007	0.007	0.007	0.008	0.008	0.009
	(0.020)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Single	-0.031**	-0.018	-0.017	-0.016	-0.020	-0.020	-0.020
	(0.015)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Have children	-0.001	0.004	0.004	0.002	0.002	0.001	0.001
	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Province (Ontario)							
British Columbia	-0.013	-0.010	-0.011	-0.010	-0.007	-0.007	-0.007
	(0.018)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Alberta	-0.014	-0.010	-0.010	-0.009	-0.004	-0.004	-0.003
	(0.018)	(0.017)	(0.017)	(0.017)	(0.016)	(0.016)	(0.016)
Quebec	0.026*	-0.007	-0.005	-0.006	-0.007	-0.007	-0.010
	(0.014)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Other	-0.010	-0.012	-0.012	-0.014	-0.014	-0.015	-0.018
	(0.021)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)

Table O3: Willingness to pay for less risk

This table includes the coefficient estimates for the additional control variable for province for the linear regressions in Table 4 to explain the willingness to pay for ESG, $\hat{\alpha}_3/\hat{\alpha}_1$. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively. Robust standard errors are reported in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)	
Preference for ESG			0.102	0.117	0.117	0.124	0.124
			(0.139)	(0.148)	(0.148)	(0.140)	(0.140)
Positive ESG beliefs			-0.052	-0.014	-0.015	-0.107	-0.108
			(0.124)	(0.130)	(0.130)	(0.122)	(0.122)
Financial literacy		-0.331***	-0.330***	-0.306***	-0.306***	-0.131**	-0.131**
		(0.057)	(0.058)	(0.062)	(0.062)	(0.059)	(0.059)
Environmental literacy				-0.061	-0.061	-0.014	-0.014
				(0.057)	(0.057)	(0.054)	(0.054)
Environmental behavior				-0.027	-0.026	0.091	0.092
				(0.098)	(0.098)	(0.093)	(0.093)
Age (25-39)							
40-54	-0.037	0.000	0.001	-0.004	-0.006	-0.164	-0.165
	(0.176)	(0.176)	(0.176)	(0.177)	(0.177)	(0.166)	(0.166)
55-65	0.227	0.364**	0.367**	0.370**	0.369**	-0.104	-0.105
	(0.182)	(0.184)	(0.185)	(0.186)	(0.186)	(0.175)	(0.175)
Education (high school or less)							
University diploma	-0.812***	-0.704***	-0.704***	-0.694***	-0.701***	-0.300	-0.307
	(0.241)	(0.241)	(0.241)	(0.241)	(0.241)	(0.231)	(0.231)
Bachelor or higher	-0.799***	-0.531**	-0.529**	-0.508**	-0.521**	-0.023	-0.035
	(0.232)	(0.235)	(0.236)	(0.237)	(0.237)	(0.226)	(0.226)
Female	1.461***	1.340***	1.343***	1.324***	1.458***	0.863***	0.982***
	(0.138)	(0.139)	(0.140)	(0.141)	(0.202)	(0.134)	(0.188)
Maritial status (married)							
Divorced/separated	-0.314	-0.314	-0.314	-0.315	-0.305	-0.238	-0.229
	(0.226)	(0.226)	(0.226)	(0.226)	(0.226)	(0.211)	(0.211)
Single	0.238	0.187	0.190	0.185	0.187	0.106	0.108
	(0.184)	(0.182)	(0.182)	(0.182)	(0.182)	(0.171)	(0.171)
Have children	-0.340**	-0.342**	-0.345**	-0.350**		-0.331**	
	(0.157)	(0.156)	(0.156)	(0.156)		(0.148)	
Income ('000 $)	-0.042	-0.023	-0.023	-0.021	-0.021	0.015	0.015
	(0.057)	(0.048)	(0.047)	(0.047)	(0.047)	(0.028)	(0.028)
Female × children					-0.502**		-0.466**
					(0.240)		(0.228)
Male × children					-0.240		-0.234
					(0.177)		(0.167)
Province (Ontario)							
British Columbia	-0.135	-0.124	-0.124	-0.122	-0.128	-0.103	-0.108
	(0.195)	(0.195)	(0.195)	(0.195)	(0.195)	(0.182)	(0.182)
Alberta	-0.314	-0.281	-0.279	-0.273	-0.266	-0.294	-0.287
	(0.228)	(0.226)	(0.227)	(0.228)	(0.228)	(0.213)	(0.213)
Quebec	0.392**	0.380**	0.380**	0.401**	0.403**	0.096	0.098
	(0.174)	(0.173)	(0.174)	(0.174)	(0.174)	(0.162)	(0.162)
Other	0.060	0.062	0.059	0.061	0.062	-0.251	-0.250
	(0.247)	(0.246)	(0.246)	(0.246)	(0.246)	(0.237)	(0.237)

Table O4: Explaining beliefs about expected returns ($\hat{\phi}_1$)

This table includes the coefficient estimates for the additional control variables marital status, parenthood, and province of the regressions in Table 5. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively. Robust standard errors are reported in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Survey questions on beliefs										
Regulations harm polluters				0.008						0.005
				(0.008)						(0.008)
Stakeholders favor ESG					0.045***					0.026***
					(0.008)					(0.010)
ESG boosts reputation						0.047***				0.032***
						(0.008)				(0.010)
ESG practices are costly							-0.029***			-0.016*
							(0.008)			(0.010)
ESG overvalued trend								-0.037***		-0.025**
								(0.009)		(0.010)
Preference for ESG									0.005	-0.010
									(0.008)	(0.009)
Environmental literacy		0.008***	0.004	0.004	0.001	0.001	0.003	0.003	0.004	-0.000
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Environmental behavior		0.011**	0.011**	0.011**	0.002	0.002	0.010**	0.010**	0.010*	0.000
		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
Financial literacy			0.010***	0.010***	0.009***	0.008**	0.011***	0.011***	0.010***	0.009**
			(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Age (25-39 omitted)										
40-54	-0.000	0.001	0.000	0.001	-0.001	-0.002	-0.001	0.000	0.000	-0.002
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
55-65	0.008	0.006	0.003	0.003	0.001	-0.000	0.001	0.001	0.003	-0.003
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Education										
(high school or less omitted)										
University diploma	0.022*	0.018	0.016	0.016	0.015	0.016	0.016	0.016	0.016	0.015
	(0.013)	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Bachelor or higher	0.029**	0.022*	0.016	0.016	0.017	0.016	0.015	0.015	0.016	0.016
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Income ('000 $)	0.003	0.003	0.002	0.002	0.003	0.003	0.003	0.002	0.002	0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Female	0.015**	0.017**	0.019**	0.019**	0.014*	0.014*	0.016**	0.016**	0.019**	0.010
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Treatment		0.012*	0.012*	0.012*	0.012	0.013*	0.013*	0.012*	0.012*	0.013*
		(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Marital status (married omitted)										
Divorced/separated	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Single	0.005	0.006	0.007	0.007	0.006	0.006	0.006	0.007	0.007	0.005
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Have children	0.002	0.002	0.002	0.001	0.001	0.001	0.002	0.003	0.002	0.002
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Province (Ontario omitted)										
British Columbia	-0.001	-0.000	-0.000	-0.000	-0.000	-0.001	-0.000	-0.001	-0.000	-0.001
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Alberta	0.004	0.006	0.006	0.005	0.007	0.006	0.006	0.007	0.006	0.008
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Quebec	-0.022**	-0.025***	-0.024**	-0.024**	-0.024**	-0.025**	-0.025**	-0.024**	-0.024**	-0.025***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Other	0.004	0.003	0.004	0.004	0.001	0.003	0.004	0.003	0.003	0.002
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)

Table O5: Determinants of ESG beliefs and preferences

This table includes the coefficient estimates for the additional control variables for marital status, parenthood, and province of the regressions in Table A5. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively. Robust standard errors are reported in brackets.

	Positive ESG Beliefs			ESG Preferences		
	(1)	(2)	(3)	(4)	(5)	(6)
Environmental literacy		0.101***	0.090***		-0.019	-0.007
		(0.007)	(0.008)		(0.012)	(0.013)
Environmental behavior		0.292***	0.294***		0.659***	0.657***
		(0.015)	(0.015)		(0.022)	(0.022)
Financial literacy			0.029***			-0.033**
			(0.008)			(0.013)
Age (25-39 omitted)						
40-54	-0.012	0.034	0.032	-0.127***	-0.015	-0.012
	(0.030)	(0.026)	(0.026)	(0.048)	(0.040)	(0.040)
55-65	0.092***	0.088***	0.080***	-0.077	-0.008	0.002
	(0.030)	(0.027)	(0.027)	(0.050)	(0.043)	(0.043)
Education						
(high school or less omitted)						
College	0.034	-0.015	-0.022	-0.015	-0.055	-0.048
	(0.037)	(0.032)	(0.032)	(0.062)	(0.056)	(0.056)
Bachelor or higher	0.130***	0.011	-0.006	-0.048	-0.152***	-0.133**
	(0.036)	(0.031)	(0.032)	(0.061)	(0.055)	(0.055)
Income ('000 $)	-0.006	-0.004	-0.005	-0.026	-0.009	-0.008
	(0.006)	(0.006)	(0.005)	(0.025)	(0.012)	(0.012)
Female	0.154***	0.147***	0.153***	0.169***	0.049	0.042
	(0.022)	(0.020)	(0.019)	(0.036)	(0.032)	(0.032)
Marital status (married omitted)						
Divorced, separated	0.005	-0.002	-0.002	-0.017	-0.036	-0.035
	(0.036)	(0.033)	(0.033)	(0.064)	(0.057)	(0.057)
Single	0.006	0.029	0.032	-0.009	0.012	0.008
	(0.030)	(0.027)	(0.027)	(0.049)	(0.041)	(0.041)
Have children	0.019	0.020	0.019	0.072*	0.054	0.055
	(0.026)	(0.023)	(0.023)	(0.043)	(0.037)	(0.037)
Province (Ontario omitted)						
British Columbia	-0.054*	-0.033	-0.033	-0.109**	-0.050	-0.050
	(0.032)	(0.029)	(0.029)	(0.054)	(0.046)	(0.046)
Alberta	-0.110***	-0.059*	-0.060*	-0.269***	-0.118**	-0.117**
	(0.038)	(0.033)	(0.033)	(0.063)	(0.052)	(0.052)
Quebec	0.060**	0.007	0.012	0.050	0.015	0.010
	(0.028)	(0.025)	(0.025)	(0.047)	(0.041)	(0.041)
Other	0.009	0.015	0.016	0.033	0.063	0.062
	(0.040)	(0.036)	(0.036)	(0.068)	(0.057)	(0.057)

Table O6: Willingness to pay for a flight with lower emissions

This table includes the coefficient estimates for the additional control variables marital status, parenthood, and province of the regressions in Table A7. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively. Robust standard errors are reported in brackets.

	Extensive Margin			Intensive Margin		
	(1)	(2)	(3)	(4)	(5)	(6)
Environmental literacy			-0.042***			-0.187***
			(0.012)			(0.021)
Environmental behavior		0.364***	0.372***		0.053	0.135***
		(0.020)	(0.020)		(0.037)	(0.035)
Financial literacy			-0.091***			-0.216***
			(0.012)			(0.024)
Age (25-39 omitted)						
40-54	-0.015	0.042	0.056	-0.354***	-0.347***	-0.264***
	(0.043)	(0.041)	(0.040)	(0.080)	(0.080)	(0.074)
55-65	0.040	0.080*	0.135***	-0.605***	-0.600***	-0.356***
	(0.043)	(0.041)	(0.041)	(0.079)	(0.079)	(0.074)
Education						
(high school or less omitted)						
University diploma	0.037	0.012	0.056	-0.109	-0.118	0.022
	(0.053)	(0.052)	(0.052)	(0.101)	(0.101)	(0.093)
Bachelor or higher	0.002	-0.065	0.038	-0.291***	-0.306***	0.024
	(0.053)	(0.051)	(0.051)	(0.096)	(0.097)	(0.089)
Income ('000 $)	-0.026	-0.010	-0.001	-0.035*	-0.034*	-0.017*
	(0.034)	(0.017)	(0.008)	(0.020)	(0.019)	(0.009)
Female	0.046	-0.010	-0.057*	-0.152***	-0.156***	-0.291***
	(0.031)	(0.030)	(0.030)	(0.052)	(0.052)	(0.049)
Marital status (married omitted)						
Divorced/separated	0.040	0.029	0.025	-0.117*	-0.119*	-0.116*
	(0.050)	(0.047)	(0.046)	(0.070)	(0.070)	(0.069)
Single	-0.038	-0.025	-0.052	0.025	0.025	-0.051
	(0.045)	(0.041)	(0.040)	(0.075)	(0.075)	(0.066)
Have children	0.035	0.028	0.021	0.102*	0.099*	0.080
	(0.036)	(0.035)	(0.034)	(0.059)	(0.059)	(0.054)
Province (Ontario omitted)						
British Columbia	0.040	0.074*	0.078*	-0.220***	-0.214***	-0.164**
	(0.044)	(0.042)	(0.042)	(0.072)	(0.072)	(0.064)
Alberta	-0.200***	-0.122**	-0.108*	-0.138	-0.132	-0.088
	(0.062)	(0.058)	(0.058)	(0.101)	(0.101)	(0.093)
Quebec	0.005	-0.017	-0.005	-0.120*	-0.124*	-0.056
	(0.040)	(0.037)	(0.037)	(0.067)	(0.067)	(0.063)
Other	0.038	0.056	0.061	-0.115	-0.113	-0.082
	(0.053)	(0.051)	(0.050)	(0.096)	(0.096)	(0.088)

Table O7: Beliefs about expected returns and financial literacy

This table includes the coefficient estimates for the additional control variables marital status, parenthood, and province of the regressions in Table A8. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively. Robust standard errors are reported in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Survey questions on financial literacy							
Yield and bond price		-0.025***					-0.030***
		(0.008)					(0.008)
Interest payments			0.041***				0.025*
			(0.012)				(0.013)
Inflation				0.048***			0.037***
				(0.011)			(0.012)
Diversification and risk					0.016*		0.006
					(0.009)		(0.009)
Mortgage						0.032***	0.021**
						(0.010)	(0.010)
Positive ESG beliefs	0.052***	0.052***	0.052***	0.050***	0.053***	0.052***	0.047***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Preference for ESG	-0.008	-0.007	-0.008	-0.007	-0.008	-0.008	-0.007
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Environmental literacy	-0.001	0.004	-0.000	-0.001	0.001	0.000	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Environmental behavior	-0.002	-0.003	-0.002	-0.000	-0.003	-0.002	0.000
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Financial literacy	0.009***						
	(0.003)						
Age (25-39 omitted)							
40-54	-0.001	-0.001	-0.001	-0.003	-0.000	-0.001	-0.003
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
55-65	-0.001	0.003	0.000	-0.003	0.001	0.000	-0.003
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Education							
(high school or less omitted)							
University diploma	0.017	0.020	0.017	0.016	0.018	0.018	0.015
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Bachelor or higher	0.016	0.024**	0.016	0.015	0.019	0.018	0.015
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Income ('000 $)	0.003	0.003*	0.003	0.002	0.003	0.003	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Female	0.011	0.006	0.010	0.010	0.010	0.009	0.007
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Treatment	0.012*	0.012*	0.012	0.013*	0.012	0.013*	0.014*
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Marital status (married omitted)							
Divorced/separated	-0.001	-0.001	-0.002	-0.001	-0.000	-0.000	-0.001
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Single	0.005	0.004	0.004	0.005	0.005	0.006	0.006
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Have children	0.001	0.002	0.001	0.001	0.001	0.001	0.002
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Province (Ontario omitted)							
British Columbia	0.001	0.002	0.001	0.001	0.001	0.002	0.002
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.010)
Alberta	0.009	0.009	0.009	0.009	0.009	0.008	0.008
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Quebec	-0.024**	-0.029***	-0.024**	-0.026***	-0.027***	-0.025***	-0.028***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Other	0.003	0.001	0.002	0.002	0.003	0.003	-0.000
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)