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DEMAND FOR ESG

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ABSTRACT

We quantify the value investors place on environmental, social, and governance (ESG) objectives over time and space using a revealed preference approach. Our approach measures investors' willingness to pay for ESG-oriented index funds in exchange for their financial and non-financial benefits. We find that the premium that investors assign to index funds with an ESG mandate rose from 3 basis points in 2019 to a peak of 17 basis points in 2020, before turning negative in 2022 and falling to negative 33 basis points in 2023. The boom and bust in willingness to pay is more pronounced among institutional investors (versus retail investors) and equity investors (versus fixed income investors). In contrast to US investors, European investors' willingness to pay for ESG started at a higher level in 2019 and remains strongly positive in 2023. Although differences in fund holdings explain some of the demand for ESG-oriented funds, much of it is driven by the ESG label itself, which may leave investors susceptible to greenwashing. When we apply our framework to the cross-section of 401(k) participant portfolios, we find that investors in climate-conscious areas and low-emission industries exhibit higher demand for ESG. We offer tentative conclusions on how value is split among investors, intermediary profits, and firm costs of capital.

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1 Introduction

In the years leading up to 2022, Larry Fink—the CEO of BlackRock, the world's largest asset manager—intensified his message to corporate executives and boards to focus on a "north star" of purpose (Fink, 2022). The Blackrock Investment Institute claimed in 2020 that we were at the beginning of a "tectonic" capital reallocation as investor interest in the environmental, social, and governance (ESG) objectives of their investments was expected to intensify (Hildebrand et al., 2020).[1] Google Trends shows the search term "ESG" increased more than 10-fold from the end of 2018 through March of 2023. Meanwhile, Bloomberg projected in 2021 that ESG mandates would account for as much as a third of global AUM in 2025. And, since 2019, the number of index funds with an ESG mandate has nearly doubled.

Such strong prognostications and trends often foreshadow reversals. ESG became a politically charged investment strategy with 19 attorneys general challenging Blackrock—and numerous public pension funds loudly terminating their BlackRock mandates—citing the asset management firm's stance on sustainability.[2] By the spring of 2024, Fink had retraced his steps in a chairman's letter that did not mention ESG, focusing instead on the state of retirement finances and the role of capitalism in renewing aging infrastructure. Meanwhile, Google searches for ESG fell by more than 60% from their peak. Against this backdrop, there has been increasing effort in forecasting and tracking investments with an explicit ESG mandate. But, investors' underlying preferences for ESG investing, especially over time and across investors, remain less understood and quantified.

We aim to fill this void with a revealed preference approach that pins down how much investors have been willing to pay for ESG, adding to a growing academic literature that seeks to understand what Starks (2023) describes as the role of investor *values* in their security selection, as distinct from the traditional role of financial *value*. Drawing on the industrial organization literature on demand estimation, which has been used to estimate demand for financial products (e.g., Buchak et al. (2018); Xiao (2020); An et al. (2021); Benetton and Compiani (2024)),

[1] https://www.bloomberg.com/professional/blog/esg-assets-may-hit-53-trillion-by-2025-a-third-of-global-aum

[2] The appropriate role of ESG in employer-sponsored retirement plans has been the subject of considerable debate. The Texas Attorney General, along with 18 other state attorneys general, has argued that the focus, at Blackrock in particular, on the "financial return of state pensions should be undivided. Many of our laws state that a fiduciary must 'discharge [their] duties solely in the interest of the participants and beneficiaries . . . for the exclusive purposes of . . . providing benefits to participants and their beneficiaries; and . . . defraying reasonable expenses of administering the system.' The stated reasons for your actions around promoting net zero, the Paris Agreement, or taking action on climate change indicate rampant violations of this duty, otherwise known as acting with 'mixed motives.' In contrast, the Department of Labor stated in 2022 that over the last 40 years "the Department has consistently recognized that ERISA does not prohibit fiduciaries from making investment decisions that reflect ESG considerations, depending on the circumstances." Governor Ron DeSantis has urged Florida public pension funds to terminate their mandates with Blackrock. For further discussion, see: https://www.dol.gov/agencies/ebsa/about-ebsa/our-activities/resource-center/fact-sheets/final-rule-on-prudence-and-loyalty-in-selecting-plan-investments-and-exercising-shareholder-rights and https://www.bloomberg.com/news/articles/2023-01-26/blackrock-retains-florida-s-billions-as-desantis-wages-esg-fight.

we estimate demand for ESG-oriented index funds. Our demand-based framework allows us to directly measure investors' willingness to pay for ESG. Specifically, by analyzing data on fund flows and investor portfolios, we assess how investors trade off fund characteristics, such as ESG, in their demand for investments. In our time series analysis, we use data on index fund flows to measure willingness to pay for ESG over time, from 2019 through 2023. We then use cross sectional data on 401(k) participant allocations to further explore how and why the willingness to pay for ESG varies by geography and industry within the U.S. in 2019.

Our revealed preference approach provides estimates that help us understand demand for ESG. First, we quantify investors' willingness to pay for ESG over time based on their observed investment decisions. Figure 1 plots the three-month moving average of willingness to pay from 2019 through 2023. We document a clear boom and bust cycle in terms of investors' willingness to pay for ESG as their beliefs and preferences evolved. Second, we provide insight into how and why investors value ESG by decomposing the multidimensional ESG criteria into the attributes of the fund's underlying holdings, such as carbon emissions or gender diversity. Third, we consider investor heterogeneity, identifying which investors—grouped by asset class, by geography across Europe and the U.S., by sophistication into institutional and retail, and by state and industry of employment within the U.S.—value ESG the most and the least.

We start by developing and estimating a model of index fund choice using a standard framework (Berry, 1994; Berry et al., 1995) and data on index funds with and without an ESG mandate.[3] We model an investor's index fund choice as a discrete choice problem where the investor has already decided on an investment category (e.g., Lipper Class, Morningstar Category) and is now selecting a specific index fund within that category. This approach allows us to focus on the index fund choice, abstracting away from the broader portfolio allocation problem. Each investor chooses the fund that maximizes their indirect utility, which depends on whether the fund is an ESG fund, its expense ratio, and other fund characteristics. By understanding how investors trade off these fund characteristics, we can quantify how much they are willing to pay for ESG.

We estimate our initial model using fund-level data from 2019 to 2023. Our time series results suggest that U.S. investor willingness to pay for ESG peaked at 17 basis points per annum in 2020 before turning negative in 2022 and declining to a statistically significant negative 33 basis points in 2023. Given this time variation, we divide our data into two subperiods: one with higher demand for ESG prior to June 2022 and one with lower demand for ESG from June 2022 through the end of 2023.

Next, we aim to understand what drives investor preferences for ESG. Do investors care

[3]This type of framework has been used to estimate demand for other financial products such as mortgages (Aguirregabiria et al., 2019; Robles-Garcia, 2019; Benetton and Compiani, 2024; Allen et al., 2023), deposits (Dick, 2008; Egan, Hortaçsu, and Matvos, 2017; Xiao, 2020; Wang, Whited, Wu, and Xiao, 2022; Egan, Lewellen, and Sunderam, 2022; Whited, Wu, and Xiao, 2023), mutual funds (An et al., 2021), cryptocurrencies (Benetton and Compiani, 2024), and insurance (Koijen and Yogo, 2016, 2022) among others.

primarily about the ESG label, or do they also value the sustainability of the underlying portfolios? To measure how investors value these attributes, we extend our demand framework to allow investor preferences to vary not only with the fund's mandate but also with the sustainability of the underlying portfolio, as measured by Morningstar sustainability ratings and carbon footprint. In the first period of our sample, we find that investors place a higher value on ESG funds with higher Morningstar ratings and a lower carbon footprint. Specifically, investors are willing to pay an additional 5 basis points to invest in a top-rated ESG fund (i.e., 4 or 5 Globe Rating by Morningstar) and 3 basis points for a 50% decrease in carbon footprint. Importantly, the ESG mandate itself remains significant even when controlling for the ESG scores of a fund's holdings. This suggests that the ESG label is important—perhaps the most critical factor—but investors are also discerning about the underlying portfolio characteristics. The importance of the label also suggests that investors may be susceptible to what Kaustia and Yu (2021) identify as greenwashing behavior by funds. These findings are consistent with the novel evidence in Hartzmark and Sussman (2019), which shows through a natural experiment that investors value funds with high sustainability ratings from Morningstar and that the label's salience is an important factor. In the second half of our sample, as sentiment shifts regarding ESG, we find that investors develop a distaste for the ESG label and become ambivalent about the sustainability of the underlying portfolio.

We also quantify the attributes of ESG that investors value using fund grades from Invest Your Values, which evaluates fund portfolio holdings along six dimensions, by including them in our demand specifications. We find that in the early part of our sample, investors are willing to pay the most for portfolios that receive favorable ratings on fossil fuels, civilian and military firearms, and gender equality. Once again, the ESG label remains significant in a multivariate regression. In the later part of our sample, the willingness to pay for favorable ratings on fossil fuels flips sign, while the willingness to pay for favorable ratings on civilian and military firearms remains positive. These results suggest that the decline in demand for ESG we observe is driven by changing beliefs and preferences regarding climate change and fossil fuels.

In our time series analysis, we assume that investors have homogeneous beliefs and preferences for ESG. We extend our analysis to show how investor beliefs and preferences for ESG vary across different groupings of investors.

For example, in the early part of our sample, both institutional and retail investors placed a premium on ESG funds, but institutional investors placed a roughly 50% (6 basis points) higher premium on ESG funds than retail investors. However, the ESG backlash is also more pronounced among institutional investors. We also examine how willingness to pay for ESG differs between US and European investors. We find that European investors' willingness to pay for ESG in the early part of our sample is roughly 50-75% (6-9 basis points) higher than that of US investors, and the willingness to pay for ESG remains strong among European investors even in the last year of our sample. Our findings suggest that European institutional investors

may be particularly susceptible to greenwashing, as they are willing to pay a 30-basis-point premium for a fund with an ESG label, even when accounting for the sustainability and carbon footprint of the fund's portfolio. We also include estimates that allow preferences for ESG to vary arbitrarily across investors, following Berry et al. (1995).

Next, we use granular data from 401(k) plans to further understand the heterogeneity in investors' preferences for ESG in the early part of our sample where demand for ESG is positive. Starting with geographic variation, we examine how the availability of ESG-oriented funds in employer-sponsored 401(k) plans varies across counties in the US. Using data from BrightScope Beacon and the Department of Labor, we observe the investment menus for 55,000 401(k) plans as of 2019, accounting for roughly 87% of 401(k) assets. The availability of ESG-related funds is correlated with households' attitudes towards climate change. At the county level, a 10 percentage point increase in the share of the population that believes carbon emissions should be regulated is associated with a 4 percentage point increase in the availability of ESG-related funds.

We then extend our demand model to the context of 401(k) portfolio choice following Egan et al. (2021) to help interpret these findings in terms of investors' willingness to pay for ESG. This approach allows investor preferences for ESG to vary arbitrarily across investors. Our results show how investors' preferences for ESG vary geographically across the US. Investors who live in counties that report they are worried about climate change are willing to pay 37 basis points for ESG. We also find that investors in Democratic counties are willing to pay a 20 basis point higher premium for ESG relative to investors in Republican counties.

Turning to industry variation, we examine how the prevalence of ESG-related funds varies across industries. Employees working in the education and information services sectors are 33% more likely to have at least one ESG investment option in their 401(k) plan than employees working in the construction sector. We also estimate the average investor working in the education and information services sectors is willing to pay an additional 23 to 32 basis points for ESG, while the average investor working in the food or transportation sectors places no value on ESG.

Finally and more speculatively, we consider whether investor interest in ESG translates to a lower cost of capital for ESG firms, or a higher return for ESG investors. Unfortunately, we have a short time series and hence limited power to test this hypothesis. Our point estimates, which are not statistically different from zero, suggest that as investors implicitly place a higher value on ESG, returns on ESG funds fall.

The paper proceeds as follows: In Section 2, we describe the data used in our analysis. In Section 3, we develop and estimate our index fund demand model and report our time series estimates of an investor's willingness to pay for ESG. In Section 4, we examine the portfolios of ESG and non-ESG funds to understand what investors are paying for in finer detail. In Section 5, we explore how interest in ESG varies across different groups of investors. In Section 6,

we investigate the geographic and industry drivers of investor interest in ESG funds in 401(k) plans. In Section 7, we discuss the implications for firms. Section 8 concludes the paper.

Related Literature

The focus on environmental, social, and governance objectives is the latest in a long line of efforts by academics and practitioners to highlight an expansive set of investor goals that go beyond pure financial value maximization. Prior incarnations include socially responsible investing and corporate social responsibilities. In her presidential address to the American Finance Association, Starks (2023) characterizes sustainable finance by its focus on *values* versus *value*. In this characterization, values investors are motivated by both returns and non-pecuniary preferences, while value investors' decisions aim to earn returns and manage risk.

A core strand of the empirical literature on ESG and its precursors focuses on its price or performance effects. In one prominent example, Hong and Kacperczyk (2009) and Blitz and Fabozzi (2017) examine the returns of so-called "sin stocks" examining whether stocks that are avoided by investors for non-financial, societal reasons have lower average returns. The former concludes that sin stocks are shunned and therefore deliver higher returns, while the latter concludes that this link is incidental. A broader range of estimates of the influence of ESG on returns (Friede et al., 2015; Bolton and Kacperczyk, 2021; Pedersen et al., 2021; Van der Beck, 2021; Pástor et al., 2022; Zerbib, 2022) and firm costs of capital (Chava, 2014; Berk and van Binsbergen, 2021) have also been mixed, with varying measures of ESG, investor composition, and tastes for ESG among the equities studied (see Gillan et al. 2021 for a summary of the literature). For example, Pástor et al. (2021) argue that the high returns of green assets over the prior decade were largely from unanticipated increases in environmental concerns rather than high expected returns. The authors find that returns on green stocks were highly correlated with mentions of risk and pessimism in newspaper coverage of climate change. Van der Beck 2021 argues that much of the high performance of ESG funds from 2017 through 2021 can be attributed to price impact from investor flows. Researchers have also examined the promised yields of corporate and municipal bonds. Baker et al. (2022) provide an overview of research on green bonds, which has found an inconsistent link between environmental scores and bond price, ranging from a small, positive effect of a green bond designation on the price of corporate and municipal bonds to a small negative one. Barber et al. (2021) look not at public markets for equity or debt but at venture capital impact funds, finding lower average returns. The boundaries of ESG are broad and include social objectives like gender and other forms of employee diversity (see Kim and Starks (2016) for example). Our approach is different and complementary: We focus not on the price effects of ESG but on investor preferences for ESG as revealed by their purchases of index funds.

A second strand focuses on the direct measurement of investor interest in ESG investing, not its indirect effect on price or performance. In lab experiments, Humphrey et al. (2021) find

that social preferences, particularly those concerning negative externalities, drive responsible investing behavior. In surveys, Riedl and Smeets (2017) find that responsible investors expect to learn lower returns and pay higher management fees. Similarly, in an experimental setting, Heeb et al. (2022) find that investors are willing to pay an additional 45 basis points for an equity fund that lowers carbon dioxide emissions. Giglio et al. (2023) find larger magnitudes. Using data from a GMSU-Vanguard survey, the authors find that the average investor expects a "diversified ESG portfolio" to underperform the market by 1.4% per annum over the next ten years. Notably, this includes investors with no ESG holdings. Those with ESG holdings expect a positive relative return on average. In a natural experiment, Hartzmark and Sussman (2019) establish a causal link between ESG labels and mutual fund flows. Not surprisingly, investor interest in ESG in turn affects fund managers' allocation decisions (Alok et al., 2020; Li et al., 2022). Our approach is again complementary: We aim to measure investor interest in ESG in units of return, as revealed in their real-world investment decisions.

A third strand focuses on the underlying drivers of investor interest in ESG investing. Broccardo et al. (2022) and Berk and van Binsbergen (2021) argue that ESG investing ought to be motivated by "voice," gaining shareholder influence directly rather than indirectly through divestment and the effects on the cost of capital, which is consistent with the view of many institutional investors (Krueger et al., 2020; Ilhan et al., 2023). It is plausible that investors also value the way that their fund managers vote (for example, see Zytnick (2022)) and our methodology could be used to measure the value that investors place on ESG engagement. Hart and Zingales (2017) and Hart and Zingales (2022) argue for shareholder welfare maximization and suggest that shareholder voting is one way to achieve this. Other research suggests a wider range of drivers of ESG preferences, including hedging motives (Tran, 2019; Baker et al., 2019), investor horizon (Starks et al., 2017), social norms (Dyck et al., 2019), failures in the private sector funding of ESG (Oehmke and Opp, 2020; Green and Roth, 2020), and a broader set of measures of impact (Cohen et al., 2020; Allcott et al., 2022). Hartzmark and Shue (2023) highlight that some impact investing strategies may be counterproductive, aiding firms that are unlikely to further reduce their environmental impacts. They highlight a channel whereby "brown" firms become more harmful as their cost of capital increases, front-loading their carbon emissions. Through this mechanism, investors' preferences for funds with an ESG mandate have a limited impact on actual sustainability. We examine the distinct effects of green labeling and green ratings on investor interest, and we attempt to peel back the onion further, considering which ESG components are valued most highly and which investors value ESG the most. However, our focus on index funds largely precludes a focus on investor engagement and voting, because the index definition is mechanical and typically delegated to an index provider like MSCI or FTSE Russell.

Our paper also relates to the growing literature on demand system asset pricing, which focuses on using data on quantities to recover investors' preferences and beliefs. In their seminal

work, Koijen and Yogo (2019a) develop a flexible characteristics-based demand system asset pricing model with heterogeneous investors.[4] The distinction between our first setting, which focuses on index funds, and the demand system asset pricing literature is that much of that literature focuses on how investors form portfolios. In contrast, we are focused on the specific index fund an investor chooses within a narrowly defined investment category (e.g., Large Cap Value Funds, Small Cap Growth Funds), conditional on (i) the investor's choice to buy an index fund in that specific investment category and (ii) the investor's existing portfolio. This allows us to abstract away from the investor's portfolio choice problem more generally and instead focus on index fund choice. The distinction between our second setting, which focuses on 401(k) asset allocation and fund selection, and the demand system asset pricing literature is that much of that literature uses log-linear demand systems while we use mean-variance optimization.

Our first approach is closest to the index fund choice models in An et al. (2021) and Hortaçsu and Syverson (2004). In particular, our demand framework builds on the work of An et al. (2021). An et al. (2021) use a Berry (1994)-type model to understand index fund choice and quantify the value that investors place on the brand of the underlying index. Our second approach borrows heavily from Egan et al. (2021) who model 401(k) investors as mean-variance optimizers, as we describe below. More generally, our paper builds on a growing literature at the intersection of industrial organization and finance on estimating demand for financial products. For example, researchers have used demand systems to estimate the value of bank deposits (Dick, 2008; Egan, Hortaçsu, and Matvos, 2017; Xiao, 2020; Wang, Whited, Wu, and Xiao, 2022; Egan, Lewellen, and Sunderam, 2022; Whited, Wu, and Xiao, 2023), bonds (Egan, 2019), credit default swaps (Du et al., 2019), insurance (Koijen and Yogo, 2016, 2022), and mortgages (Aguirregabiria et al., 2019; Robles-Garcia, 2019; Benetton and Compiani, 2024; Allen et al., 2023)

2 Data

We collect data on mutual funds and 401-K allocations.

2.1 Sources

2.1.1 Mutual Fund and ETF Data

Our core data that we use to estimate our index fund choice model are from the CRSP Mutual Fund database. For mutual funds and ETFs available for sale in the US, CRSP provides monthly fund returns, total net assets, and quarterly summary information regarding fund expense ratios

[4]The Koijen and Yogo (2019a) methodology has been extended to study other settings, including exchange rates (Koijen and Yogo, 2019b), cryptocurrencies (Benetton and Compiani, 2024), bonds (Bretscher et al., 2020), competition in the stock market (Haddad et al., 2021), and global equities (Koijen et al., 2019).

and Lipper classifications. We restrict attention to those mutual funds and ETFs identified in CRSP as index funds.

We merge our CRSP data set with monthly data from Morningstar Direct at the ticker-by-month level. Morningstar provides fund-by-month level data on fund ESG ratings as described further below, on Morningstar Categories, such as "U.S. Mid-Cap Value," and on the well-known Morningstar Rating. The Morningstar Rating is a proprietary measure of a fund's risk-adjusted return that ranges from one to five stars. This rating remains an important factor in determining mutual fund choice as highlighted in the academic literature on mutual fund flows (Del Guercio and Tkac (2008); Evans and Sun (2020); Ben-David et al. (2021); Reuter and Zitzewitz (2021)).

Our final sample is at the fund-by-month level over 56 months, from May 2019 through December 2023. Our sample starts in May 2019 when ESG ratings from Morningstar become available for the first time in our data. While our sample period is relatively short, this period captures the recent growth and subsequent decline in the public's interest in ESG funds. Figure 2 panel (a) displays Google search data from Google Trends for the search term "ESG" over a much longer period from 2004 through early 2024. There was a sharp increase in the search popularity of the term from 2019 through 2022, followed by a sharp reversal. The reversal coincides with a focus on the term ESG in Fox News coverage. Figure 2 panel (b) displays the share of news programs on Fox News that mentioned "ESG" presumably in a negative light and a matched sample from MSNBC.

2.1.2 Measures of ESG

We use data from three different sources to measure a fund's ESG attributes.

Morningstar Morningstar provides data on several different measures of ESG at the fund-by-month level. First, Morningstar provides indicator variables that show whether a fund has an explicit ESG mandate, a sustainability mandate, or an impact mandate. Index funds often implement these investment mandates by excluding companies/issuers in specific industries or with unfavorable ESG scores.[5] Second, Morningstar provides its own Sustainability Rating ranging from one to five globes, where five indicates the highest possible sustainability rating (globes are used to distinguish the sustainability metric from the traditional, risk-adjusted star rating). Morningstar constructs its Sustainability Rating with a bottom-up aggregation of the

[5]Roughly 70% of funds with an ESG mention they "exclude" or "drop" certain companies/industries in the investment strategy section of their prospectus. For example, the iShares ESG MSCI EM Leaders ETF (ticker:LDEM) describes in its prospectus that "The Index Provider begins with the MSCI Emerging Markets Index (the "Parent Index") and excludes securities of companies involved in the business of alcohol, tobacco, gambling, and nuclear power and weapons, thermal coal, and unconventional oil and gas businesses (e.g. thermal coal extraction and generation or oil sands extraction), companies involved with conventional and controversial weapons, and producers and major retailers of civilian firearms based on revenue or percentage of revenue thresholds for certain categories (e.g. $1 billion or 50%) and categorical exclusions for others (e.g. nuclear weapons)."

fund's portfolio. A fund's sustainability rating is a weighted average of the sustainability ratings of companies in its portfolio, which measures company-level ESG risks and opportunities.[6]

Invest Your Values We also measure several dimensions of ESG using data from Invest Your Values. Invest Your Values provides fund-by-month level data starting in April 2020. The data cover 3,000 mutual funds that have at least 50% of their holdings in stocks. Invest Your Values determines a fund's exposure to fossil fuels, deforestation, firearms, weapons, gender equality, and tobacco and provides corresponding letter grades ranging from "A" to "F" for each category. Invest Your Values also computes each fund's carbon footprint in terms of metric tonnes of CO_2 or CO_2 equivalents per $1 million invested based on scope 1 and scope 2 emissions. Lastly, Invest Your Values data records whether funds are offered by members of the US SIF: The Forum for Sustainable and Responsible Investment.[7]

Fund Prospectuses We also measure funds' ESG leanings through the language they use in their summary prospectuses. We download summary disclosure forms (Form 497K) for each fund from the SEC's Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database, supplementing our database with updates to definitive materials (Form 497) in years with missing summary disclosures. Our simple measure of a fund's ESG leaning in a given year is whether its prospectus mentions "ESG."

2.1.3 401-K Allocations

In addition, we use comprehensive data covering 55,000 401(k) plans in the US to help understand what drives heterogeneity in investor demand. The typical 401(k) plan allows investors to allocate their retirement savings to a fixed menu of investment options (typically mutual funds) that are determined by the 401(k) sponsor (e.g., employer). 401(k) plans are an important source of wealth and equity exposure for US households. As of 2021, Americans held roughly $7 trillion in 401(k) assets and defined contribution plans were the sole source of equity exposure for most American households (Badarinza et al., 2016).[8]

Our 401(k) data comes from BrightScope Beacon and the Department of Labor (see Egan et al. (2021) for a description of the data). In the data, we observe the 401(k) menu and plan-level allocations for 55,000 401(k) plans in the US as of 2019.[9] The entire BrightScope data

[6] https://www.morningstar.com/content/dam/marketing/shared/Company/Trends/Sustainability/Detail/Documents/Morningstar-Sustainable-Investing-Handbook.pdf.

[7] The Invest Your Values data are compiled by the shareholder advocacy organization As You Sow's Fossil Free Funds platform. Full details on how grades are computed by Invest Your Values are available online: https://fossilfreefunds.org/how-it-works; https://deforestationfreefunds.org/how-it-works; https://genderequalityfunds.org/how-it-works; https://gunfreefunds.org/how-it-works; https://prisonfreefunds.org/how-it-works; https://weaponfreefunds.org/how-it-works; and https://tobaccofreefunds.org/how-it-works.

[8] https://www.ici.org/faqs/faq/401k/faqs_401k

[9] We focus on the year 2019 due to the availability of both 401(k) and ESG data.

set covers 85 percent of assets in ERISA-defined contribution plans. The average 401(k) plan has 26 different investment options, which are typically structured as mutual funds. Using our Morningstar data we can determine which mutual funds available in 401(k) plans have an ESG mandate.[10]

2.2 Fund-Level Summary Statistics: ESG Funds

Figure 3 panel (a) displays the share of index funds with an ESG mandate over our sample period as per Morningstar. Over the period from 2019 to 2022, the share of index funds with an ESG mandate almost doubled from less than 3% to 5%. Figure 3 panel (b) displays the corresponding share of index funds with an ESG mandate weighted by assets. The results indicate that the share of index-fund assets in funds with an ESG mandate roughly tripled over our sample period. Since 2022, growth has leveled off or declined.

Table 1 displays the summary statistics corresponding to our base data set. Observations are at the index fund-by-month level. Panel (a) displays summary statistics for the full data set, and panel (b) displays summary statistics separately for funds with and without an ESG mandate. The median fund in our sample has assets of $168 million and charges an expense ratio of 45 basis points. It is useful to compare ESG and non-ESG funds, which we do in panel (b). On average, funds with an ESG mandate tend to be smaller, with lower expense ratios and higher Morningstar Ratings, than funds without an ESG mandate. The biggest distinction between funds with and without an ESG mandate is fund age: ESG funds are on average about half as old as non-ESG funds. The mean ESG fund has been around for 5.8 years while the mean non-ESG fund has been around for 10.8 years. Because newer funds tend have fewer assets and lower expense ratios, fund age is a key control variable in our analysis.[11]

We use six different ESG measures in our main analysis. We report the correlation between the different measures of ESG in Table 1 panel (c). The variables *ESG Fund* and *Sus. Fund* indicate whether the fund has an ESG or sustainability mandate as measured by Morningstar. The two mandates are highly correlated, indicating that funds with an ESG mandate are also highly likely to have a sustainability mandate. The next variable *ESG Strategy* indicates whether a fund mentions "ESG" in the investment strategy of its summary prospectus. This measure has a correlation of 0.88 with the Morningstar ESG mandate. The next variable *Sus. Rating* reflects the fund's Morningstar Sustainability Rating, which ranges from 1 to 5. We find a modest correlation between whether a fund has an ESG mandate and its Morningstar Sustainability Rating

[10] We also treat any investment fund name which includes one of the following terms as ESG: esg, environment, sustainability, social, responsible, and impact.

[11] Appendix Table A1 displays the share of index funds with an ESG mandate as of December 2021 for each Morningstar Category. ESG mandates are most common in the Morningstar Categories "Allocation-30% to 50% Equity," "Global Large-Stock Blend," "Corporate Bond," and "Global Small/Mid Stock." For example, one in five funds tracking global small/midcap stock indices has an ESG mandate. In the largest Morningstar Category by number of funds and assets, "Large Blend", roughly 9% of funds have an ESG mandate.

($\rho = 0.26$). The variable *Carbon Emissions* measures the direct and indirect carbon emissions (scope 1 and 2) of a fund's portfolio in terms of metric tonnes of CO_2 or CO_2 equivalents per $1 million invested. It is only modestly negatively correlated with the ESG mandate indicators. Finally, *US-SIF Member* indicates the fund is offered by members of the Forum for Sustainable and Responsible Investment. The correlation with a Morningstar ESG designation is 0.44. The modest correlations between many of these ESG measures are useful in our analysis because they allow us to separately identify which characteristics are most relevant for investors.

3 The Value of ESG: How Much Are Investors Willing to Pay?

We build and estimate a model of investor demand for index funds which allows us to quantify how much investors are willing to pay for ESG.[12] Investors may be willing to pay a premium for index funds with an ESG mandate because: (a) they anticipate these funds will deliver higher risk-adjusted returns; (b) they experience non-pecuniary benefits from investing in ESG companies, whether these benefits reflect taste or a desire to see non-financial returns; or (c) a combination of these two. In this section, we measure investors' willingness to pay for ESG.

3.1 Framework

We model index fund selection as a discrete choice problem with a standard model used in the industrial organization literature (Berry, 1994). We consider the discrete choice problem of investor i choosing to invest in one fund from the set of funds $\mathcal{L}_{mt}$ that track investment objective m (e.g., US Large Cap Equities, US Small Cap Equities, European Large Cap Equities) and that are available for sale at time t. Thus, we model which index fund an investor chooses conditional on the investor's chosen investment objective. This allows us to abstract away from how investors select investment objectives and fund categories and from the larger optimization problem of an investor's entire portfolio. The real-world analogue is the separation of asset allocation and security selection. For example, an investor might first choose to put 30% of her assets into US Large Cap Equities and only then choose whether these assets might be allocated to an ESG index fund in that category or a corresponding non-ESG fund. We are modeling this lower-level choice.

Each investor chooses the fund k that maximizes her indirect utility. Investor i's indirect utility flow from purchasing index fund k at time t is given by

$$u_{ikt} = -\alpha_{it} p_{kt} + \gamma_{it} ESG_{kt} + X'_{kt}\Theta_{it} + \xi_{kt} + \epsilon_{ikt}. \tag{1}$$

[12] Our primary analysis focuses on investor demand for index funds rather than the supply of index funds. In Appendix A.5, we develop and estimate a model of supply for index funds. Modeling the supply side allows us to assess how the costs and markups of operating an index fund vary across funds with and without an ESG mandate.

Investors receive a dis-utility flow $\alpha_{it}p_{kt}$ from paying expense ratio p_{kt} and receive utility flow $X'_{kt}\Theta_{it}$ from other mutual fund characteristics X_{kt}. The term ξ_{kt} captures unobserved fund-by-time characteristics and ϵ_{ikt} is an unobserved investor-by-fund-by-time specific demand shock. The investor-specific ϵ_{ikt} indicates that the product-space is horizontally differentiated such that investors potentially disagree about which index fund is the best.

The variable ESG_{kt} indicates whether the fund has an ESG mandate, and the parameter γ_{it} measures the utility flow that investors assign to ESG funds. All else equal, investors are willing to pay γ_{it}/α_{it} higher expense ratio for an ESG fund. One can think of γ_{it}/α_{it} either as capturing investors' beliefs about the excess returns of ESG funds and/or the non-pecuniary utility investors get from investing in an ESG fund. Both interpretations of γ_{it}/α_{it} are isomorphic in the underlying model.

Given that we model an investor's fund choice conditional on choosing a fund in investment objective m, we define the market for an index fund at the investment objective level such that the market is synonymous with the investment objective. Following the standard assumption in the literature that the unobserved demand-shock ϵ_{ikt} follows a type-1 extreme value (T1EV) distribution, the probability investor i chooses fund k in market m at time t is given by:

$$Prob_{ikmt} = \frac{\exp(-\alpha_{it}p_{kt} + \gamma_{it}ESG_{kt} + X'_{kt}\Theta_{it} + \xi_{kt})}{\sum_{l\in\mathcal{L}_{mt}} \exp(-\alpha_{it}p_{lt} + \gamma_{it}ESG_{lt} + X'_{lt}\Theta_{it} + \xi_{lt})}. \tag{2}$$

The market share of fund k in market m at time t is then equal to

$$s_{kmt} = \int_{\alpha_t}\int_{\gamma_t}\int_{\Theta_t} \frac{\exp(-\alpha_{it}p_{kt} + \gamma_{it}ESG_{kt} + X'_{kt}\Theta_{it} + \xi_{kt})}{\sum_{l\in\mathcal{L}_{mt}} \exp(-\alpha_{it}p_{lt} + \gamma_{it}ESG_{lt} + X'_{lt}\Theta_{it} + \xi_{lt})} dF_{\alpha_t}dF_{\gamma_t}dF_{\Theta_t},$$

where we integrate over the unobserved preferences across investors. This market share equation forms the basis of our estimation strategy below where we recover the underlying utility parameters.

In our initial specification, we allow investor preferences for ESG to vary over time but keep them constant across investors such that $\gamma_{it} = \gamma_{y(t)}$, where $y(t)$ indexes the year. We also assume that preferences for other characteristics are constant across investors and over time.[13] Given our setup, the market share of fund k in market m at time t is given by:

$$s_{kmt} = \frac{\exp(-\alpha p_{kt} + \gamma_{y(t)}ESG_{kt} + X'_{kt}\Theta_{it} + \xi_{kt})}{\sum_{l\in\mathcal{L}_{mt}} \exp(-\alpha p_{lt} + \gamma_{y(t)}ESG_{lt} + X'_{lt}\Theta + \xi_{lt})}.$$

In Section 5, we allow preferences for ESG to vary across investors based on observable investor characteristics and arbitrarily using a random coefficients model following Berry et al. (1995). We then explore the sources of heterogeneity in Section 6.

[13] In an alternative specification, we also allow common investor preferences $\gamma_{it} = \gamma_t$ to vary by month t.

3.2 Estimation

We estimate our discrete choice demand system to recover an investor's willingness to pay for ESG. Following eq. (2), and given our assumptions about preferences, the market share of fund k in tracking investment objective m at time t can be written in logs as:

$$\ln s_{kmt} = -\alpha p_{kt} + \gamma_{y(t)} ESG_{kt} + X'_{kt}\Theta + \xi_{kt} - \ln\left(\sum_{l \in \mathcal{L}_{mt}} \exp(-\alpha p_{lt} + \gamma_{y(t)} ESG_{lt} + X'_{lt}\Theta + \xi_{lt})\right). \tag{3}$$

We estimate the following equivalent regression specification:

$$\ln s_{kmt} = -\alpha p_{kt} + \gamma_{y(t)} ESG_{kt} + X'_{kt}\Theta + \mu_{mt} + \xi_{kt}, \tag{4}$$

where the market fixed effects (μ_{mt}) absorb the nonlinear term in eq. (3) such that we can estimate eq. (4) using linear regression methods.

We estimate the model using monthly index fund data. In our time series specifications, we calculate a fund's market share in terms of net fund flows where we define the relevant market as the Lipper Class-by-fund type-by-month:

$$s^{Flow}_{kmt} = \frac{Flow_{kmt}}{\sum_{l \in \mathcal{L}_{mt}} Flow_{lmt}}.$$

We define $Flow_{kmt}$ as $TNA_{kmt} - TNA_{km,t-1}(1 + r_{kmt})$. We focus on flows rather than the level of assets under management to capture the active decisions of investors.[14] As a robustness check, we also construct market shares based on AUM as

$$s^{AUM}_{kmt} = \frac{AUM_{kmt}}{\sum_{l \in \mathcal{L}_{mt}} AUM_{lmt}},$$

while accounting for investor inertia following Brown et al. (2023). Lipper Classes are designed to create homogeneous groups of funds with similar investment objectives (e.g., Large Cap Core, Small Cap Growth, High Yield Funds, etc.) and fund type indicates whether an index fund is structured as an ETF or mutual fund.

In our regression specifications, we control for the fund's expense ratio and its traditional Morningstar "star" rating. We also control for fund age by including fund age fixed effects measured in months and past cumulative 1-, 3-, 6-, and 12-month returns. These fixed effects

[14] An empirical challenge with using flows is that they can potentially be negative. When computing market shares, we restrict our data set to those fund-month observations that receive positive flows. Imposing this restriction is nonetheless consistent with our framework, and we are still able to recover investors' preference parameters. By imposing this restriction, we are effectively estimating the conditional market share: the market share of a fund among those funds in the market receiving positive flows. As a robustness check, we re-estimate the model where we construct market shares based on AUM, which are always positive. We report the corresponding results in Appendix Table A3.

help control for the fact that investors might simply chase past returns and that ESG funds tend to be newer funds—we want to compare the relative market shares of funds that were launched in the same market at the same time.

One challenge with directly estimating eq. (4) is that fund expenses are potentially endogenous. We are effectively regressing quantities on prices (i.e. expense ratios). The concern is that if a fund manager either partially or fully observes the demand shock ξ_{kt} prior to setting its expense ratio p_{kt} then expense ratios are endogenous. For example, if a fund manager anticipates a high demand shock for its fund then the manager may find it optimal to increase the expense ratio it charges to investors. The resulting endogeneity bias would cause us to underestimate how sensitive investors are to prices such that our estimate of α ($-\alpha$) would be biased downwards (upwards).

To address this endogeneity, we use cost shifters as instruments for expense ratios, following Janssen and Thiel (2024). While expense ratios overall may be endogenous, they consist of both endogenous components and exogenous cost shifters. Fund managers provide a detailed breakdown of their expenses as described in Gao and Livingston (2008). Expenses such as distribution/marketing and advisory fees are likely endogenous, but other expenses, including service agent, administrative, transfer, custodian, etc., likely reflect the operational costs of running a fund. Therefore, we instrument for a fund's expense ratio using its non-advisory- and non-distribution-related expenses using data from Morningstar. The relevancy condition requires these cost shocks to be correlated with the fund's expense ratio, which we verify with our data. These non-advisory- and non-distribution-related expenses comprise 15-20% of expenses for a typical fund. The exogeneity condition requires that the demand shock at time t for fund k in market m is orthogonal to the fund's non-advisory- and non-distribution-related expenses.

3.3 Results

Table 2 displays the results corresponding to our demand model. Column (1) displays our OLS estimates, and columns (2) and (3) display our IV estimates. The final column includes additional fund controls for past performance: Morningstar ratings and past 1-, 3-, 6-, and 12-month fund returns. All three columns include fund-age fixed effects and market fixed effects, so the results can be interpreted as demand effects within a market and within a particular fund- age group. As discussed in Section 2.2 it is important to control for fund age because ESG funds tend to be newer funds, which tend to be smaller and charge lower fees. These fixed effects reduce the sample size from the total described in the summary statistics above.

As expected, we estimate a negative and statistically significant coefficient on fund expenses in each specification. We report these demand elasticities in the bottom panel of Table 2. We find that demand for index funds is relatively elastic, with elasticities ranging from 1.5-1.9 depending on the specification. The estimated elasticities are consistent with an interpretation

that index funds tend to be relatively homogeneous products.

We also find that investors value ESG in the early years of our sample and do not value ESG in the last two years of our sample. In each specification, we estimate a positive and significant coefficient on an indicator variable for an ESG mandate in 2020 and 2021. By examining the ratio of the ESG coefficient relative to the expense ratio coefficient, we can interpret how investors value ESG in units of annual return. As reported in the bottom panel of Table 2, our results indicate that investors were willing to pay an additional 11 to 17 basis points for an ESG fund, depending on the controls and whether or not we instrument for the expense ratio. These coefficients change sign in 2022 and 2023. Investors were willing to pay between 5 and 35 basis points to avoid an ESG fund. We illustrate this time series variation, where we allow investor preferences for ESG to vary by month, in Figure 1, and we choose June 2022 as the breakpoint where demand for ESG changes sign.

Table 3 divides the sample into three broad asset classes: US Equities, Corporate Bonds, and International Equities. In the early period, willingness to pay for ESG is lowest in Corporate Bonds at 5 basis points—where a loss in yield might be the most visible—and highest in US Equities at 17 basis points (Table 3, panel a). Much of this comes from the lower elasticity of demand in US Equities. International Equity investors are willing to pay 5 basis points. In the later period, the willingness to pay for US and International Equities changes signs, while the willingness to pay for Corporate Bonds falls by half to two basis points and is no longer statistically significant (Table 3, panel b).

3.4 Robustness

Here, we explore several robustness checks to ensure our parameter estimates are robust to alternative measures of ESG and specifications.

Alternative Measures of ESG: In our baseline time series demand specification, we estimate the value investors assign to a fund's ESG mandate, as defined by Morningstar. As a robustness check, we also explore if investors are willing to pay a premium for funds with either a sustainability mandate or impact mandate or for funds that discuss ESG in the investment strategy section of their prospectus. The corresponding estimates are displayed in Appendix Table A2. The results indicate that investors were willing to pay an additional 8 basis points for a fund that has a sustainability mandate, 13 basis points for a fund that mentions ESG in its prospectus, and 13 basis points for a fund offered by a member of US-SIF in the early period. In the later period, preferences change sign to -40 basis points, -27 basis points, and -4 basis points.

Accounting for Investor Inertia: One potential concern in our baseline time series analysis is that if some investors are inattentive, the preferences/beliefs we recover may not reflect the true preferences of investors. We address this concern by measuring market shares in terms of

flows rather than assets under management. As a robustness check, we reestimate our demand specification where we measure market shares in terms of assets under management and account for investor inertia following Brown et al. (2023). The model assumes that a fraction ϕ of investors are inattentive each period, and simply maintain their existing portfolio, while the other $1 - \phi$ of investors rebalance their portfolio. Full details of the model and estimation are in the Appendix Subsection A.3. We report the corresponding estimates in Appendix Table A3. Consistent with our baseline time series estimates, we estimate that the elasticity of demand ranges from 1.9 to 2.2. We also find that investors are willing to pay roughly a 9 to 25 basis point premium to invest in ESG funds in the early period, which changes to -20 to -23 basis points in 2023, depending on the specification.

Accounting for Management Fixed Effects, a New Fund Only Sample, and a Vanguard Only Sample: We present several additional specifications in Appendix Table A4. In column (2), we include management fixed effects, so that we are now examining the preference for ESG within a fund complex like Fidelity or Vanguard. This tends to lower the elasticity of demand, removing an important source of variation in fees across fund complexes and increasing the absolute value of our estimates of willingness to pay. In column (3), we focus only on new funds, so the comparisons are apples to apples in firm age, with ESG funds appearing only in recent years. This is perhaps our preferred specification. However, it reduces our power when we consider the composition of fund holdings below. In column (4), we address the concern of endogenous expense ratios by using a subsample of index funds in which fees are arguably exogenous: those funds managed by Vanguard. Vanguard is structured as a mutual company; thus, its customers are also its owners, and consequently, it is incentivized to sell its mutual funds based on marginal costs to maximize producer and consumer surplus. The variation in Vanguard's expense ratios should be driven by variation in cost shocks rather than demand shocks, and therefore, expense ratios for Vanguard should not be endogenous. The estimates are similar to our baseline time series estimates and indicate that Vanguard fund holders are willing to pay as much as 42 basis points for ESG in 2021 but attach a small discount to ESG in 2023.

Alternative Instruments: We instrument for fund expense ratios using fund-specific cost shifters (e.g., custodian and administrative costs) following Janssen and Thiel (2024). As a robustness check, we also instrument for expense ratios using Hausman instruments (Hausman, 1996). Specifically, we instrument for the expense ratio that fund manager j charges for its fund k in market m at time t using the average expense ratio that manager j charges on all of its other funds (active and passive) in other markets (excluding m) at time t. The idea behind this strategy is that the instrument is potentially relevant because a manager's marginal costs of operating funds are correlated across the funds it operates. The exogeneity condition requires

that the demand shock at time t for fund k in market m managed by manager j is orthogonal to the expense ratios that manager j charges on its funds in other markets. For example, the exogeneity condition requires that the unobserved demand shock for Fidelity's US Large Cap Equity Index fund is uncorrelated with the fees that Fidelity charges on Fidelity's Corporate Bond Fund. We report the corresponding estimates in column (5) of Appendix Table A4. The estimates of the elasticity of demand and value investors place on ESG are quite similar to our baseline specification.

4 What are Investors Paying For?

In this section, we examine what investors value when they invest in ESG funds along three dimensions. First, we examine the portfolio similarity of funds in the same Lipper Class with and without an ESG mandate. To the extent that ESG and non-ESG index funds hold similar portfolios, our main estimates may underestimate the value investors place on ESG. For example, suppose the willingness to pay for ESG is 10 basis points, and 75% of the portfolio of an ESG fund is identical to that of a non-ESG fund. In that case, it suggests that rather than paying a 10 basis points premium for ESG, investors behave as if they would be willing to pay an additional 40 basis points (=10 bps/(1-75%)) for ESG. Second, we examine whether investors are paying for an ESG label or whether they are discerning about the contents of funds' underlying portfolios. The value investors place on the ESG label, relative to actual fund holdings, provides insight into their susceptibility to greenwashing. Third, we use fund-level grades from Invest Your Values to decompose investor valuation of ESG into narrower environmental and social objectives.

4.1 Portfolio Similarity of ESG and Non-ESG Funds

First, we examine the similarity of ESG and non-ESG portfolios in terms of holdings and returns.

4.1.1 Portfolio Overlap

Our base portfolio overlap measure computes the total percentage of two funds' assets that are invested in the same securities. We take the sum across all securities of the minimum portfolio share either fund allocates to each security. For funds k and l in year t, with positive holdings set $\mathcal{H}(k)$ and holdings shares w_{kat} for each security a, we define portfolio overlap to be:

$$portfolio\,overlap_{klt} = \sum_{a \in \mathcal{H}(k) \cap \mathcal{H}(l)} \min\left(w_{kat}, w_{lat}\right).$$

For each ESG fund, we can find the non-ESG fund in the same Lipper class with the most similar portfolio. We define $\mathcal{C}_{k,t}$ as the set of non-ESG competitors to fund k in year t belonging

to the same Lipper class. The portfolio overlap between ESG fund k and its closest non-ESG competitor is

$$non\,esg\,portfolio\,overlap_{kt} = \max_{l \in \mathcal{C}_{kt}} portfolio\,overlap_{klt}$$

Table 4 displays the value-weighted average portfolio overlap, within category, between ESG funds and their closest non-ESG competitors as of 2021. There is also variation across categories. For the average ESG index funds tracking the US broad market (i.e., US Blend/Core), we can find a non-ESG fund within the same investment category where roughly 76% of the holdings are the same. Similarly, for the average ESG index fund tracking US growth stocks, we can find a non-ESG fund within the same investment category where roughly 74% of the holdings are the same. On average, across all ESG funds, we find a matched non-ESG fund with a 71% overlap in weights. Thus, an investor willing to pay 17 basis points more for an ESG fund is implicitly behaving as if she is willing to pay 59 basis points (17 / (1-71%)) for the pure ESG component of their underlying holdings.

4.1.2 Return Correlation

We conduct a similar exercise that measures the return correlation between ESG and non-ESG funds. For each ESG fund, we calculate the maximum pairwise correlation between its monthly returns and the monthly returns for non-ESG funds in the same category in 2021.

Given ESG fund k and its set of non-ESG competitors $\mathcal{C}_k$ within the same Lipper class, we can compute the return correlation between

$$non\,esg\,return\,similarity_k = \max_{l \in \mathcal{C}_k} \mathrm{Corr}(\mathrm{ret}_k, \mathrm{ret}_l)$$

Table 4 displays the average (within category) value of $non\,esg\,return\,similarity_k$ across ESG funds in our sample. The results indicate that for the average ESG fund, there is a non-ESG fund with monthly returns that are 98.6% correlated with the ESG fund. Overall, our results suggest that both the returns and portfolios of many ESG funds are quite similar to those of non-ESG competitors. The implication is that our measure of the value investors place on ESG funds might be a small fraction of the value that investors place on ESG activity. Alternatively, they may value the ESG label more than a truly differentiated investment strategy, a possibility that we will examine in the proceeding subsection.

4.2 Are Investors Discerning? Continuous Portfolio-Level Measures of ESG

A skeptic of ESG investing might argue that ESG investors are simply paying for the ESG label. To understand whether investors are paying for only the ESG label, we examine whether demand for index funds is sensitive to the ESG ratings of the companies in the fund's underlying portfolio. As described in Section 2, we measure how a fund's portfolio ranks in terms of

ESG using Morningstar's Sustainability Rankings and its carbon footprint. Both measures are constructed using the firms held in a fund's portfolio.

Using these additional measures, which measure the degree of ESG alongside an ESG label, we augment our initial utility specification as follows:

$$u_{ikt} = -\alpha p_{kt} + \gamma ESG_{kt} + \lambda ESG\,Rating_{kt} + X'_{kt}\Theta + \xi_{kt} + \epsilon_{ikt}. \tag{5}$$

The variable ESG_{kt} again indicates whether fund k at time t has an ESG mandate and the variable $ESG\,Rating_{kt}$ measures the fund portfolio's ESG rating as per Morningstar or based on its carbon footprint. We estimate our augmented demand specification following eq. (4) with our additional ratings control variables.

We report the corresponding estimates across the early and late samples in Table 5. In column (1), we include only the indicator variable whether a firm has an ESG mandate. In column (2), we add an indicator for funds with a four- or five-globe rating as per Morningstar. In column (3), we add the log carbon footprint of the fund's portfolio, measured in terms of tonnes of CO_2 per \$1 million invested. In column (4), we include all three measures simultaneously. We run these regressions in early and later periods when ESG is valued positively and negatively, and we report the results in Table 5 panels (a) and (b).

The results in panel (a) suggest that investors are somewhat discerning when it comes to ESG. The coefficients in column (2) indicate that investors behave as if they would be willing to pay an additional 5 basis points for a four or five globe rated fund as per Morningstar. The results in column (3) indicate that investors are willing to pay an additional 3 basis points for a 50% reduction in carbon emission.

Lastly, the results in column (4) indicate that investors independently value the three different ESG characteristics of a fund's portfolio. Importantly, the label itself retains statistical and economic significance. This suggests that investors may be paying largely for an ESG label and are modestly discerning when selecting ESG funds according to their underlying holdings as defined by Morningstar and carbon footprint. Either there are aspects of investment relevant to ESG that are missing in the Morningstar and carbon footprint ratings or investors (or a subset of them) value the label itself above and beyond of the underlying qualities of the portfolio.

Consistent with our earlier findings, the results change signs in the later period (Table 5, panel b). In the second half of our sample investors attach a discount to funds with an ESG label, and no longer place a premium on Morningstar globes or funds with a smaller carbon footprint.

4.3 Do Investors Value Some Dimensions of ESG More Than Others?

The singular ESG mandate is an umbrella that covers an expansive set of objectives. To the extent that investors drill down to portfolio-level holdings along multiple dimensions or pay

attention to Invest Your Values grading, we can detect the aspects of ESG for which revealed preference is especially high. And again, we can ask whether the ESG label has value, even after we control for fund-level grades. Invest Your Values grades funds along six dimensions. Table 6 adds indicator variables for funds with an "A" grade for fossil fuels, deforestation, gender equality, civilian firearms, military firearms, and tobacco. We again run these regressions in early and later periods when ESG is valued positively and negatively, and we report the results in Table 6 panels (a) and (b).

In the early period, investor willingness to pay is highest for high fossil fuels and civilian firearms grades at a univariate 7 basis points, with gender equality and military firearms next at 6 and 2 basis points. These results are reported in columns (1) through (6) (Table 6, panel a). In a multivariate regression in column (7), we find that fossil fuels, firearms, and gender equality retain value and statistical significance. Again, the ESG label retains its importance, suggesting that Invest Your Values, like Morningstar, does not capture all of the elements of ESG that interest investors, or that investors pay for the ESG label itself irrespective of portfolio holdings.

In the later period, we witness a shift in ESG interest (Table 6, panel b). Investor preferences for fossil fuels switch sign and preferences for gender equality drop to zero, while the two firearms grades remain positive and at similar levels of economic significance. The ESG label also reverses sign when we control for these underlying drivers. These results suggest that the observed decline in demand for ESG is driven by shifting beliefs and preferences concerning climate change and fossil fuels.

Overall, our results from this section suggest that while ESG index funds are often quite similar to their non-ESG counterparts in terms of holdings and returns, investors appear somewhat discerning in their ESG investments. They are willing to pay a premium for ESG funds with lower carbon footprints and more sustainable portfolios. Even so, most of the value seems to arise from the ESG label itself, which may make investors susceptible to greenwashing.

5 Variation Across Investors

So far, our focus has been on the representative index fund investor's willingness to pay for ESG. Next, we explore how investor preferences for ESG vary across different groups of investors. First, we examine how preferences vary with observable investor characteristics, including whether the investor class is institutional and whether the class is from Europe or the US. We also explore what aspects of ESG investors value, paying particular attention to the importance of the label, which allows us to understand how susceptible each investor class is to ESG greenwashing. Second, we allow for unobserved heterogeneity in investor preferences more broadly by estimating a random coefficients model following Berry et al. (1995). This approach allows us to recover the distribution of preferences across investors.

Institutional vs. Retail Investors

In our baseline time series specification, we assume that γ_{it} varies over time but is constant across investors. Here, we allow γ_{it} to vary across institutional and retail investors and over time. We separately estimate demand (Eq. 4) for institutional and retail investors. We classify retail and institutional demand for mutual funds based on whether the fund, defined at the share class level, is classified in CRSP as a retail or institutional fund. For ETFs, which are available to both institutional and retail investors, we determine the assets held by institutional investors using institutional holdings data from Form 13F filings.[15] We then separately compute market shares for retail and institutional investors and reestimate our demand specification for each investor type.[16]

We report our estimates of retail and institutional investor preferences in Table 7. The estimates in columns (1)-(3) correspond to retail investor demand, and the estimates in columns (4)-(6) correspond to institutional investor demand. Comparing retail versus institutional demand yields several insights. First, as expected, institutional investor demand is roughly 30-45% more elastic than retail investor demand. Second, both retail and institutional investors were willing to pay a premium for ESG in the early part of our sample in 2020 and 2021. However, institutional investors place a roughly 50% (6 basis points) higher premium on ESG than retail investors. Third, consistent with our earlier results, both retail and institutional preferences for ESG change signs in the later part of our sample.

5.1 US vs European Investors

We also examine how preferences for ESG vary between US and European investors. In our baseline time series specification, we focused on funds available to US investors. Here, we estimate demand for European investors using Morningstar data on funds available for sale in Europe. We re-estimate Eq. (4) with our European fund data from Morningstar over the period from 2019 to 2023. This European fund data is similar to our US fund data from CRSP.

We report our estimates of demand from European investors in Table 8. Comparing these results with our demand for US investors (Table 2) illustrates three key points. First, the elasticity of demand we estimate for European investors ranges from 1.2 to 1.4, which is similar to, albeit slightly smaller than, the elasticity of demand we estimate for US investors. This is consistent with funds generally being more expensive in Europe than in the US. Second, we find that European investors are willing to pay a higher premium for ESG funds than US investors.

[15] The Securities and Exchange Commission requires all institutional investment managers with assets of at least $100 million to disclose their holdings on a quarterly basis as part of Form 13F. We use Form 13F data from Thomson to calculate the share of ETF assets held by institutional investors. We restrict the share held by institutional investors to between zero and one.

[16] Retail investors sometimes purchase institutional share classes, for example through their retirement plans. Our measure of institutional investor market share includes both institutional investors and retail investors who have access to institutional share classes.

European investors were willing to pay 17-21 basis points for ESG as of 2021, which is roughly 50-70% (6-9 basis points) higher than US investors' willingness to pay for ESG. Lastly, unlike what we observe in the US, we do not find evidence of an ESG backlash in Europe. European investors' willingness to pay for ESG falls modestly over the period 2021 to 2023, from 17 to 14 basis points (Column 3), but remains positive and significant.

5.2 Susceptibility to Greenwashing Across Investors

Our analysis from Section 4.2 suggests that while ESG investors are discerning, the label itself generates most of the value. To the extent that investors rely on and value the label, it makes them susceptible to what Kaustia and Yu (2021) identify as greenwashing behavior by funds, paying more simply for the ESG-labeled mandate. We measure investors' susceptibility to greenwashing based with the coefficient on the ESG-labeled mandate, holding the fund's portfolio characteristics constant. Specifically, building on our analysis in Section 4.2 we separately estimate US and European institutional and retail investor demand for index funds, controlling for the ESG label, the fund's carbon footprint, and whether the fund had a top sustainability rating according to Morningstar.

Figure 4 displays the value placed on the ESG label by investor type over the early part of our sample (prior to June 2022), where all investors place positive value on ESG. The results suggest that, conditional on portfolio characteristics, US retail and institutional investors are willing to pay 11 to 12 basis points for the ESG label. Thus, both institutional and retail investors in the US appear equally susceptible to greenwashing. In contrast, institutional investors in Europe are willing to pay more than 30 basis points for the label, while European retail investors place little value on the label, conditional on fund characteristics. One might be surprised that among all investors, European institutional investors may be the most susceptible to greenwashing. These results are consistent with the possibility that European institutional investors, on average, are investing in ESG to appease their stakeholders without demonstrating meaningful sensitivity to underlying portfolio attributes, at least as measured by Morningstar. These findings suggest a regulatory response much like the European Union's Sustainable Finance Disclosure Regulation (SFDR), which increased ESG-related disclosure requirements for funds.

5.3 Random Coefficients Model

Lastly, we reestimate our baseline time series model allowing investor preferences for ESG to vary arbitrarily across investors. Specifically, we parameterize $\gamma_{it} = \gamma_{y(t)} + \sigma_\gamma \nu_{it}$, such that preferences vary across investors. The term $\gamma_{y(t)}$ captures mean investor preferences for ESG, and the term ν_{it} captures investor-specific preferences. We assume that $\nu_{it} \sim N(0,1)$ such that σ_γ represents the standard deviation of preferences for ESG across investors. We estimate the

model following Berry et al. (1995) and report the full details of the model and estimation in the Appendix and the results in Appendix Table A5.

The estimates of the average value investors place on ESG follow a similar hump-shaped pattern that peaks in 2021 and decreases thereafter as part of the ESG backlash. We also estimate substantial heterogeneity in preferences for ESG. The standard deviation of an investor's willingness to pay for ESG is 65 basis points. The results indicate that in 2021, investors in the 95th percentile were willing to pay upwards of 60 basis points for ESG. Conversely, those in the bottom 5th percentile placed a 150 basis point discount on ESG.

While estimating a random coefficients model allows us to determine the distribution of investor heterogeneity, it does not explain why some investors place a premium while others place a discount on ESG funds. To understand this heterogeneity better, in the following section, we use additional data from 401(k) plans to explore the factors driving the value investors place on ESG.

6 What Drives Investor Heterogeneity? Evidence from 401(k) Plans

We next explore heterogeneity and specifically how preferences for ESG vary geographically across the US and across industries using data from 401(k) plans. These data allow us to explore what drives variation in investors' willingness to pay for ESG. In the first subsection below, we examine the extensive margin: How likely is a 401(k) plan to include an ESG option? In the second subsection below, we examine the intensive margin: How highly do 401(k) investors value ESG funds when they have one as an investment option?

6.1 The Extensive Margin of Interest in ESG

6.1.1 Geographic Variation in the Availability of ESG Investment Options

Figure 5 displays the share of 401(k) plans in a state that has at least one ESG investment option as of 2019.[17] Roughly 48% of 401(k) plans in our sample have at least one ESG investment option. The map illustrates that there is substantial variation across the country and that households living in coastal regions are more likely to have an ESG investment alternative in their 401(k) plans.

We more formally examine geographic dispersion in the availability of ESG-related investment options in the following regression specification:

$$Share\,of\,401k\,with\,ESG\,Option_c = \theta\,Attitudes\,about\,Climate\,Change_c + X_c'\Psi + \eta_c. \quad (6)$$

[17] We assign 401(k) plans to states and counties based on the firm's headquarters. The median firm in the Brightscope Beacon sample has 223 employees/participants (Egan et al., 2021).

Observations are at the county c level. The dependent variable $Share\,of\,401k\,with\,ESG\,Option_c$ measures the share of 401(k) plans in county c that have at least one investment option with an ESG mandate. The main independent variables of interest are investors' attitudes towards climate change. We measure investors' attitudes towards climate change using survey data from the Climate Change in the American Mind project from 2019 (Howe et al., 2015). Each variable in the survey data set corresponds to the estimated percentage of adults in each county holding a particular belief about climate change. These beliefs include: whether climate change is happening, whether respondents are worried about climate change, whether climate change is caused by humans, and whether CO_2 as a pollutant should be regulated. We also measure political attitudes based on the two-party Democrat presidential vote share in 2020 from county-level election returns tabulated by the MIT Election Data + Science Lab. These measures of attitudes towards climate change are all highly correlated; the first principal component explains 92% of the variance.

We also control for demographic and climate change risk factors. We measure local climate risks using the Federal Emergency Management Agency's National Risk Index, which computes natural hazard risk across hazard types and provides an aggregate county-level risk score ranging from zero to one. We also control for median household income, percent of the population with a college education, and median age.

Table 9a displays the estimates corresponding to eq. (6). We find a positive and significant relationship between climate change concerns and ESG investment in each specification. The results in column (5) indicate that a 10 percentage point increase in the share of the population that believes humans cause climate change is associated with a 3 percentage point (8%) increase in the share of 401(k) plans with an ESG investment option. Similarly, the results in column (7) indicate that a 10 percentage point increase in the share of the population that believes CO_2 emissions should be regulated is associated with a 4 percentage point (12%) increase in the share of 401(k) plans with an ESG investment option. We also find that higher-income areas are more likely to have an ESG alternative. We also find some modest evidence that areas with older and more educated populations and more exposed to climate change risk are more likely to have an ESG investment alternative. Overall, the results suggest investors' attitudes towards climate change appear in their 401(k) plans.

6.1.2 Industry Variation in the Availability of ESG Investment Options

Following Egan et al. (2021), we examine how holdings and preferences vary across industries. We start by examining how the availability of ESG-related investment options in 401(k) plans varies across industries. Table 10a displays the share of 401(k) plans that have at least one ESG investment option at the industry level (2-digit NAICS). The results indicate that there is substantial variation in the availability of ESG investment options across sectors. We find that 401(k) participants working in the technology and education sectors are 33% more likely

to have an ESG investment option than 401(k) participants working in the construction sector. The results suggest that firms in sectors that are larger contributors to emissions, such as transportation, oil and gas, utilities, and agriculture, are less likely to offer an ESG-related investment option.

Figure 6 panel (a) displays a scatter plot of the availability of ESG-related investment options versus environmental score at the industry level. We measure environmental score at the industry level using data from Sustainalytics, where a higher environmental score corresponds to lower environmental risk. Although the sample is small, the results indicate that there is a positive slope between environmental score and the share of employers offering an ESG-related investment option. Thus, employers in those industries with lower emissions are more likely to offer ESG alternatives in their 401(k) plans.

6.2 The Intensive Margin of Interest in ESG: Willingness to Pay for ESG

6.2.1 Framework and Estimation

Our empirical strategy for estimating the intensive margin of interest in ESG draws on the framework in Egan et al. (2021). We briefly summarize this framework here. This framework and the corresponding estimates allow for investor preferences for ESG to vary arbitrarily across investors, enabling us to explore how investors' willingness to pay for ESG varies among them. In our previous analysis (Section 3), we modeled an investor's index fund choice rather than their full portfolio choice. Here, because of the 401(k) setting where investors' choices are limited by the available menu, we model an investor's full portfolio choice problem.

Each of the 401(k) investors i forms a portfolio from the set of securities $k = 1, ..., K_i$ and a risk-free asset. We assume investors have mean-variance preferences with risk aversion λ_i. Investors choose the $K_i \times 1$ vector of weights $\boldsymbol{\omega}_i$ to maximize

$$\max_{\omega} \boldsymbol{\omega}_i'(\boldsymbol{\mu}_i - \boldsymbol{p}) + (1 - \boldsymbol{\omega}_i'\mathbf{1})R_F - \frac{\lambda_i}{2}\boldsymbol{\omega}_i'\Sigma_i\boldsymbol{\omega}_i,$$

where $\boldsymbol{\mu}_i$ is a vector of investor i's expectations of fund returns, $\boldsymbol{p}$ is a vector of fund expenses, R_F is the risk-free return, Σ_i is the $K_i \times K_i$ covariance matrix of expected fund returns, and λ_i is risk aversion. The corresponding set of first order conditions is

$$\Sigma_i\boldsymbol{\omega}_i = \lambda_i^{-1}\left(\boldsymbol{\mu}_i - \boldsymbol{p} - \mathbf{1}R_F\right). \tag{7}$$

For each investor, we have K_i first order conditions which are the core of the estimation strategy.

Egan et al. (2021) show that with an estimate of Σ_i, denoted $\hat{\Sigma}_i$, one can directly estimate Eq. (7) by regressing $\hat{\Sigma}_i\boldsymbol{\omega}_i$ on the vector of product fees $\boldsymbol{p}$, which allows the researcher to non-parametrically identify each investor's vector of expected excess returns $(\boldsymbol{\mu}_i - \mathbf{1}R_F)$ and risk aversion λ_i. The estimated coefficient corresponding to fees in the regression is the inverse of

the investor's risk aversion, and the residual from the regression corresponds to expected excess returns scaled by risk aversion. Identification requires exogenous variation in the fees investors pay for each investment option that is orthogonal to investor beliefs, which the authors address using a similar set of instruments as we employ in Section 3.

The methodology allows researchers to separately identify each investor's risk preferences and beliefs about each asset appearing in her 401(k) plan, with the caveat that the 401(k) data is at the plan level rather than the individual level. Thus, the estimates from Egan et al. (2021) correspond to the beliefs of the average participant. Egan et al. (2021) interpret the beliefs as reflecting expected returns. We interpret these expected returns as a willingness to pay for ESG that could come from expectations of financial or non-financial returns.

6.2.2 Geographic Variation in Willingness To Pay

We use these estimates from Egan et al. (2021) as a dependent variable to examine how investors' willingness to pay for ESG varies geographically. Specifically, we estimate the regression:

$$\mu_{pk} = \varphi ESG_k + \psi Attitudes\,about\,Climate\,Change_{c(p)} \times ESG_k + \delta_p + \phi_{m(k)} + \eta_{pk}. \tag{8}$$

Observations are at the 401(k) plan-by-fund level as of 2019, where we restrict our attention to index funds. The dependent variable, μ_{pk}, reflects the average (across fund participants) willingness to pay for fund k in 2019 among participants in 401(k) plan p, as per Egan et al. (2021). The independent variable ESG_k indicates whether fund k has an ESG mandate and the coefficient φ measures investors' willingness to pay for ESG. We include the interaction term $Attitudes\,about\,Climate\,Change_{c(p)} \times ESG_k$ to allow the value investors place on ESG to vary depending on investors' attitudes about climate change. We also include 401(k) plan fixed effects to account for differences across plans as well as Morningstar Category-by-BrightScope Category fixed effects, which capture differences in risk.

We report the estimates in Table 9b. The results in column (1) indicate that investors are willing to pay an additional 25 basis points for ESG in the 401(k) cross section from 2019, which is consistent with our previous results. Note that this point estimate is a bit higher than our baseline time series estimate but similar to our estimate for US equity investors (Table 3, panel a). We also find that the value investors place on ESG varies with their attitudes towards climate change. The results in column (2) indicate that investors who are worried about climate change are willing to pay 37 (=43-6) basis points for ESG, while investors who are not worried about climate change are effectively not willing to pay anything for ESG (-6 basis points). Similarly, the results in column (4) indicate that investors who believe climate change is caused by humans are willing to pay 40 basis points for ESG. Lastly, we find that both sides of the political spectrum place some value on ESG. At the extremes, the results in column (6) suggest that in a county with a 100% two-party Republican vote share, investors are willing to pay 12 basis points for ESG. Conversely, in a county with a 100% two-party Democrat vote

share, investors are willing to pay 31 basis points (=19+11).

6.2.3 Industry Variation in Willingness to Pay

Next, we examine how the value investors place on ESG varies across industries (i.e., 2-digit NAICS). We display the corresponding estimates in Table 10b. The results are broadly consistent with our previous findings regarding the availability of ESG investments in Table 10a. The results suggest that, on average, investors working in the management of companies and industries (i.e., NAICS 52) are willing to pay 69 basis points per annum for ESG. Conversely, the average investor working in the transportation sector places negative value on ESG (-63 basis points), although the estimate is not statistically different from zero. Figure 6 panel (b) displays a scatter plot of the willingness to pay for ESG versus environmental score at the industry level. We find a modest positive correlation between environmental score and willingness to pay for ESG, which suggests that those employees working in those industries with lower emissions are willing to pay a higher premium for ESG.

7 Implications for Firms

In this final section, we speculate on the implications for firms. Traditional finance theory, with efficient capital market pricing, suggests that an investment in ESG involves a tradeoff where investors sacrifice financial returns for the psychic and societal benefits of promoting non-financial social and environmental objectives. Heinkel et al. (2001) and more recently, Oehmke and Opp (2020), Pástor et al. (2021), and Pedersen et al. (2021) develop models where investor interest in ESG leads to a reduction in returns. Hackbarth and Luo (2024) develop a model where firms opt into ESG policies if their benefits, which depend on time-varying investor demand, exceed costs. In this interpretation, investors collectively aim to push up the prices of firms that seek these societal goals above a traditional discounted value of their future cash flows, thereby lowering the firms' cost of capital. The 17 basis points we estimate in the period of peak ESG sentiment is then a lower bound. Investors are paying for ESG explicitly in their willingness to pay higher fees and implicitly in earning lower future returns.

By contrast, many investment management firms do not embrace traditional finance theory and efficient capital markets: They do not describe ESG investing as a tradeoff. For example, Blackrock has argued that today's prices do not yet reflect the financial benefits of corporate ESG and the tailwind of the investor "transition to sustainable preferences." This is akin to a demographic shift that increasingly favors firms with highly rated ESG practices; a shift that these market watchers argue is not yet reflected in current market prices. The Blackrock pitch is that both firms and investors can do well, earning higher than average profits through ESG practices and higher than average returns by reallocating investable assets towards funds with ESG

mandates. This is consistent with a literature in behavioral asset pricing, where the stock market underreacts in its valuation of relevant information—particularly slow, demographic shifts as in DellaVigna and Pollet (2007), and where shifts in the supply of securities and investor demand drive asset prices, as in Greenwood and Vayanos (2010). In this second interpretation, investors only care about returns, not societal externalities, and our estimates of revealed preference suggest that investors on average believe that the return on an ESG fund will be 17 basis points higher than an otherwise equivalent non-ESG fund.[18]

The key testable implication that separates these two interpretations is their diametrically opposed predictions for the link between ESG and future returns. Traditional finance theory suggests a negative relationship between ESG preferences and future returns. The practitioner view suggests a positive relationship between ESG and future returns. We examine whether our monthly time-varying measure of investors' willingness to pay for ESG (Figure 1) forecasts the future returns of ESG funds. For expositional ease, we report the full details in the Appendix Subsection A.6 but summarize the findings here.

We have limited power to test this hypothesis, and we find directional evidence for both points of view. ESG funds, as a whole, earned returns that were 25 basis points higher per year over our short sample period, suggesting a tailwind of rising preferences consistent with the practitioner view. Meanwhile, holding this tailwind constant, the time variation in investors' willingness to pay for ESG has been negatively related, although not significantly different from zero, to the future returns on ESG funds—suggesting that once investor interest in ESG has risen, future returns on ESG funds will fall if this pattern holds, consistent with traditional finance theory.

If investors correctly internalize that their preferences for ESG potentially drive down future returns, then our estimates of an investor's willingness to pay for ESG may be a lower bound on the non-pecuniary benefits an investor gets from investing in ESG. This calculation assumes that investors correctly internalize the relationship between preferences for ESG and returns, which may not be true in practice. That said, this illustrates how our baseline time series estimates of 17 basis points in 2020 may underestimate investors' true preferences for ESG at that time. It also suggests that firms capture some of the total value when demand for ESG is high.

8 Conclusion

We estimate investors' willingness to pay for ESG index funds. Using a workhorse demand model from the industrial organization literature, we estimate that investors' willingness to pay for ESG has varied considerably over our five-year sample, ranging from a high of 17 basis points in 2020 to a low of negative 33 basis points in 2023. This estimate is likely a

[18] Survey evidence from Krueger et al. (2020) suggests that institutional investors believe that both pecuniary and non-pecuniary benefits are important motives for thinking about climate risks.

lower bound in the early part of our sample for several reasons. First, we show that there is substantial overlap between the portfolios of ESG and non-ESG funds. Given that the average overlap is 71% across US broad market index funds, this suggests that investors are effectively paying 59 basis points (=17/(1-71%)) to invest in a pure, disjoint fund with only ESG stocks. Second, to the extent that investor demand pushes prices up and thus future returns down, we may underestimate an investor's gross (gross of returns) willingness to pay for ESG. We lack the power to pinpoint this final effect because we estimate an investor's net (net of returns) willingness to pay for ESG, but our point estimates suggest a rough tripling of our baseline time series estimate.

In the early part of the sample, we find that the value investors place on ESG funds comes mainly from the label, but investors are also discerning. Investors are willing to pay a premium for funds with higher sustainability ratings and lower carbon footprints. Investors are also willing to pay a premium for funds that receive favorable ratings on fossil fuels, civilian and military firearms, and gender equality. We also find evidence of heterogeneity across investors. Institutional and European investors place a higher premium on ESG in the early part of our sample than retail investors in the US. Using our 401(k) sample, we find that in locations with a greater reported concern for climate change and in industries that emit less carbon, investor interest in ESG is greater.

Our estimates for 2020, which initially indicated a positive sentiment towards ESG, undergo a complete reversal in 2023, turning statistically negative in a climate that has become more hostile to ESG investing. Much of the estimated value (or lack of value) of ESG in the first part and second parts of our sample comes from the label itself. Shifts in views on fossil fuels are an important driver of the reversal in willingness to pay. Still the label remains the most important driver of willingness to pay even controlling for portfolio characteristics. Overall, our results suggest that investor demand and perceptions of ESG have and likely will continue to evolve, a fact that models of pro social investment behavior might take into account.

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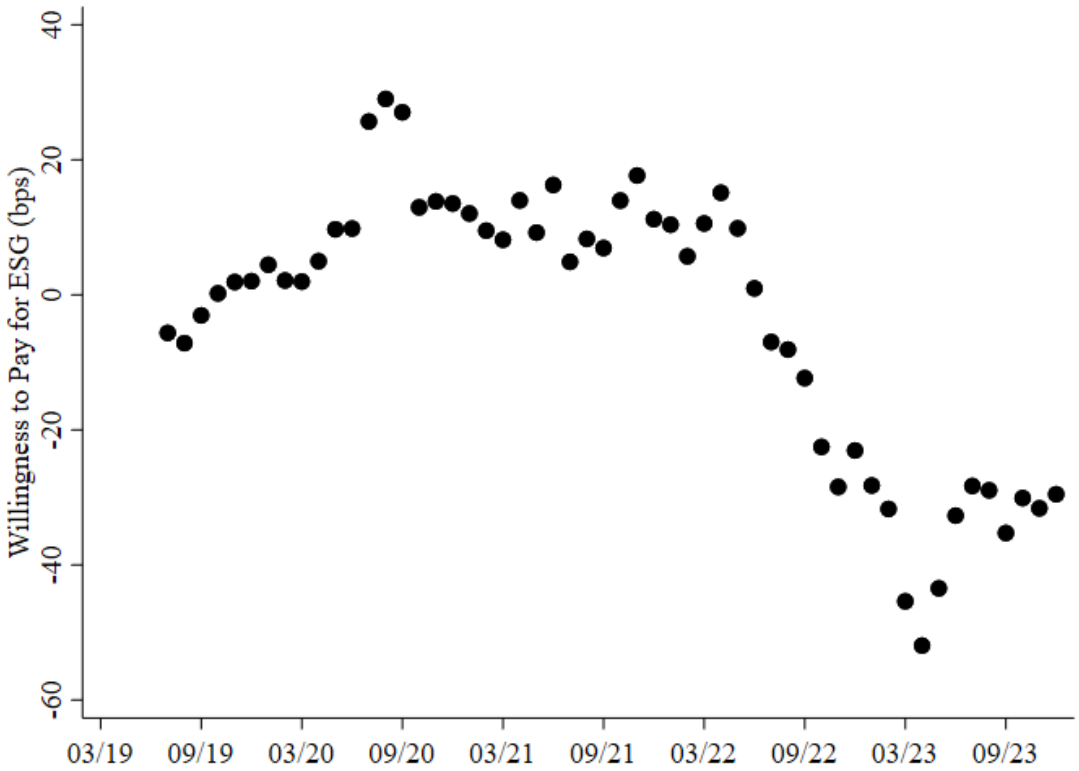
Tables and Figures

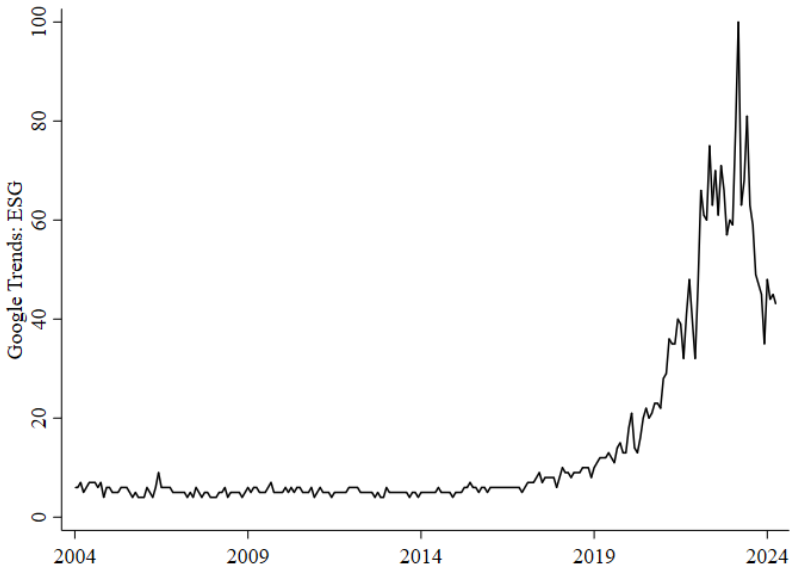
Figure 1: Willingness to Pay for ESG Over Time



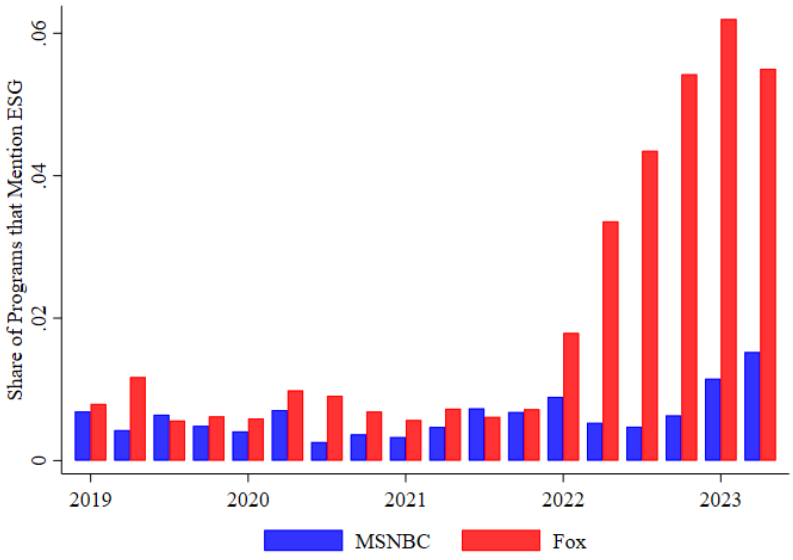
Notes: Figure 1 displays our estimates corresponding to an investor's willingness to pay for ESG where we allow an investor's preference for ESG to vary month-to-month (eq. 12). We report the 3-month rolling average over our sample period.

Figure 2: Popularity of ESG of Over Time

(a) Google Trends - Searches for "ESG"



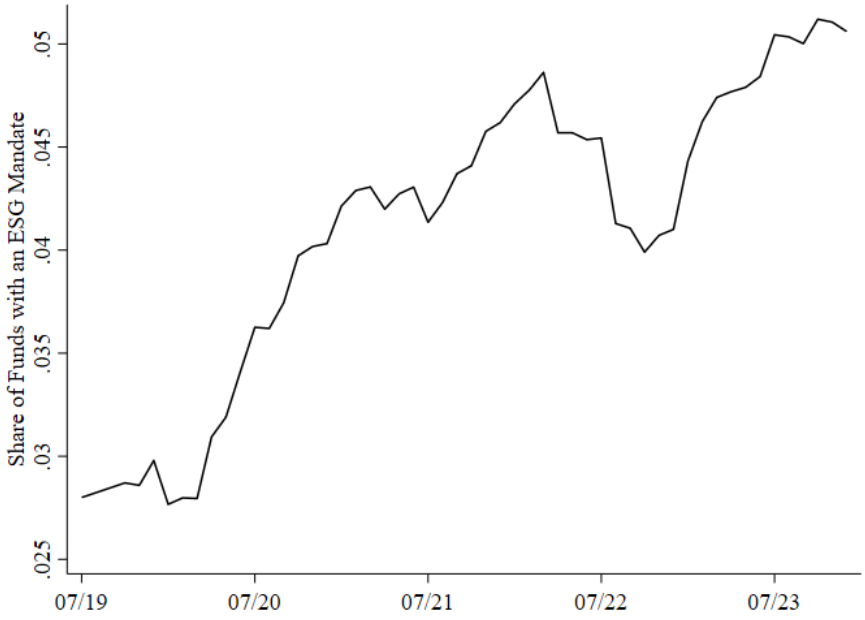
(b) Share of Programs that Mention ESG



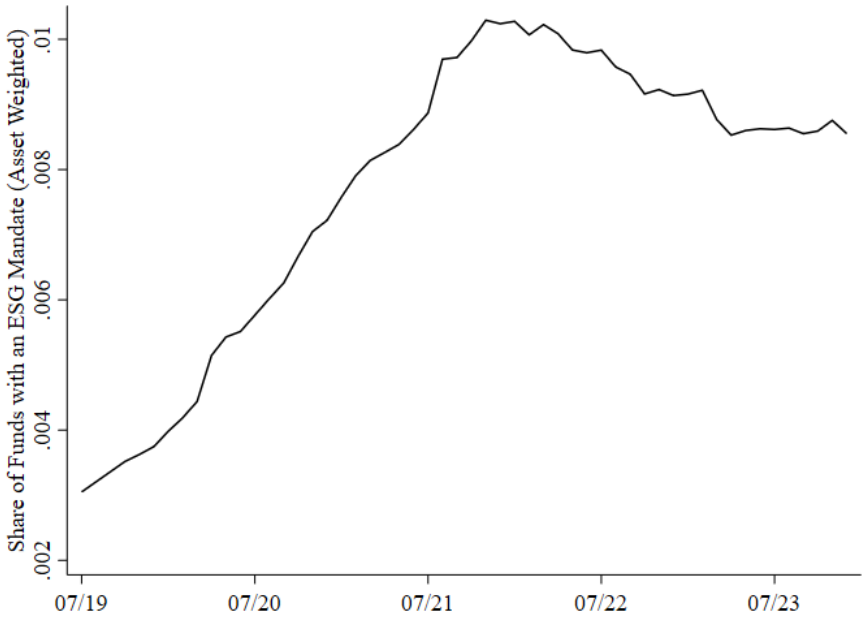
Notes: Figure 2 panel (a) displays the popularity of the search term "ESG" as per Google Trends. Observations are monthly over the period 2004 through May 2005. Google Trends are scaled such that numbers represent search interest relative to peak popularity, which is assigned a value of 100. For example, a value of 50 in a given month means that the term is half as popular in that month relative to the term's peak popularity. Figure 2 panel (b) displays the share of news programs on MSNBC and Fox News that mention the term "ESG".

Figure 3: Growth of ESG Index Funds

(a) ESG Index Funds (Equal Weighted)

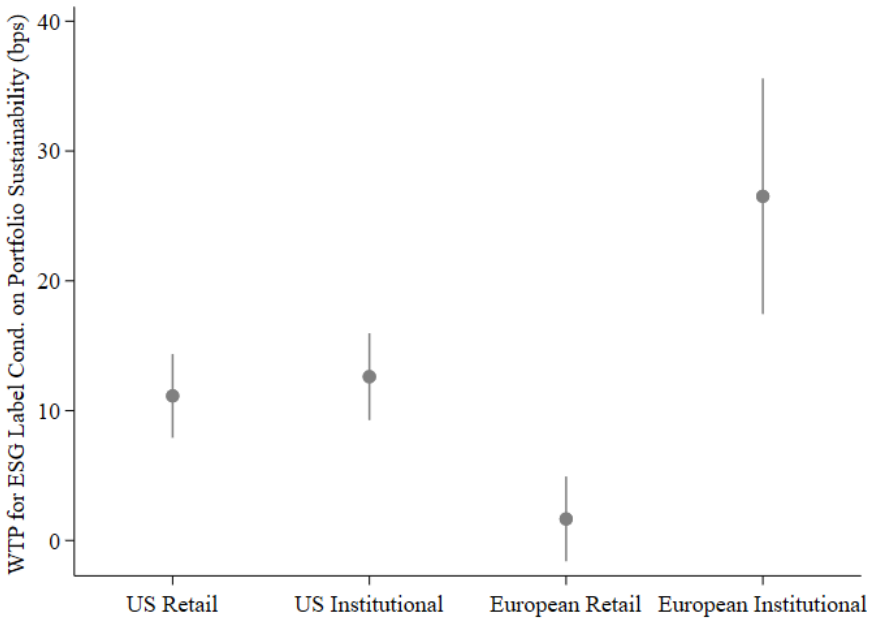


(b) ESG Index Funds (Asset Weighted)



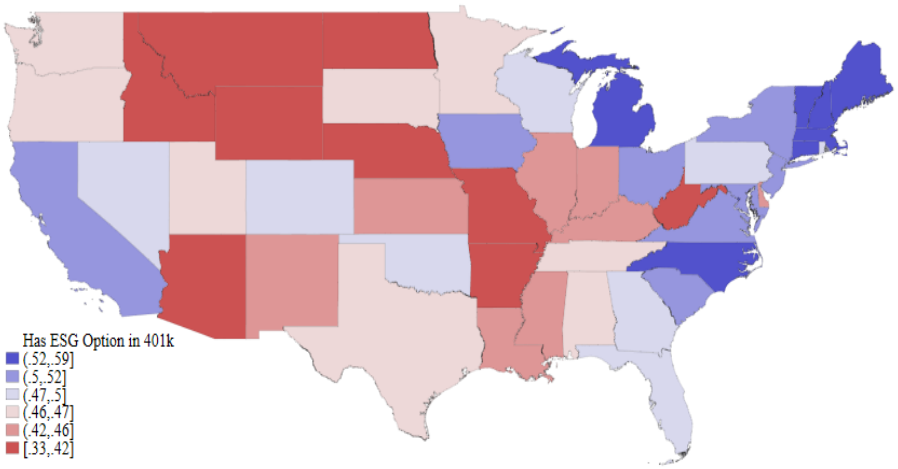
Notes: Figure 3 displays the share of index funds with an ESG mandate. In panel (a), we report the equal weighted share of index funds and in panel (b) we report the AUM weighted share of index funds.

Figure 4: Susceptibility to Greenwashing by Investor Type



Notes: Figure 4 displays the estimated willingness to pay for the ESG label among U.S. and European institutional and retail investors, conditional on the sustainability of the fund's underlying portfolio. The estimates are constructed from a regression that mirrors the one reported in column (3) of Table 5a, where we estimate the specification separately for US and European institutional and retail investors. We control for the sustainability of the fund by including controls for whether the fund received a top sustainability rating (4 or 5 Globes) from Morningstar and the fund's log carbon emissions.

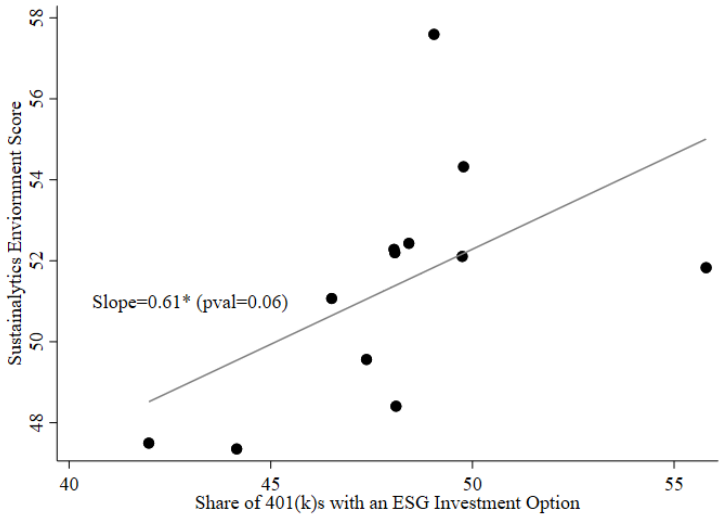
Figure 5: Share of 401(k) Plans with an ESG Investment Option



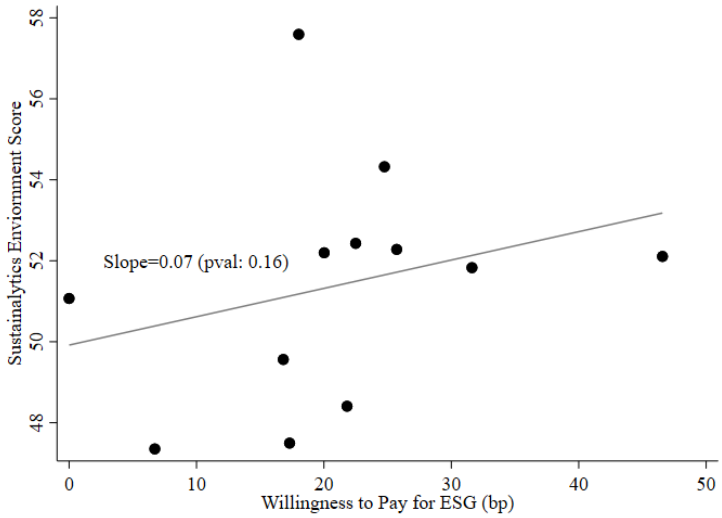
Notes: Figure 5 displays the share of 401(k) plans that have at least one ESG investment alternative. Observations are at the state level as of 2019.

Figure 6: Industry Analysis: Interest in ESG vs. Environmental Score

(a) Share of 401(k) Plans with an ESG Investment Option vs. Environmental Score



(b) Willingness to Pay for ESG vs. Environmental Score



Notes: Figure 6 panel (a) displays a binned scatter plot of the availability of ESG-related investment options versus environmental scores at the industry level. We measure environmental score at the industry level using data from Sustainalytics, where a higher environmental score corresponds to lower environmental risk. Panel (b) displays a binned scatter plot of an investor's estimated willingness to pay for ESG versus environmental scores at the industry level. Our estimates of an investor's willingness to pay for ESG at the industry level corresponds to the regression results reported in Table 10b. To account for outliers, when constructing panel (b) we truncate the results from Table 10b at zero from below.

Table 1: Summary Statistics

(a) Fund Summary Statistics

	Obs.	Mean	Std. Dev.	Median
Total Net Assets ($mm)	259,559	3,196.92	16,924.75	167.90
Expense Ratio (bps)	257,943	61.73	61.89	45.00
Fund Age (Years)	259,927	9.89	6.84	8.92
Morningstar Rating	112,168	3.12	1.09	3.00
ESG Measures:				
ESG Fund	146,310	0.04		
Sustainability Fund	146,116	0.06		
Morningstar Sustainability Rating	122,591	2.91	0.99	3.00
ln(Carbon Footprint)	76,178	4.28	1.32	4.42
ESG-Related Strategy	213,968	0.03		
Member of the US-SIF	61,103	0.02		
Fossil Fuel Grade: A	61,103	0.16		
Deforestation Grade: A	61,103	0.16		
Gender Equality Grade: A	61,103	0.22		
Civilian Firearm Grade: A	61,103	0.58		
Military Firearm Grade: A	61,103	0.30		
Tobacco Grade: A	61,103	0.38		

(b) ESG vs. Non-ESG

	Non-ESG		ESG		
	Mean	Std. Dev.	Mean	Std. Dev.	Difference
Total Net Assets ($mm)	3,891	20,640	687	1,912	3,204***
Expense Ratio (bps)	59.78	61.60	37.06	32.06	22.72***
Fund Age (Years)	10.76	7.16	5.78	5.91	4.98***
Morningstar Rating	3.11	1.09	3.33	0.98	-0.22***

(c) Correlations between ESG Measures

Variables	ESG Fund	Sus. Fund	ESG Strategy	Sustainability Rating	US-SIF Member	ln(Carbon Footprint)
ESG Fund	1.00					
Sus. Fund	0.85	1.00				
ESG Strategy	0.88	0.80	1.00			
Sus. Rating	0.26	0.24	0.19	1.00		
US-SIF Member	0.44	0.41	0.50	0.15	1.00	
ln(Carbon Footprint)	-0.07	-0.05	-0.05	-0.24	-0.05	1.00

Notes: Table 1 displays summary statistics for our base data set. Observations are at the fund-by-month level over the period 05/2019-03/2022. In panel (a) we report summary statistics for the full sample and in panel (b) we separately report summary statistics for funds with and without an ESG mandate. In panel (c) we report the correlations between our different ESG measures. The indicator variables *ESG*, *Impact*, and *Sustainability Fund* indicate whether the fund has the corresponding mandate as reported by Morningstar. *Sustainability Rating* reflects Morningstar's globe ratings. The variable *ln(Carbon Footprint)* measures the log of the fund's scope 1 and 2 emissions and is measured in terms of metric tonnes of CO_2 or CO_2 equivalents per $1 million invested. *ESG-Related Strategy* indicates whether a fund mentions ESG in the strategy section of its prospectus. *Member of the US-SIF* indicates whether the fund is a member of the Forum for Sustainable and Responsible Investing. The grade variables (e.g., *Fossil Fuel Grade: A*) indicate whether the fund received an "A" grade in the respective category as per Invest Your Values. *** p<0.01, ** p<0.05, * p<0.10.

Table 2: Demand for Index Funds - Preferences for ESG

	(1)	(2)	(3)
Expense Ratio (bps)	-0.034***	-0.029***	-0.026***
	(0.00004)	(0.001)	(0.001)
ESG Fund x (Year=2019)	0.079	0.078	-0.018
	(0.130)	(0.132)	(0.133)
ESG Fund x (Year=2020)	0.518***	0.502***	0.332***
	(0.115)	(0.117)	(0.115)
ESG Fund x (Year=2021)	0.373***	0.359***	0.300***
	(0.110)	(0.111)	(0.111)
ESG Fund x (Year=2022)	-0.243**	-0.251**	-0.142
	(0.117)	(0.117)	(0.118)
ESG Fund x (Year=2023)	-0.972***	-0.965***	-0.926***
	(0.125)	(0.126)	(0.126)
Observations	49,312	49,166	48,532
R-squared	0.429	0.161	0.178
Market F.E.	X	X	X
IV		X	X
Additional Fund Controls			X
Elasticity of Demand	1.9	1.6	1.5
Value of ESG (2019; bp)	2	3	-1
	(3.8)	(4.3)	(4.4)
Value of ESG (2020; bp)	15***	17***	13***
	(3.4)	(4.0)	(4.2)
Value of ESG (2021; bp)	11***	12***	11***
	(3.2)	(4.0)	(4.8)
Value of ESG (2022; bp)	-7**	-9**	-5
	(3.4)	(4.5)	(5.1)
Value of ESG (2023; bp)	-29***	-33***	-35***
	(3.7)	(3.8)	(4.5)

Notes: Table 2 displays the regression results corresponding to our demand model (4). Observations are at the fund-by-month level over the period 05/2019-12/2023. Markets are defined at the Lipper Class-by-month-by-fund type level. Additional fund controls include Morningstar star rating and past cumulative 1-, 3-, 6-, and 12-month returns. In each specification we include fund-age (in months) fixed effects and market fixed effects. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

In the bottom panel we interpret the demand estimates in terms of the elasticity of demand and investor's willingness to pay for ESG. Standard errors are computed using the delta method. We compute the elasticity of demand using the average expense ratio in the data (59 basis points) and assuming a market share of 5%.

Table 3: The Demand for Index Funds - By Asset Class

(a) Pre June 2022

	(1)	(2)	(3)
Expense Ratio (bps)	-0.027***	-0.056***	-0.044***
	(0.001)	(0.008)	(0.004)
ESG Fund	0.463***	0.278*	0.237
	(0.079)	(0.152)	(0.169)
Observations	12,744	2,961	4,404
R-squared	0.235	0.304	0.268
Market F.E.	X	X	X
IV	X	X	X
Sample	US Equities	Bonds	Intl. Equities
Elasticity of Demand	1.5	3.1	2.5
Value of ESG (bp)	17***	5*	5
	(3.0)	(2.8)	(3.7)

Notes: Table 3 displays the regression results corresponding to our demand model (eq . 4). Observations are at the fund-by-month level over the period 05/2019-05/2022 in panel (a) and 06/2022-12/2023 in panel (b). Markets are defined at the Lipper Class-by-month-by-fund type level. In each specification we control for Morningstar rating, past cumulative 1-, 3-, 6-, and 12-month returns, fund-age (in months) fixed effects, and market fixed effects. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$. In the bottom panel we interpret the demand estimates in terms of the elasticity of demand and investors' willingness to pay for ESG. Standard errors are computed using the delta method. We compute the elasticity of demand using the average expense ratio in the data (59 basis points) and assuming a market share of 5%.

Table 3: The Demand for Index Funds - By Asset Class (Continued)

(b) Post June 2022

	(1)	(2)	(3)
Expense Ratio (bps)	-0.022***	-0.021**	-0.035***
	(0.001)	(0.011)	(0.005)
ESG Fund	-0.362***	0.041	-2.044***
	(0.124)	(0.224)	(0.279)
Observations	6,924	1,457	2,269
R-squared	0.225	0.107	0.221
Market F.E.	X	X	X
IV	X	X	X
Sample	US Equities	Bonds	Intl. Equities
Elasticity of Demand	1.3	1.2	2.0
Value of ESG (bp)	-16***	2	-58***
	(5.5)	(10.6)	(13.6)

Notes: Table 3 displays the regression results corresponding to our demand model (eq . 4). Observations are at the fund-by-month level over the period 05/2019-05/2022 in panel (a) and 06/2022-12/2023 in panel (b). Markets are defined at the Lipper Class-by-month-by-fund type level. In each specification we control for Morningstar rating, past cumulative 1-, 3-, 6-, and 12-month returns, fund-age (in months) fixed effects, and market fixed effects. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$. In the bottom panel we interpret the demand estimates in terms of the elasticity of demand and investors' willingness to pay for ESG. Standard errors are computed using the delta method. We compute the elasticity of demand using the average expense ratio in the data (59 basis points) and assuming a market share of 5%.

Table 4: Portfolio Overlap and Return Correlation

Category	Avg. Portfolio Overlap	Avg. Return Correlation
EM	0.589	0.989
Global	0.435	0.978
International	0.611	0.960
Other	0.356	0.848
US Blend/Core	0.755	0.994
US Growth	0.741	0.980
US Value	0.516	0.971
Total	0.705	0.986

Notes: Table 4 column (1) displays the average portfolio overlap (weighted by assets within a fund category) for each ESG fund and the corresponding Non-ESG fund with the most similar portfolio. Column (2) displays the average return correlation (weighted by assets within a fund category) for each ESG fund and the corresponding Non-ESG fund with the most correlated returns. Investment categories are constructed by aggregating Lipper classes.

Table 5: The Effect of Portfolio and Stock-Level ESG Ratings

(a) Pre June 2022

	(1)	(2)	(3)	(4)
Expense Ratio (bps)	-0.029***	-0.028***	-0.058***	-0.060***
	(0.001)	(0.001)	(0.002)	(0.003)
ESG Fund	0.280***			0.686***
	(0.065)			(0.095)
4+ Globe Rating		0.144***		0.167***
		(0.041)		(0.059)
ln(Carbon Footprint)			-0.306***	-0.233***
			(0.038)	(0.040)
Observations	32,300	34,343	15,718	15,604
R-squared	0.182	0.178	0.203	0.206
Market F.E.	X	X	X	X
IV	X	X	X	X
Elasticity of Demand	1.6	1.6	3.3	3.4
Value of ESG (bp)	10***			11***
	(2.3)			(1.5)
Value of 4+ Globe Rating (bp)		5***		3***
		(1.5)		(1.0)
Value of 50% Dec. In Carbon Footprint (bp)			3***	2***
			(0.3)	(0.3)

Notes: Table 5 displays the regression results corresponding to our demand model (eq . 4). Observations are at the fund-by-month level over the period 05/2019-05/2022 in panel (a) and 06/2022-12/2023 in panel (b). Markets are defined at the Lipper Class-by-month-by-fund type level. In each specification we control for Morningstar rating, past cumulative 1-, 3-, 6-, and 12-month returns, fund-age (in months) fixed effects, and market fixed effects. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$. In the bottom panel we interpret the demand estimates in terms of the elasticity of demand and investors' willingness to pay for ESG. Standard errors are computed using the delta method. We compute the elasticity of demand using the average expense ratio in the data (59 basis points) and assuming a market share of 5%.

Table 5: The Effect of Portfolio and Stock-Level ESG Ratings (Continued)

(b) Post June 2022

	(1)	(2)	(3)	(4)
Expense Ratio (bps)	-0.023***	-0.025***	-0.028***	-0.026***
	(0.001)	(0.001)	(0.001)	(0.001)
ESG Fund	-0.801***			-0.829***
	(0.100)			(0.113)
4+ Globe Rating		-0.259***		-0.072
		(0.062)		(0.071)
ln(Carbon Footprint)			0.115***	0.040
			(0.041)	(0.042)
Observations	16,199	16,245	13,344	13,309
R-squared	0.170	0.170	0.179	0.181
Market F.E.	X	X	X	X
IV	X	X	X	X
Elasticity of Demand	1.3	1.4	1.6	1.5
Value of ESG (bp)	-35***			-31***
	(4.5)			(4.5)
Value of 4+ Globe Rating (bp)		-11***		-3
		(2.6)		(2.7)
Value of 50% Dec. In Carbon Footprint (bp)			-2***	-1
			(0.7)	(0.8)

Notes: Table 5 displays the regression results corresponding to our demand model (eq . 4). Observations are at the fund-by-month level over the period 05/2019-05/2022 in panel (a) and 06/2022-12/2023 in panel (b). Markets are defined at the Lipper Class-by-month-by-fund type level In each specification we control for Morningstar rating, past cumulative 1-, 3-, 6-, and 12-month returns, fund-age (in months) fixed effects, and market fixed effects. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$. In the bottom panel we interpret the demand estimates in terms of the elasticity of demand and investors' willingness to pay for ESG. Standard errors are computed using the delta method. We compute the elasticity of demand using the average expense ratio in the data (59 basis points) and assuming a market share of 5%.

Table 6: Demand for Index Funds - Aspects of ESG

(a) Pre June 2022

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Expense Ratio (bps)	-0.057***	-0.057***	-0.057***	-0.057***	-0.057***	-0.057***	-0.060***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Fossil Fuel Grade: A	0.395***						0.331***
	(0.117)						(0.122)
Deforestation Grade: A		0.006					0.032
		(0.100)					(0.103)
Gender Equality Grade: A			0.362***				0.235***
			(0.067)				(0.069)
Civilian Firearm Grade: A				0.408***			0.213***
				(0.073)			(0.075)
Military Firearm Grade: A					0.142*		0.054
					(0.085)		(0.085)
Tobacco Grade: A						-0.017	-0.115
						(0.083)	(0.084)
ESG Fund							0.743***
							(0.094)
Observations	15,169	15,169	15,169	15,169	15,169	15,169	15,056
R-squared	0.199	0.199	0.200	0.200	0.199	0.199	0.205
Market F.E.	X	X	X	X	X	X	X
IV	X	X	X	X	X	X	X
Elasticity of Demand	3.2	3.2	3.2	3.2	3.2	3.2	3.4
Value of Fossil Fuel Grade: A (bp)	7***						5***
	(2.0)						(2.0)
Value of Deforestation Grade: A (bp)		0					1
		(1.8)					(1.7)
Value of Gender Equality Grade: A (bp)			6***				4***
			(1.2)				(1.2)
Value of Civilian Firearm Grade: A (bp)				7***			4***
				(1.2)			(1.2)
Value of Military Firearm Grade: A (bp)					2*		1
					(1.5)		(1.4)
Value of Tobacco Grade: A (bp)						0	-2
						(1.5)	(1.4)
Value of ESG (bp)							12***
							(1.4)

Notes: Table 6 displays the regression results corresponding to our demand model (eq. 4). Observations are at the fund-by-month level over the period 05/2019-05/2022 in panel (a) and 06/2022-12/2023 in panel (b). The grade related independent variables indicate whether the fund received an A grade in a given category as per Invest Your Values. Markets are defined at the Lipper Class-by-month-by-fund type level. In each specification we control for Morningstar rating, past cumulative 1-, 3-, 6-, and 12-month returns, fund-age (in months) fixed effects, and market fixed effects. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

In the bottom panel we interpret the demand estimates in terms of the elasticity of demand and investor's willingness to pay for ESG. Standard errors are computed using the delta method. We compute the elasticity of demand using the average expense ratio in the data (59 basis points) and assuming a market share of 5%.

Table 6: Demand for Index Funds - Aspects of ESG (Continued)

(b) Post June 2022

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Expense Ratio (bps)	-0.048***	-0.048***	-0.048***	-0.049***	-0.048***	-0.049***	-0.046***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Fossil Fuel Grade: A	-0.762***						-0.680***
	(0.202)						(0.209)
Deforestation Grade: A		-0.356***					-0.297**
		(0.137)					(0.141)
Gender Equality Grade: A			-0.044				0.010
			(0.097)				(0.098)
Civilian Firearm Grade: A				0.206**			0.301***
				(0.091)			(0.091)
Military Firearm Grade: A					0.056		0.131
					(0.112)		(0.114)
Tobacco Grade: A						-0.263***	-0.253***
						(0.100)	(0.098)
ESG Fund							-0.909***
							(0.123)
Observations	9,616	9,616	9,616	9,616	9,616	9,616	9,606
R-squared	0.175	0.174	0.173	0.174	0.173	0.174	0.181
Market F.E.	X	X	X	X	X	X	X
IV	X	X	X	X	X	X	X
Elasticity of Demand	2.7	2.7	2.7	2.7	2.7	2.7	2.6
Value of Fossil Fuel Grade: A (bp)	-16***						-15***
	(4.4)						(4.7)
Value of Deforestation Grade: A (bp)		-7**					-6**
		(3.0)					(3.1)
Value of Gender Equality Grade: A (bp)			-1				0
			(2.0)				(2.1)
Value of Civilian Firearm Grade: A (bp)				4**			7***
				(1.8)			(1.9)
Value of Military Firearm Grade: A (bp)					1		3
					(2.3)		(2.5)
Value of Tobacco Grade: A (bp)						-5**	-5**
						(2.2)	(2.3)
Value of ESG (bp)							-20***
							(3.2)

Notes: Table 6 displays the regression results corresponding to our demand model (eq. 4). Observations are at the fund-by-month level over the period 05/2019-05/2022 in panel (a) and 06/2022-12/2023 in panel (b). The grade related independent variables indicate whether the fund received an A grade in a given category as per Invest Your Values. Markets are defined at the Lipper Class-by-month-by-fund type level. In each specification we control for Morningstar rating, past cumulative 1-, 3-, 6-, and 12-month returns, fund-age (in months) fixed effects, and market fixed effects. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

In the bottom panel we interpret the demand estimates in terms of the elasticity of demand and investor's willingness to pay for ESG. Standard errors are computed using the delta method. We compute the elasticity of demand using the average expense ratio in the data (59 basis points) and assuming a market share of 5%.

Table 7: The Demand for Index Funds - By Investor Type

	(1)	(2)	(3)	(4)	(5)	(6)
Expense Ratio (bps)	-0.033***	-0.028***	-0.026***	-0.046***	-0.038***	-0.035***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
ESG Fund x (Year=2019)	-0.000	0.006	-0.108	0.249	0.279	0.259
	(0.156)	(0.159)	(0.163)	(0.171)	(0.172)	(0.170)
ESG Fund x (Year=2020)	0.354***	0.352***	0.221*	0.703***	0.676***	0.529***
	(0.132)	(0.135)	(0.132)	(0.136)	(0.139)	(0.138)
ESG Fund x (Year=2021)	0.358***	0.341**	0.315**	0.699***	0.673***	0.618***
	(0.136)	(0.138)	(0.138)	(0.131)	(0.133)	(0.132)
ESG Fund x (Year=2022)	-0.289**	-0.273**	-0.145	-0.055	-0.064	0.025
	(0.139)	(0.139)	(0.139)	(0.126)	(0.126)	(0.127)
ESG Fund x (Year=2023)	-0.415***	-0.381***	-0.334**	-0.694***	-0.673***	-0.617***
	(0.137)	(0.137)	(0.138)	(0.129)	(0.129)	(0.130)
Observations	36,414	36,270	35,836	41,300	41,161	40,674
R-squared	0.480	0.158	0.175	0.443	0.121	0.137
Market F.E.	X	X	X	X	X	X
IV		X	X		X	X
Additional Fund Controls			X			X
Sample	Retail	Retail	Retail	Inst.	Inst.	Inst.
Elasticity of Demand	1.8	1.6	1.4	2.6	2.1	1.9
Value of ESG (2019; bp)	0	0	-4	5	7	7
	(4.8)	(4.9)	(5.4)	(2.8)	(4.6)	(4.0)
Value of ESG (2020; bp)	11***	12***	9*	15***	18***	15***
	(4.0)	(4.9)	(5.1)	(2.9)	(3.7)	(3.8)
Value of ESG (2021; bp)	11***	12**	12**	15***	18***	18***
	(4.1)	(4.9)	(5.4)	(2.7)	(3.6)	(3.9)
Value of ESG (2022; bp)	-9**	-10**	-6	-1	-2	1
	(4.2)	(5.6)	(6.3)	(3.7)	(3.5)	(4.9)
Value of ESG (2023; bp)	-13***	-13***	-13**	-15***	-18***	-18***
	(4.2)	(4.8)	(5.3)	(2.8)	(3.4)	(3.6)

Notes: Table 7 displays the regression results corresponding to our demand model (4). Panel (a) corresponds to retail investor demand and panel (b) corresponds to institutional investor demand. Observations are at the fund-by-month level over the period 05/2019-12/2023. Markets are defined at the Lipper Class-by-month-by-fund type level. Additional fund controls include Morningstar star rating and past cumulative 1-, 3-, 6-, and 12-month returns. In each specification we include fund-age (in months) fixed effects and market fixed effects. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

In the bottom panel we interpret the demand estimates in terms of the elasticity of demand and investor's willingness to pay for ESG. Standard errors are computed using the delta method. We compute the elasticity of demand using the average expense ratio in the data (59 basis points) and assuming a market share of 5%.

Table 8: European Demand for Index Funds - Preferences for ESG

	(1)	(2)	(3)
Expense Ratio (bps)	-0.024***	-0.022***	-0.025***
	(0.001)	(0.002)	(0.002)
ESG Fund x (Year=2019)	-0.010	-0.016	-0.059
	(0.087)	(0.088)	(0.095)
ESG Fund x (Year=2020)	0.281***	0.284***	0.079
	(0.076)	(0.077)	(0.082)
ESG Fund x (Year=2021)	0.440***	0.449***	0.412***
	(0.063)	(0.063)	(0.066)
ESG Fund x (Year=2022)	0.348***	0.352***	0.387***
	(0.066)	(0.067)	(0.067)
ESG Fund x (Year=2023)	0.310***	0.313***	0.343***
	(0.067)	(0.067)	(0.067)
Observations	85,863	84,754	79,088
R-squared	0.304	0.012	0.019
Market F.E.	X	X	X
IV		X	X
Additional Fund Controls			X
Elasticity of Demand	1.3	1.2	1.4
Value of ESG (2019; bp)	0	-1	-2
	(3.7)	(4.1)	(3.3)
Value of ESG (2020; bp)	12***	13***	3
	(3.3)	(3.8)	(3.0)
Value of ESG (2021; bp)	19***	21***	17***
	(2.7)	(3.5)	(3.9)
Value of ESG (2022; bp)	15***	16***	16***
	(2.9)	(3.4)	(3.0)
Value of ESG (2023; bp)	13***	15***	14***
	(2.9)	(3.5)	(3.1)

Notes: Table 8 displays the regression results corresponding to our demand model (4). Observations are at the fund-by-month level over the period 01/2019-12/2023 for index funds available for sale in Europe. Markets are defined at the Morningstar category-by-month-by-fund type level. Additional fund controls include Morningstar star rating and past cumulative 1-, 3-, 6-, and 12-month returns. In each specification we include fund-age (in months) fixed effects and market fixed effects. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

In the bottom panel we interpret the demand estimates in terms of the elasticity of demand and investor's willingness to pay for ESG. Standard errors are computed using the delta method. We compute the elasticity of demand using the average expense ratio in the data (59 basis points) and assuming a market share of 5%.

Table 9: Geographic Variation in ESG Preferences

(a) Geographic Variation in the Availability of ESG-Oriented Funds in 401(k) Plans

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Worried About Climate Change	0.214***	0.118*								
	(0.070)	(0.064)								
Climate Change is Happening			0.228***	0.120*						
			(0.077)	(0.068)						
Climate Change is Caused by Humans					0.309***	0.202***				
					(0.077)	(0.061)				
Should Regulate CO2							0.434***	0.226**		
							(0.112)	(0.105)		
Democratic Vote Share									0.105***	0.040
									(0.031)	(0.028)
Overall Risk	-0.011	0.034*	-0.003	0.041**	-0.021	0.022	0.000	0.036**	-0.012	0.036*
	(0.018)	(0.018)	(0.017)	(0.016)	(0.019)	(0.016)	(0.017)	(0.017)	(0.018)	(0.019)
ln(Income)	0.055***	0.074***	0.062***	0.076***	0.046**	0.069***	0.064***	0.078***	0.068***	0.077***
	(0.019)	(0.018)	(0.019)	(0.019)	(0.019)	(0.018)	(0.019)	(0.019)	(0.019)	(0.019)
Pct College	0.060	0.103*	0.039	0.095	0.031	0.074	0.025	0.084	0.018	0.102*
	(0.070)	(0.055)	(0.071)	(0.058)	(0.070)	(0.054)	(0.067)	(0.058)	(0.073)	(0.058)
ln(Median Age)	0.110***	0.034	0.101**	0.026	0.112***	0.048	0.077*	0.031	0.107***	0.025
	(0.038)	(0.037)	(0.039)	(0.036)	(0.037)	(0.036)	(0.040)	(0.037)	(0.039)	(0.038)
Observations	2,142	2,142	2,142	2,142	2,142	2,142	2,142	2,142	2,142	2,142
R-squared	0.071	0.197	0.069	0.197	0.079	0.200	0.081	0.197	0.072	0.196
State F.E.		X		X		X		X		X

Notes: Table 9a displays the regression results corresponding to a linear regression model (eq.6). Observations are at the county level. The dependent variable is the share of 401(k) plans in a county as of 2019 that include at least one mutual fund with an ESG mandate. The regressions are weighted by the number of 401(k) plans in each county. Robust standard errors are in parenthesis. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table 9: Geographic Variation in ESG Preferences (Continued)

(b) Geographic Variation in Willingness to Pay for ESG

	(1)	(2)	(3)	(4)	(5)	(6)
ESG Fund	0.253***	-0.064	-0.054	-0.020	-0.145	0.119*
	(0.016)	(0.148)	(0.180)	(0.132)	(0.294)	(0.070)
ESG Fund x Worried About Climate Change		0.434**				
		(0.204)				
ESG Fund x Happening			0.390*			
			(0.231)			
ESG Fund x Climate Change is Caused by Humans				0.421**		
				(0.205)		
ESG Fund x Should Regulate CO2					0.521	
					(0.388)	
ESG Fund x Democratic Vote Share						0.192*
						(0.100)
Observations	160,697	159,410	159,410	159,410	159,410	159,410
R-squared	0.965	0.965	0.965	0.965	0.965	0.965
Plan F.E.	X	X	X	X	X	X

Notes: Table 9b displays the regression results at the fund-by-401(k) plan level, where we restrict our attention to index funds (eq. 8). The dependent variable is the plan participants' average (across participants) expected return of the fund as per Egan, MacKay and Yang (2021). Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table 10: Variation in ESG Preferences Across Industries

(a) Availability of ESG-Oriented Funds in 401(k) Plans Across Industries

Sector	Mean
Educational Services	0.56
Information	0.56
Professional, Scientific, and Tech. Services	0.53
Wholesale Trade	0.50
Real Estate and Rental and Leasing	0.50
Management of Companies and Enterprises	0.49
Manufacturing	0.49
Arts, Entertainment, and Recreation	0.49
Admin and Support and Waste Services	0.48
Finance and Insurance	0.48
Mining, Quarrying, and Oil and Gas Extraction	0.48
Utilities	0.48
Other Services (except Public Administration)	0.48
Health Care and Social Assistance	0.47
Retail Trade	0.47
Transportation and Warehousing	0.47
Agriculture, Forestry, Fishing and Hunting	0.45
Public Administration	0.45
Accommodation and Food Services	0.44
Construction	0.42

Notes: Table 10a Table displays the share of 401(k) plans that have at least one ESG investment option at the industry level (2-digit NAICS) as of 2019.

Table 10: Variation in ESG Preferences Across Industries (Continued)

(b) Willingness to Pay for ESG Across Industries

	(1)
ESG Fund x Management of Companies and Enterprises	0.690*
	(0.409)
ESG Fund x Real Estate and Rental and Leasing	0.466***
	(0.122)
ESG Fund x Public Administration	0.423***
	(0.083)
ESG Fund x Information	0.316***
	(0.048)
ESG Fund x Other Services (except Public Administration)	0.312***
	(0.050)
ESG Fund x Arts, Entertainment, and Recreation	0.308***
	(0.106)
ESG Fund x Professional, Scientific, and Tech. Services	0.276***
	(0.029)
ESG Fund x Health Care and Social Assistance	0.257***
	(0.038)
ESG Fund x Utilities	0.257*
	(0.138)
ESG Fund x Wholesale Trade	0.248***
	(0.082)
ESG Fund x Admin and Support and Waste Services	0.225**
	(0.097)
ESG Fund x Educational Services	0.225***
	(0.054)
ESG Fund x Finance and Insurance	0.218***
	(0.067)
ESG Fund x Mining, Quarrying, and Oil and Gas Extraction	0.200
	(0.154)
ESG Fund x Manufacturing	0.180***
	(0.049)
ESG Fund x Construction	0.173**
	(0.077)
ESG Fund x Retail Trade	0.168***
	(0.063)
ESG Fund x Agriculture, Forestry, Fishing and Hunting	0.119
	(0.190)
ESG Fund x Accommodation and Food Services	0.067
	(0.098)
ESG Fund x Transportation and Warehousing	-0.625
	(0.734)
Observations	160,697
R-squared	0.965
Plan F.E.	X
Fund Category F.E.	X

Notes: Table 10b displays the regression results at the fund-by-401(k) plan level, where we restrict our attention to index funds. The dependent variable the plan participants' average (across participants) expected return of the fund as per Egan, MacKay and Yang (2021). Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table 11: ESG Returns and Willingness to Pay for ESG

	(1)	(2)	(3)
ESG Fund	25.180	23.577	
	(49.472)	(49.628)	
Value of ESG (σ) x ESG Fund		-21.338	-34.703
		(41.696)	(44.926)
Expense Ratio (bps)	0.151	0.153	2.116
	(0.491)	(0.492)	(3.336)
Constant	411.538***	411.227***	245.537
	(145.795)	(145.780)	(215.329)
Observations	103,947	103,947	103,940
R-squared	0.909	0.909	0.911
Mkt FE	X	X	X
Fund FE			X

Notes: Table 11 displays the regression results corresponding to our linear regression model (13). Observations are at the fund-by-month level over the period 05/2019-12/2023. The dependent variable are monthly fund annualized returns measured in basis points. The Value of ESG are in units of standard deviations. Markets are defined at the Lipper Class-by-month-by-fund type level. Standard errors are in parentheses and are clustered at the monthly level. *** p<0.01, ** p<0.05, * p<0.10.

A Appendix

The appendix contains additional descriptions of our data and robustness checks.

A.1 Additional Descriptive Statistics

Table A1 presents the share of ESG funds by Morningstar category. Some categories have no ESG funds, while other categories have as much as a 40% representation of ESG funds.

A.2 Alternative Measures of ESG

Table A2 repeats our baseline time series analysis in Column 1 of Table 5. Rather than use the Morningstar classification for an ESG fund, which we repeat in the first column, we consider: whether the fund has a sustainability mandate as measured by Morningstar; whether a fund mentions "ESG" in the investment strategy of its summary prospectus; and whether the fund is offered by members of the Forum for Sustainable and Responsible Investment.

A.3 Accounting for Investor Inertia

We estimate an alternative model of investor demand following Brown et al. (2023), where we explicitly model investor inertia. In the framework developed in Brown et al. (2023), a fraction ϕ of investors are inactive each period and simply maintain their investments from the previous period, and $1-\phi$ of investors are active. Total AUM can then be written in terms of active and inactive demand:

$$AUM_{kt} = \underbrace{\phi AUM_{kt-1}(1+r_{kt})}_{\text{Inactive demand}} + AUM_{kt}^{Active},$$

where inactive demand at time t is given by the share of inactive investors (ϕ) multiplied by their holdings from the previous period scaled by gross returns. Brown et al. (2023), estimate the empirical analog:

$$\ln AUM_{kt} = \phi \ln(AUM_{kt-1}(1+r_{k,t})) + X_{kt}'\Gamma + \iota_{kt} \tag{9}$$

and estimate that roughly 3% of investors are active each month. Given the estimate of $\hat{\phi}$, we can calculate the total assets of fund k held by active investors at time t as:

$$AUM_{kt}^{Active} = \exp\left(\frac{\ln AUM_{kt} - \hat{\phi} AUM_{kt-1}(1+r_{kt})}{1-\hat{\phi}}\right)$$

and the market share for fund k that track investment objective m as:

$$s_{kmt} = \frac{AUM_{kmt}^{Active}}{\sum_{l \in \mathcal{L}_{mt}} AUM_{lmt}^{Active}},$$

where $\mathcal{L}_{mt}$ is the set of funds that track investment objective m. Table A3 displays the estimates corresponding to our baseline time series investor demand specification where we measure market shares based on active demand. As discussed in the text, the results imply that investors' willingness to pay for ESG in the early part of the sample is roughly 6-25 basis points, which is similar to our estimates where we measure market shares in terms of flows.

A.4 Random Coefficients Logit Model

We reestimate our baseline time series model allowing investor preferences for ESG to vary arbitrarily across investors. We parameterize investor preferences for ESG as: $\gamma_{it} = \gamma_{y(t)} + \sigma_\gamma \nu_{it}$. The term $\gamma_{y(t)}$ captures mean investor preferences for ESG, and the term ν_{it} captures investor-specific preferences. We assume that $\nu_{it} \sim N(0, 1)$ such that σ_γ represents the standard deviation of preferences for ESG across investors. In addition to whether the fund has an ESG mandate, we also control for the fund expense ratio, fund age, Morningstar rating, and past returns (1-, 3, 6, and 12-month cumulative returns). Preferences for other these non-ESG characteristics are assumed to be constant across investors, as in our baseline time series specification.

We estimate the model following Berry et al. (1995) using the pyBLP package as described by the authors in Conlon and Gortmaker (2020). In addition to our cost-shifter instruments, we also use the BLP instruments.[19] The corresponding estimates are displayed in Table A5.

A.5 Investors and Intermediaries

If investors act as if they are willing to pay more for an ESG fund, and by implication, for the securities that make up the fund's portfolio, this value is captured in part by the fund's investors, the firms in the fund's portfolio, and the fund management company and its employees who create and manage the ESG fund. In the early part of our sample, we find that investors were willing to pay a 17 basis point premium to invest in ESG funds. How much of that benefit is potentially captured by intermediaries depends on the competitiveness of the index fund market. For example, if the index fund market is perfectly competitive, intermediaries might capture zero ESG benefit. However, if the index fund market is not very competitive, such that fund managers are price setters rather than price takers, ESG funds might charge higher expense ratios.

[19] Using the pyBLP package we use the optimal BLP instruments, where we iteratively compute the optimal BLP instruments until the estimates converge.

To calculate the division between investors and intermediaries, we estimate the supply-side of the model to calculate intermediaries' profit margins on ESG and non-ESG funds. The profits of index fund manager j are given by

$$\Pi_j = \sum_{m \in \mathcal{M}} \sum_{k \in \mathcal{J}_j} N_m s_k (p_k - \kappa_k),$$

where we omit the time subscripts t for convenience. The set $\mathcal{M}$ denotes the set of markets (i.e., fund objectives) and the size of each market in terms of total net assets is denoted N_m. The set $\mathcal{J}_j$ denotes the set of index funds that are operated by index fund manager j. We assume that the manager managing index fund k has a constant marginal cost κ_k such that its profit margin is given by $p_k - \kappa_k$.

We further assume that index fund managers play a multi-product differentiated Nash Bertrand expense ratio setting game, where index fund managers take the set of index funds and associated non-expense ratio characteristics as given. The first-order condition corresponding to fund k operated by manager j is:

$$\frac{1}{\alpha} = (p_k - c_k) - \sum_{k' \in \mathcal{J}_j} s_{k'} (p_{k'} - \kappa_{k'}). \tag{10}$$

Note that given an estimate of α and observed expense ratios and market shares, we can use the above set of first order conditions to recover the marginal cost of operating a fund κ_k for each fund k.[20] The median cost is 15 basis points.

One implication of this simple supply and demand framework is that, because investors are willing to pay more for ESG funds in the first part of our sample, index fund managers will find it optimal to charge a premium for ESG funds. We report the corresponding estimates in Table A6. In column (1), the dependent variable is a fund's expense ratio while in column (2), the dependent variable is the firm's costs. We see that the average ESG fund charges an expense ratio that is 5.4 basis point higher than for the average non-ESG fund. The results in column (2) indicate that ESG funds have a 2.5 basis points higher marginal cost. This implies that ESG funds charge a markup that is roughly 3 basis points higher than non-ESG funds.

A.6 Implications for Firms

We examine whether ESG funds have higher realized returns than non-ESG funds and whether investors' time-varying preferences or beliefs about ESG are positively correlated with future ESG returns. We add the significant caveat that our sample is quite short, which makes this type of return prediction exercise challenging. This testable implication that separates the two

[20] Note that our estimation procedure allows costs to be negative. When computing marginal costs, we assume the minimum marginal cost is -10 basis points.

possibilities is clear in theory but harder to implement with precision.[21]

We estimate the following regression specification:

$$Ret_{kt} = \phi ESG_{kt} + \eta_{kt}, \tag{11}$$

where Ret_{kt} measures the monthly net of fee return of fund k at time t, and is annualized (i.e., multiplied by 12) in columns (1) through (3). We also include market (i.e., Lipper class-by-fund type-by-month) fixed effects to control for market-wide trends and account for risk. We report the estimates in column (1) of Table 11, and we find no statistically significant link between an ESG mandate and future returns, though the point estimate is an economically meaningful 25 basis points per year. The standard error is higher still, so we cannot reject the hypothesis that there is no link.

Next, we examine whether investors' willingness to pay for ESG is correlated with returns. We start by estimating the utility parameters corresponding to the specification:

$$u_{ikt} = -\alpha p_{kt} + \sum_{t=0}^{T} \gamma_t ESG_{kt} + X'_{kt}\Theta + \xi_{kt} + \epsilon_{ikt}, \tag{12}$$

where we allow investor's preferences for ESG, denoted γ_t, to vary month-to-month over our sample period ($t = 0$ to $t = T$). We report the corresponding estimates in terms of an investor's willingness to pay for ESG, which we denote $Value\,of\,ESG_t = -\hat{\gamma}_t/\hat{\alpha}$.

We estimate whether the value investors place on ESG is correlated with future fund returns in the following regression:

$$Ret_{kt} = \phi ESG_{kt-1} + \theta Value\,of\,ESG_{t-1} + \psi Value\,of\,ESG_{t-1} \times ESG_{kt-1} + \eta_{kt}. \tag{13}$$

The parameter ψ captures whether the value investors place on ESG is correlated with ESG returns in the proceeding month.

These results appear in columns (2) and (3) of Table 11.

[21] We add another caveat that other versions feature less investor rationality. Perhaps investors believe that ESG funds will earn higher returns, but they are incorrect. So, our estimates both above and below are statements about the tradeoffs that investors are making, not the tradeoffs they necessarily intended to make. Everywhere we say that investors value ESG at a certain level, we could add a more precise but wordy substitute that investors "act as if" they value ESG at a particular level.

Appendix Tables

Table A1: ESG Funds by Morningstar Category

Morningstar Category	# Funds	Total Assets ($mm)	Share with ESG Mandate
US Fund Allocation–30% to 50% Equity	5	3,033	40.00%
US Fund Global Large-Stock Blend	36	71,117	38.89%
US Fund Corporate Bond	31	118,520	22.58%
US Fund Global Small/Mid Stock	10	3,265	20.00%
US Fund Allocation–70% to 85% Equity	6	382	16.67%
US Fund Intermediate Core-Plus Bond	7	18,019	14.29%
US Fund Natural Resources	42	45,853	11.90%
US Fund Allocation–50% to 70% Equity	9	64,818	11.11%
US Fund Global Real Estate	18	13,834	11.11%
US Fund Foreign Large Blend	138	915,655	10.14%
US Fund Global Bond-USD Hedged	10	164,698	10.00%
US Fund India Equity	11	8,420	9.09%
US Fund High Yield Bond	46	77,802	8.70%
US Fund Diversified Emerging Mkts	81	291,433	8.64%
US Fund Large Blend	316	4,662,384	8.54%
US Fund Large Growth	110	719,934	8.18%
US Fund Large Value	138	620,842	6.52%
US Fund Miscellaneous Sector	32	30,015	6.25%
US Fund Small Blend	114	405,343	6.14%
US Fund Mid-Cap Growth	49	219,594	6.12%
US Fund Emerging Markets Bond	17	28,660	5.88%
US Fund Intermediate Core Bond	59	826,864	5.08%
US Fund China Region	45	35,646	4.44%
US Fund Mid-Cap Blend	106	368,051	3.77%
US Fund Short-Term Bond	29	174,791	3.45%
US Fund Mid-Cap Value	40	67,412	2.50%
US Fund Foreign Large Value	41	49,383	2.44%
Other Categories	1,280	2,058,485	0.00%

Notes: Table A1 displays summary statistics for our data set. Observations are as of December 2021 and are at the Morningstar Category level. Morningstar Categories are sorted by the share with an ESG mandate.

Table A2: Demand for Index Funds - Alternative ESG Measures

(a) Pre June 2022

	(1)	(2)	(3)	(4)
Expense Ratio (bps)	-0.029***	-0.029***	-0.027***	-0.060***
	(0.001)	(0.001)	(0.001)	(0.003)
ESG Fund	0.280***			
	(0.065)			
Sustainability Fund		0.239***		
		(0.063)		
ESG-Related Strategy			0.366***	
			(0.070)	
Member of the US-SIF				0.762***
				(0.133)
Observations	32,300	32,301	30,129	15,169
R-squared	0.182	0.182	0.181	0.199
Market F.E.	X	X	X	X
IV	X	X	X	X
Elasticity of Demand	1.6	1.6	1.5	3.4
Value of ESG (bp)	10***			
	(2.3)			
Value of Sustainability (bp)		8***		
		(2.2)		
Value of ESG-Related Strategy (bp)			13***	
			(1.3)	
Value of US-SIF Membership (bp)				13***
				(1.0)

Notes: Table A2 displays the regression results corresponding to our demand model (eq. 4). Observations are at the fund-by-month level over the period 05/2019-05/2022 in panel (a) and 06/2022-12/2023 in panel (b). In each specification we control for Morningstar rating, past cumulative 1-, 3-, 6-, and 12-month returns, fund-age (in months) fixed effects, and market fixed effects. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

In the bottom panel we interpret the demand estimates in terms of the elasticity of demand and investor's willingness to pay for ESG. Standard errors are computed using the delta method. We compute the elasticity of demand using the average expense ratio in the data (59 basis points) and assuming a market share of 5%.

Table A2: Demand for Index Funds - Alternative ESG Measures (Continued)

(b) Post June 2022

	(1)	(2)	(3)	(4)
Expense Ratio (bps)	-0.023***	-0.023***	-0.022***	-0.048***
	(0.001)	(0.001)	(0.001)	(0.004)
ESG Fund	-0.801***			
	(0.100)			
Sustainability Fund		-0.919***		
		(0.095)		
ESG-Related Strategy			-0.581***	
			(0.102)	
Member of the US-SIF				-0.199
				(0.181)
Observations	16,199	16,196	14,014	9,616
R-squared	0.170	0.171	0.162	0.173
Market F.E.	X	X	X	X
IV	X	X	X	X
Elasticity of Demand	1.3	1.3	1.2	2.7
Value of ESG (bp)	-35***			
	(4.5)			
Value of Sustainability (bp)		-40***		
		(4.4)		
Value of ESG-Related Strategy (bp)			-27***	
			(2.4)	
Value of US-SIF Membership (bp)				-4
				(2.0)

Notes: Table A2 displays the regression results corresponding to our demand model (eq. 4). Observations are at the fund-by-month level over the period 05/2019-05/2022 in panel (a) and 06/2022-12/2023 in panel (b). In each specification we control for Morningstar rating, past cumulative 1-, 3-, 6-, and 12-month returns, fund-age (in months) fixed effects, and market fixed effects. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

In the bottom panel we interpret the demand estimates in terms of the elasticity of demand and investor's willingness to pay for ESG. Standard errors are computed using the delta method. We compute the elasticity of demand using the average expense ratio in the data (59 basis points) and assuming a market share of 5%.

Table A3: Demand for Index Funds - Accounting for Inertia

	(1)	(2)	(3)
Expense Ratio (bps)	-0.039***	-0.037***	-0.033***
	(0.000)	(0.001)	(0.001)
ESG Fund x (Year=2019)	0.251*	0.263*	0.100
	(0.142)	(0.143)	(0.135)
ESG Fund x (Year=2020)	0.942***	0.936***	0.647***
	(0.133)	(0.135)	(0.131)
ESG Fund x (Year=2021)	0.334***	0.323***	0.291***
	(0.110)	(0.111)	(0.109)
ESG Fund x (Year=2022)	-0.026	-0.028	0.090
	(0.103)	(0.103)	(0.094)
ESG Fund x (Year=2023)	-0.779***	-0.773***	-0.759***
	(0.092)	(0.092)	(0.091)
Observations	105,907	105,633	104,570
R-squared	0.152	0.151	0.210
Market F.E.	X	X	X
IV		X	X
Additional Fund Controls			X
Elasticity of Demand	2.2	2.1	1.9
Value of ESG (2019; bp)	6*	7*	3
	(3.6)	(2.8)	(4.0)
Value of ESG (2020; bp)	24***	25***	19***
	(3.4)	(3.0)	(3.9)
Value of ESG (2021; bp)	9***	9***	9***
	(2.8)	(2.5)	(3.3)
Value of ESG (2022; bp)	-1	-1	3
	(2.6)	(3.8)	(2.8)
Value of ESG (2023; bp)	-20***	-21***	-23***
	(2.4)	(3.6)	(2.8)

Notes: Table A3 displays the regression results corresponding to our demand model (Eq. 4) where we account for inertia following Brown et al. (2023). We assume that 97% of investors are inert each month. Observations are at the fund-by-month level over the period 05/2019-12/2023. Markets are defined at the Lipper Class-by-month-by-fund type level. Additional fund controls include Morningstar star rating and past cumulative 1-, 3-, 6-, and 12-month returns. In each specification we include fund-age (in months) fixed effects and market fixed effects. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

In the bottom panel we interpret the demand estimates in terms of the elasticity of demand and investor's willingness to pay for ESG. Standard errors are computed using the delta method. We compute the elasticity of demand using the average expense ratio in the data (59 basis points) and assuming a market share of 5%.

Table A4: Demand for Index Funds - Additional Specifications

	(1)	(2)	(3)	(4)	(5)
Expense Ratio (bps)	-0.026***	-0.019***	-0.037***	-0.080***	-0.038***
	(0.001)	(0.001)	(0.002)	(0.008)	(0.001)
ESG Fund x (Year=2019)	-0.018	-0.292**	0.449**	0.274	0.030
	(0.133)	(0.132)	(0.196)	(0.469)	(0.132)
ESG Fund x (Year=2020)	0.332***	0.262**	0.683***	2.107***	0.400***
	(0.115)	(0.121)	(0.166)	(0.577)	(0.114)
ESG Fund x (Year=2021)	0.300***	0.398***	1.034***	3.379***	0.311***
	(0.111)	(0.120)	(0.179)	(0.510)	(0.112)
ESG Fund x (Year=2022)	-0.142	-0.104	0.253	0.545	-0.142
	(0.118)	(0.121)	(0.232)	(0.477)	(0.119)
ESG Fund x (Year=2023)	-0.926***	-0.933***	-1.422***	-0.213	-0.960***
	(0.126)	(0.135)	(0.251)	(0.515)	(0.126)
Observations	48,532	48,531	11,228	4,689	48,319
R-squared	0.178	0.064	0.153	0.079	0.176
Market F.E.	X	X	X	X	X
IV	X	X	X		
Management F.E.		X			
New Fund Sample			X		
Vanguard Sample				X	
Hasuman IV					X
Elasticity of Demand	1.5	1.0	2.1	4.5	2.1
Value of ESG (2019; bp)	-1	-16**	12**	3	1
	(5.1)	(7.2)	(6.7)	(6.0)	(2.9)
Value of ESG (2020; bp)	13***	14**	18***	26***	10***
	(4.4)	(6.5)	(4.5)	(6.5)	(3.3)
Value of ESG (2021; bp)	11***	21***	28***	42***	8***
	(4.2)	(6.5)	(6.3)	(7.5)	(3.1)
Value of ESG (2022; bp)	-5	-6	7	7	-4
	(4.5)	(6.6)	(5.3)	(5.8)	(3.4)
Value of ESG (2023; bp)	-35***	-50***	-38***	-3	-25***
	(4.8)	(7.8)	(5.0)	(7.5)	(3.0)

Notes: Table A4 displays the regression results corresponding to our demand model (Eq. 4). Observations are at the fund-by-month level over the period 05/2019-12/2023. Markets are defined at the Lipper Class-by-month-by-fund type level. Additional fund controls include Morningstar star rating and past cumulative 1-, 3-, 6-, and 12-month returns. In each specification we include fund-age (in months) fixed effects and market fixed effects. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

In the bottom panel we interpret the demand estimates in terms of the elasticity of demand and investor's willingness to pay for ESG. Standard errors are computed using the delta method. We compute the elasticity of demand using the average expense ratio in the data (59 basis points) and assuming a market share of 5%.

Table A5: Demand for Index Funds - Random Coefficients Model

	(1)
Linear Parameters:	
Expense Ratio (bps)	-0.0275***
	(0.00049)
ESG Fund	-2.027***
	(0.471)
ESG Fund x (Year=2020)	0.599
	(0.186)
ESG Fund x (Year=2021)	0.770
	(0.190)
ESG Fund x (Year=2022)	0.426
	(0.183)
ESG Fund x (Year=2023)	-0.739
	(0.180)
Nonlinear Parameters:	
ESG Fund (σ):	1.785***
	(0.290)
Other Controls	X
Observations	48,107

Notes: Table A5 displays the regression results corresponding to our demand model where we allow investor preferencces for ESG to vary across investors. We allow the mean preference for ESG to vary year-to-year but keep the standard deviation of preferences for ESG constant over time. Other controls include fund age (in months), past 1-, 3-, 6-, and 12-month cumulative returns, and Morningstar rating. Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A6: Expense Ratios and Markups

VARIABLES	(1) Exp. Ratio	(2) Costs
ESG Fund	4.976***	2.390***
	(0.392)	(0.334)
Observations	47,725	47,725
R-squared	0.814	0.773
Mkt FE	X	X
Management FE	X	X

Notes: Table A6 displays the regression results corresponding to our linear regression model. Observations are at the fund-by-month level over the period 05/2019-03/2022. The dependent variable in column (1) is the fund's expense ratio in basis points and the dependent variable in column (2) is the estimated fund markup in basis points. Markets are defined at the Lipper Class-by-month-by-fund type level. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.