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ESG Fund Allocations among New, Do-It-Yourself Defined Contribution Plan Participants

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KEY FINDINGS

■ While ESG strategies are relatively popular internationally, they have yet to gain traction in the US, especially in the DC space, although recent surveys suggest this could change in the near future.

■ This research explores the factors related to ESG fund usage among new DC participants who have access to ESG funds as part of their DC plan and finds relatively low interest in ESG funds, since allocations were lower than random chance would suggest.

■ Plan sponsors adding ESG funds need to take a thoughtful approach since it could require participants to opt out of the default investment, which is typically professionally managed. This, in turn, could result in lower long-term risk-adjusted performance.

ABSTRACT

Investment strategies focused on environmental, social, and governance (ESG) issues have been receiving increased interest among defined contribution (DC) plan sponsors, consultants, and regulators. This article explores the allocation decisions of 9,324 newly enrolled DC participants who are self-directing their accounts in a DC plan that offers at least one ESG fund. The analysis suggests that demand for ESG funds is relatively low, with ESG fund allocations and holding levels being lower than random chance would suggest. While there are some clear demographic preferences for ESG funds (e.g., among younger participants with higher incomes), ESG allocations appear to be primarily a function of weak preferences, driven by naïve diversification, although ESG allocations are significantly higher in plans where general ESG usage is more elevated. ESG funds have the potential to drive participants away from professionally managed investment options, such as target-date funds, resulting in lower risk-adjusted returns for participants if they are simply added to core menus. Overall, this analysis suggests that plan sponsors should take a thoughtful and cautious approach when considering adding ESG funds to an existing core menu.

Investment strategies focused on environmental, social, and governance (ESG) issues have been receiving increased interest among defined contribution (DC) plan sponsors, consultants, and regulators recently despite the relatively low assets in ESG strategies in DC plans today.[1] Given high levels of inertia among DC participants (i.e., low levels

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[1] For example, according to Cerulli (2021), only 13% of plan sponsors note that they do currently offer an ESG fund, while 29% said they are likely to add at least one fund in the next 24 months.

of trading[2]) and increased usage of default investments (such as target-date funds), growth in ESG funds in DC plans will likely come from new participants.

This article explores the allocation decisions of 9,324 new DC participants, across 108 DC plans, who are self-directing their accounts (i.e., are "do-it-yourself" (DIY) investors) where there is at least one ESG fund[3] available in the core menu. While this sample is relatively small, the implied participant population required to generate this final dataset is approximately two million participants, given the filters applied and the data requirements.[4]

Among DIY investors, allocations to ESG funds are relatively modest when offered in the core menu. Only 8.9% of participants had any allocation to an ESG fund and the average allocation to ESG funds among those who hold at least one ESG fund was 18.7% of the total balance. The average allocation to ESG funds among all DIY participants included in the analysis was 1.7% even though ESG funds represented 5.1% of all funds available. If we control for the number of funds held by participants, the probability of a participant holding a single fund with a given attribute (e.g., assuming there is only one ESG fund on the menu) is 10.7%. If we test the probability of holding a single fund on the menu the values tend to exceed 12% with average allocations exceeding 20%. In other words, allocations to ESG funds are lower than random chance alone would suggest.

ESG funds are relatively scarce among the core menus considered. For example, among plans that offer ESG funds, 76% offered only one ESG fund, which was most commonly an equity fund (77% of funds), with Large Blend being the most common investment style (51% of all ESG funds available).

Younger participants with higher deferral rates and higher incomes were more likely to allocate to an ESG fund. However, the two factors which appeared to drive the largest allocations to ESG funds were not related to participant demographics, but rather to the number of funds in the participant portfolio and the percentage of participants in the respective DC plan allocating to an ESG fund. The notable increase in the probability of owning an ESG fund as the number of portfolio holdings increases, along with other core menu relationships, suggests naïve diversification is likely driving a significant amount of the ESG allocation decision (i.e., the decision to allocate to the ESG fund is likely based on a weak preference, not necessarily conviction in ESG). The fact that ESG allocations increase as more participants in a plan allocate to ESG funds suggests plan interest effects could be an especially strong driver of future growth in ESG funds (despite relatively low usage today).

An additional analysis suggests DIY participants have expected returns that are approximately 100 basis points lower than investors using professionally managed portfolios, such as target-date funds and managed accounts, ignoring any additional cost associated with the service/solution[5]. Additionally, DIY investors who allocate to ESG funds exhibit different traits than participants who do not allocate to ESG funds. For example, ESG participants tend to invest more aggressively[6] and, as such, have higher expected returns, although they have a lower expected risk-adjusted return (i.e., the expected portfolio alpha declines as portfolio allocations increase). These findings suggest that adding ESG funds to core menus may create additional implicit return "costs" for participants to the extent that the decision to allocate to an ESG

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[2] For example, only approximately 10% of participants initiate trades in a given year according to Vanguard (2021).

[3] Based on a Morningstar classification: Sustainable Investment—Overall = Yes (in Morningstar Direct)

[4] Assuming 30% of new participants opt to self-direct their accounts, of those self-directing only 15% have plan tenures of two years or less, and only 10% of plans offer an ESG fund.

[5] There would not typically be any additional fees for target-date funds, although there would for a retirement managed account service.

[6] Part of this effect is likely due to the fact most ESG funds are equity funds.

fund drives participants away from professionally managed multi-asset options (e.g., target-date funds).

Overall, this research paints a mixed picture of the actual interest and drivers of demand for ESG funds in DC plans and suggests that plan sponsors should take a thoughtful approach when considering adding ESG funds to an existing core menu.

DATASET

Data for this analysis is obtained from one of the top ten recordkeepers of US DC plans. For the analysis, approximately 100,000 participants who are self-directing their accounts (i.e., are DIY investors) with less than one year of service are initially randomly selected from the entire available participant population.

In order to be included in the dataset, the participant must meet the following criteria:

- Participants are between the ages of 20 and 80.
- Years of plan participation (i.e., plan tenure) is two years or less.
- The participant must be coded as actively participating in the plan.
- The participant must have an income higher than $10,000.
- The participant must have a balance greater than $1.

Only participants who recently joined the plan were considered for the analysis, which was defined as having a plan tenure of fewer than two years. We focus only on new participants because it is not clear how long the ESG funds have been available, and allocation changes among already enrolled participants tend to be relatively low. For example, only approximately 10% of participants who self-direct their accounts at Vanguard (2021) trade their portfolios (i.e., change their allocations) in a given year.

Morningstar Category is used as the primary investment-style metric and is based on whatever the fund Category was in Morningstar Direct for each fund on December 30, 2021. Morningstar Category is a holding-based classification approach based on trailing three-year fund statistics.[7] Funds are identified either by SecId, as provided by the recordkeeper, or ticker if SecId is not available.

A fund is determined to be an "ESG fund" if it is categorized as a Sustainable Investment—Overall by Morningstar. There are a large number of funds in the dataset that do not have an ESG classification (i.e., the fund cannot be identified). We only consider plans where we can identify the ESG status of all but two funds[8] to ensure we can accurately capture whether each fund being allocated is an ESG fund. Additionally, there must be at least 10 participants in a given plan with available information for that plan to be included in the analysis.

Combined, these filters reduce the initial dataset of approximately 100,000 participants to 9,324 participants across 108 (both public and private) DC plans. While this dataset is admittedly small, it's worth reiterating how the five filters above significantly impact the observation count. For example:

- Most DC participants aren't new to the respective plan. In a separate analysis focused on portfolio efficiency (some of which we leverage as part of this research), also drawing on data from the same recordkeeper, only 16.4% of DIY participants had plan tenures of two years or less (Blanchett and Liu 2022);

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[7] For additional information on the category approach, see http://morningstardirect.morningstar.com/clientcomm/Morningstar_Categories_US_April_2016.pdf.

[8] One of these is typically a Stable Value or some other type of money market fund.

- Most participants who join a DC plan don't self-direct their accounts. Roughly two-thirds to three-fourths of new participants use default investments or some other professionally managed portfolio (Vanguard 2021; Blanchett and Bruns 2019, among others);
- Most plans don't offer ESG funds. According to Cerulli (2021), only 13% of plan sponsors affirmatively note offering ESG funds (while 78% say they don't offer an ESG fund and 9% don't know). While we are only able to include approximately 9% of the participants from the initial dataset, this is not too far from the general ESG availability statistic of 13%.

Though the participant count is only 9,324, we can work backward from the final sample to determine the actual initial dataset required to generate our sample. For example, if we assume only 10% of plans offer an ESG fund[9], 30% of new participants self-direct their accounts, and only 15% have plan tenures of two years or less, the implied initial dataset required to generate our sample population of 9,324 participants would be approximately two million participants. While the sample could potentially be improved with increased fund identification (e.g., identifying whether each fund is actually an ESG fund), it is unlikely to materially increase the sample size, given the relatively low availability of ESG funds to begin with.

Two definitions of being an "ESG investor" are included in the analysis (effectively the dependent variable in subsequent regressions), as well as eight key relationship variables (effectively independent variables), which can be broken into four groups: participant demographic information, participant portfolio variables, information about the DC core menu, and overall plan interest in ESG.

The two ESG investor variables are whether or not the participant has an allocation to any ESG fund whatsoever (effectively a binary variable equal to one if the participant has a balance of one penny or greater in an ESG fund) and the percentage of the participant's total balance in ESG funds. While these variables are similar, there are important differences between the two that affect the findings, which we will review in future sections.

The three demographic variables considered are age, savings rate, and income. Balance is not included because these are new participants, and balances should be largely a function of income and deferral rates (and potentially rollovers). Whenever income is included in any type of correlation or regression analysis, the natural logarithm of income is used to reduce skewness.

The two participant portfolio variables included in the analysis are the total number of funds in the participant's portfolio and the overall equity allocation of the participant's portfolio (as estimated by the recordkeeper).

The two core menu variables included are the total number of core menu funds available (excluding target-date funds) and the percentage of core menu funds classified as ESG funds.

One plan interest variable is included, which is the percentage of participants in the plan using ESG funds. This is included to determine the extent of plan-level effects related to the ESG allocation decision. For example, are ESG allocations higher, lower, or not impacted by the percentage of participants in the plan allocating to ESG funds?

Exhibit 1 includes descriptive statistics on these ten variables.

A number of the variables are related to the decision to allocate to an ESG fund as well as to each other. We demonstrate these general relationships in Exhibit 2, which shows the correlations between variables.

The ESG usage variable used in Exhibit 2 is whether the participant has *any* allocation to an ESG fund (i.e., it is a binary variable). Note that the correlations

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[9]This gets us close to the initial 100,000 participants reviewed.

EXHIBIT 1
Descriptive Statistics

	ESG% Balance	ESG% > 0	Age	Savings%	Income	# Ppt Funds	Equity%	# Plan Funds	ESG % Total Plan Funds	% Plan Ppts in ESG Funds
Median	0.00	0.00	51.00	0.00	$58,500	2.00	40.20	130.00	3.08	4.67
Average	1.67	0.09	49.94	3.70	$79,893	3.57	43.83	86.59	5.15	8.93
Std. Dev.	7.81	0.29	14.73	8.78	$51,325	4.50	43.33	53.72	3.75	8.56

NOTES: Please see Notes to Disclosure for additional information.

EXHIBIT 2
Variable Correlations

#	Variable	1	2	3	4	5	6	7	8	9
1	ESG% > 0	1.00	−0.09	0.10	0.11	0.48	0.20	−0.18	0.16	0.30
2	Age	−0.09	1.00	−0.28	−0.24	−0.06	−0.37	0.56	−0.43	−0.35
3	Savings%	0.10	−0.28	1.00	0.34	0.06	0.33	−0.54	0.38	0.34
4	Income	0.11	−0.24	0.34	1.00	0.08	0.30	−0.47	0.37	0.28
5	# Ppt Funds	0.48	−0.06	0.06	0.08	1.00	0.30	−0.11	0.04	0.10
6	Equity%	0.20	−0.37	0.33	0.30	0.30	1.00	−0.51	0.33	0.31
7	# Plan Funds	−0.18	0.56	−0.54	−0.47	−0.11	−0.51	1.00	−0.72	−0.60
8	ESG % Total Funds	0.16	−0.43	0.38	0.37	0.04	0.33	−0.72	1.00	0.52
9	% Plan Ppts in ESG	0.30	−0.35	0.34	0.28	0.10	0.31	−0.60	0.52	1.00

between ESG usage and the other variables are very similar,[10] regardless of how being an ESG investor is defined, except for the relationship between being an ESG investor and the number of funds in the participant portfolio. In this case, if "ESG investor" is defined as having any allocation to an ESG fund, the correlation between that variable (number 1 in Exhibit 2) and the number of funds in the participant portfolio (number 5) is .48 (as noted in Exhibit 2). However, if ESG investor is included as a continuous variable, based on the percentage of the participant's total balance in ESG funds, the correlation drops to .13.

In other words, how being an ESG investor is defined has a material impact on the relative importance of the noted relationship with the number of funds in the investor's portfolio. The fact that the correlation increases significantly using the *any* allocation definition implies a relatively weak preference is at play when allocating to ESG funds (i.e., it is an effect of naïve diversification). We explore this in greater detail in future sections.

There are clearly some relatively high correlations between several demographic variables in Exhibit 2, such as income and savings rate (i.e., participants with higher incomes tend to save more), which makes regression analysis especially important when attempting to understand the relationship between each variable and ESG usage, as it allows one to determine the marginal contribution of each variable while holding other variables constant.

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[10] And the correlations among the other variables to each other are obviously unaffected by the definition of ESG investor.

EXHIBIT 3

Distribution of the Number of ESG Funds Available

# ESG Funds	Count	% All Plans
1	82	75.93%
2	17	15.74%
3	5	4.63%
4	3	2.78%
5	1	0.93%
	108	**100.00%**

EXHIBIT 4

Most Common ESG Fund Categories

Category	Count
Large Blend	75
Large Growth	12
Small Blend	8
Allocation—50% to 70% Equity	8
Intermediate Core Bond	8
Foreign Large Blend	8
Mid Blend	5

ESG FUND AVAILABILITY

ESG funds are relatively rare in core menus today, although the interest in related strategies is growing. For example, while only 13% of plan sponsors note they do currently offer an ESG fund, 29% of sponsors said they are likely to add at least one fund in the next 24 months Cerulli (2021).

Exhibit 3 provides context around the distribution of the number of ESG funds available in each of the 108 plans included in the analysis. No plan offered more than five ESG funds, and the vast majority (approximately 76%) offered only one ESG fund. This suggests it would be relatively difficult to build a diversified portfolio using only the ESG funds currently in DC plans.

Next, in Exhibit 4, we provide context about the distribution of the investment styles of ESG funds (based on Morningstar Category) for those styles with five or more funds used (note that the same fund can be used multiple times, and each instance would be included).

Roughly half of all ESG funds available are Large Blend funds. Only 13 of the funds (8.7% of the identifiable Category total) are fixed income funds and only 12 (8.1% of the identifiable total) are balanced funds. Again, this suggests it is relatively difficult to build a truly diversified portfolio using only ESG funds.

The difficulty associated with building a diversified portfolio with only ESG funds has important implications on overall portfolio efficiency. If allocating to ESG funds requires participants to opt out of using a professionally managed portfolio option (e.g., target-date funds or retirement managed accounts), it may negatively impact future expected returns. This potential cost is something we explicitly attempt to quantify in a future section.

## PARTICIPANT ESG FUND ALLOCATIONS

Of the 9,324 participants included in the dataset, only 833 had some allocation to an ESG fund, which is 8.9% of the total. Among participants with an allocation to an ESG fund, the average allocation was 18.7%, with a standard deviation of 19.0%. The total average balance allocation to ESG funds is 1.7% (including all participants). There are only 56 participants (0.6% of the total) with ESG allocations greater than 50% of their balance and only 19 participants (0.2% of the total) with 100% of their balance in ESG funds. In other words, even among participants who select ESG funds, they almost always play a relatively supporting role as part of the overall portfolio.

Exhibit 5 includes the allocation distribution to ESG funds as a percentage of the total balance, among participants with part of their balance in an ESG fund. Allocations to ESG funds are relatively low and actually smaller than random chance would suggest. For example, ESG funds represented 5.1% of all funds available to participants, yet represented only 1.7% of total balances.

EXHIBIT 5
ESG Allocations as a Percentage of Total Balance, among Participants with an ESG Allocation
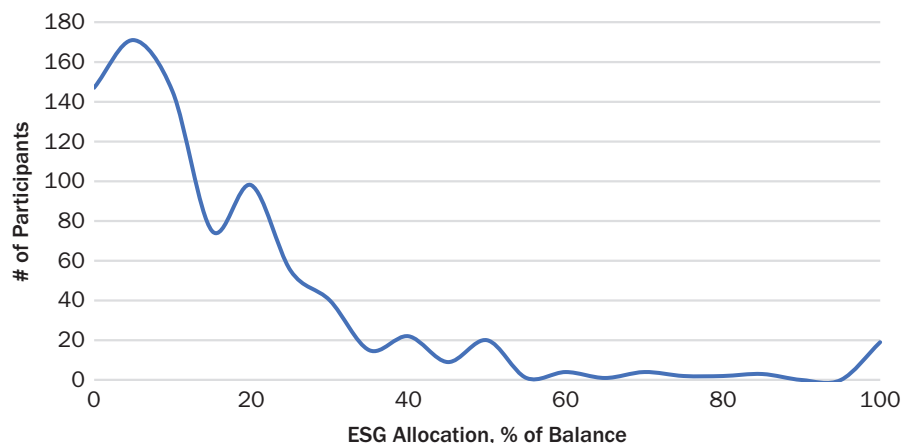
If each participant were to only hold one fund and randomly allocate to that one fund, that fund would receive 2.8% of total assets. In reality, though, participants select a variety of funds and it's possible to control for this. For example, if there are 20 funds available on a core menu and the participant portfolio consisted of 10 funds, there would be a 50% probability of a participant holding a fund with a specific attribute (if we assume only one fund on the menu had that attribute). If we apply this logic to the entire participant population, we would expect 10.7% of participants to hold the respective fund, which is higher than the actual percentage of participants holding an ESG fund (8.9%). The 10.7% also understates the true target because it only assumes there is one relevant fund when some plans have multiple ESG funds.

Additionally, a random fund holding test is conducted, where the probability of a participant holding the second, fourth, and seventh fund in the plan menu list is conducted. The odds of holding each fund are 13.7%, 12.9%, and 13.0%, respectively, with average allocations (among those holding the fund), of 30.7%, 26.2%, and 29.3%, respectively.

In summary, the noted ESG holding allocation levels are lower than random chance would suggest.

WHO ALLOCATES TO ESG FUNDS?

To better understand the factors related to ownership of ESG funds, we break each of the variables into five groups, which are effectively quintiles.[11] Details on the thresholds and participant counts by group are included in Appendix A. In addition to providing context on the averages by quintiles, we also conduct a series of regressions for each analysis and include the results of the regressions in the noted Appendix for robustness purposes.

First, we provide context on average ESG Allocations as a percentage of the total balance for all participants in Exhibit 6, and the corresponding ordinary least squares (OLS) regression analysis is included in Appendix B.

There are clearly a number of variables related to the percentage allocation to ESG funds. For example, the average allocation to ESG funds declines with age, and

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[11] If possible, although the data is somewhat lumpy and therefore while the groups increase monotonically, they may not each be the same size

EXHIBIT 6

Average ESG Allocations as a Percentage of Total Balance, All Participants by Quintile Group
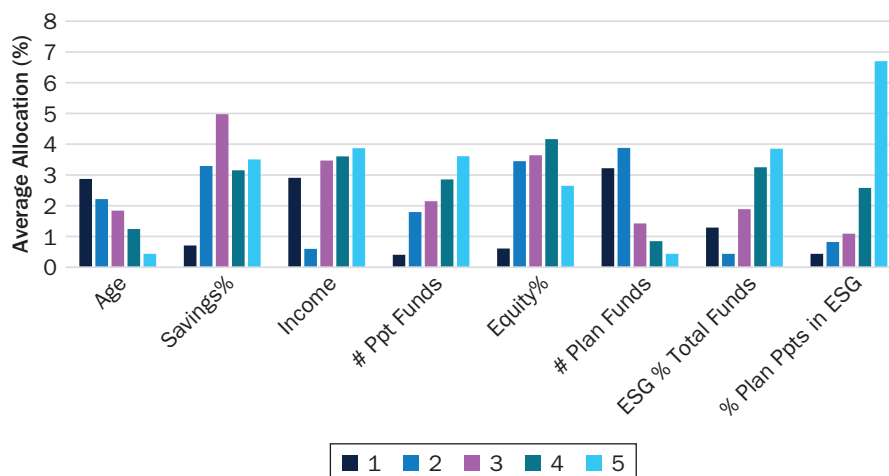
the relationship is relatively monotonic. The overall relationship between ESG fund allocations and age declines notably in the regressions (included in Appendix B), whereby there is no statistically significant effect when the plan core menu and plan participant ESG usage are controlled for (Models 4 and 5). The age relationship, while statistically significant when viewed in isolation, is not nearly as strong as other variables when predicting the likelihood of allocation to ESG (e.g., demonstrated by how the R^2 evolves across models in Appendix B).

The relation between the other two demographic variables, savings rate and income, is noisier than age, although ESG fund allocations do increase for higher savings rates and higher income levels. The economic significance of these variables also disappears when the plan core menu and plan participant ESG usage are controlled for.

The more funds in a participant portfolio, the higher the allocation is to ESG funds on average. To some extent, this suggests naïve diversification could be at play when it comes to some of the ESG allocations, an effect explored more in later tests.

There is a clear positive relationship between the risk level of the participant portfolio and average ESG fund allocation. This is likely based on the fact the vast majority of ESG funds are equity funds, and therefore higher ESG allocations would be suggestive of a more aggressive investor, on average.

The negative relationship between the number of plan funds and ESG allocations again implies naïve diversification effects could be at play for many of the ESG investors, similar to the positive relationship between the percentage of total core menu funds and ESG allocations.

The positive relationship between the percentage of participants in ESG and average allocations is especially notable given the spread in Exhibit 6 and the statistical significance in the regressions (e.g., comparing how the R^2 more than doubles when including it in the regressions moving from Model 4 to Model 5 in Appendix B). This suggests the more people in a plan using ESG funds, the more participants allocate to ESG funds on average, holding everything else constant (i.e., the regression analysis). This is especially important since ESG allocations are relatively low currently, and while it appears a decent amount of existing allocations are due to naïve diversification strategies, this suggests there is notable potential for higher usage the more popular it becomes in plans.

EXHIBIT 7
Percentage of Participants Holding an ESG Fund, All Participants by Quintile Group
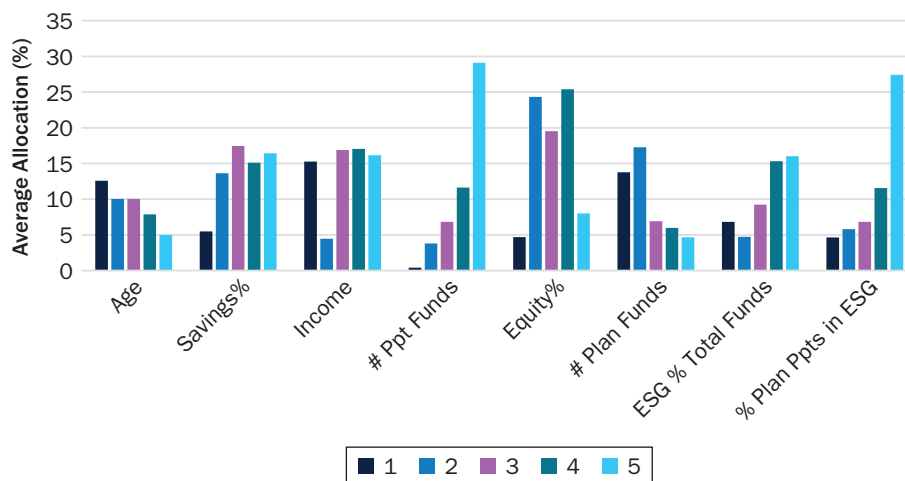
Next, we explore the percentage of participants in each quintile group who hold an ESG fund (among all participants) in Exhibit 7, with the average marginal effects from a probit regression included in Appendix C.

The results in Exhibit 7 are relatively similar to Exhibit 6, but the importance of the number of funds in a portfolio and ESG ownership becomes clearer (as does the overall role of naïve diversification). Among participants who only hold one fund (which is the first quintile group for the number of funds in the participant portfolio), only 0.4% owned an ESG fund. In contrast, among participants who held five or more funds, 29.1% held an ESG fund. In other words, ownership of ESG funds increases dramatically simply as a function of the number of funds in the participant's portfolio. This suggests a weak preference for ESG since the allocation is simply based on the fact the participant owns more funds and doesn't suggest a clear preference for ESG, consistent with the previous random holdings analysis (i.e., ESG allocations were lower than random chance would suggest).

Next, in Exhibit 8, we explore the average allocations to ESG funds, as a percentage of the total balance, among only those participants with at least some allocation to an ESG fund. The results of a series of OLS regressions are included in Appendix D.

First, for context, the reason the allocation for quintile group 1 for the number of funds is 100% (in Exhibit 8) is that participants in that group only hold one fund, and to be included in this analysis, one must hold an ESG fund; therefore, the allocation to ESG funds would need to be 100%. The average allocation to ESG funds among participants holding at least one fund was 18.7%.

The allocations in Exhibit 8 are relatively consistent with the results in Exhibits 6 and 7. For example, not only are older participants less likely to own an ESG fund in the first place (Exhibit 7), but among those who do own ESG funds, ESG allocations also tend to be lower than for younger participants (suggesting age is at least partially related to ESG demand).

Again, there is clear evidence of the role of naïve diversification with respect to ESG allocation decisions (e.g., the decreasing allocations as the number of portfolio funds increases, the decreasing allocations as the number of plan funds increases, and the increasing allocations as the percentage of overall funds that are ESG increase). Additionally, it is notable that the relationship between the percentage of participants in a plan using ESG and the allocations to ESG is positive, since it suggests there are important plan-level interest effects at play, whereby ESG has the potential to experience more growth the more widely the strategy is used.

EXHIBIT 8

Average ESG Allocations as a Percentage of Total Balance, All Participants Holding an ESG Fund by Quintile Group
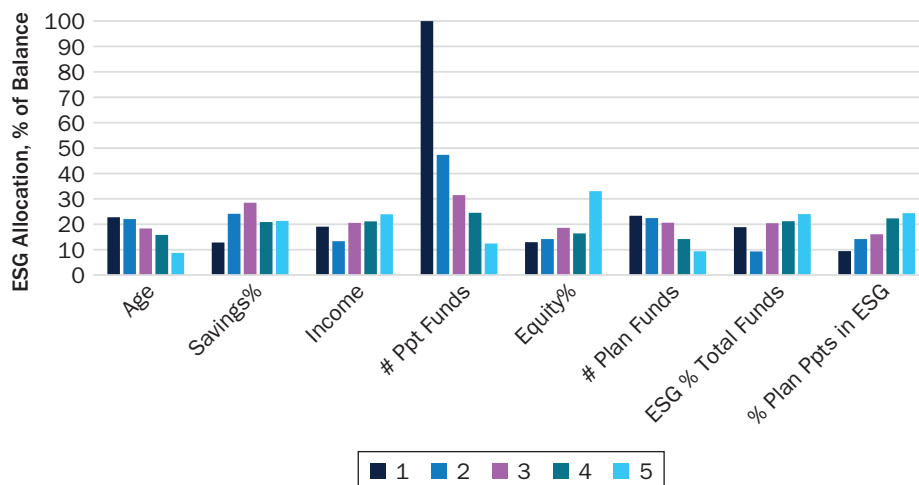
PORTFOLIO EFFICIENCY IMPLICATIONS

One potential issue with simply adding ESG funds to the core menu is that it may entice certain participants to opt out of some type of professionally managed portfolio, such as a target-date fund or retirement managed accounts, and to self-direct their accounts. There is a significant body of literature, going back decades, that notes how the average investor underperforms a professionally managed portfolio.

To provide context on the potential costs associated with self-directing, an additional analysis is performed where the efficiency of the respective portfolios is determined, using an approach (and part of the dataset) from Blanchett and Liu (2022).

For the analysis, each fund held by the participant is mapped to an investment style based on the fund Morningstar Category and subsequent index, which we believe best reflects the investment exposures of that fund. Note that we do not perform any type of further style analysis on the respective funds. Our approach implicitly assumes the participant is selecting a fund based on the fund's primary style exposure. While other attributes of the individual funds are likely to impact allocation decisions (for example, past performance), using a Morningstar Category-mapped index allows us to use general style weights of the fund without worrying about the unique tilts implicit within each portfolio manager's strategy.

For multi-asset funds (for example, target-date funds), we assume a relatively complex blend of various asset classes to reflect that these funds will likely be well-diversified. The overall weights for each category are based on the average equity allocation to all funds in that category as of November 2021 and are included in Appendix E. The underlying style weights (e.g., to large cap growth, blend, value, etc.) are based on the Morningstar Lifetime Indexes (obtained from Morningstar Direct) and included in Appendix F.

The style-mapping approach used for this analysis is superior to other approaches, especially those based on factor regressions, such as in Calvet, Campbell, and Sodini (2007). The descriptive power of factor regression is going to be limited by the number of independent variables included in the regression. For example, Ayres and Curtis (2015) only include three factors to estimate fund risk exposures (i.e., betas) for each investment, which are domestic equity (proxied by the Russell 3000), fixed income (proxied by the Barclays US Aggregate Bond index), and international equity (proxied by MSCI

EAFE International equity index). In our approach, there are 84 different style-types mapped to 31 different potential indices/Categories. This approach provides a robust framework to estimate portfolio efficiency. Additionally, using the Morningstar Category as the primary definition of style also matches how the fund's risk is often presented to the participant (i.e., in enrollment materials and online).

The returns and standard deviations for each participant allocation are estimated by multiplying the matrix of estimated Category weights by the assumed returns, standard deviations, and correlations for the respective style groups, which are included in Appendix G. The returns and standard deviations are based on PGIM Quantitative Solution's 10-year capital market assumptions as of Q4 2021.[12] The correlation matrix is not included due to size considerations, but can be obtained by contacting the authors.

The analysis assumes the performance of ESG funds is consistent with the underlying investment style. In other words, there is no explicit assumption that ESG-focused strategies will underperform or outperform their ESG-agnostic peers, controlling for style. Evidence on this effect is mixed, and it would be difficult to assess the level of ESG engagement of each fund and the extent to which it has exposures to different potential ESG return factors.

We include not only the base 9,324 DC participants in the various OLS regressions (results in Appendix H) but also 50,000 other participants who are enrolled in retirement-managed accounts at the same recordkeeper, based on data from Blanchett and Liu (2021). These additional participants are included as it allows us to estimate the expected return differences between a professionally managed portfolio versus DIY investing. The portfolio allocations for the retirement managed account service are created by either Morningstar or Edelman Financial Engines.[13]

We estimate the following statistics for each participant: the risk-adjusted return for the portfolio (i.e., the alpha), the expected geometric return (i.e., the beta), the equity allocation (which will obviously be related to the expected return), and the number of funds in the portfolio. Each of these variables are included as a dependent variable in an OLS regression, with the results included in Appendix H.

The regression results clearly suggest there is a return cost associated with DIY investing (i.e., participants who DIY are likely to underperform participants who delegate portfolio management to an investment professional), where the expected risk-adjusted return (i.e., alpha) for DIY investors is 33 basis points lower than those in professionally managed portfolios, and the overall expected return is 99 basis points lower than professionally managed portfolios. The 99 basis points of expected underperformance is a combination of the negative alpha (i.e., 33 bps) plus the fact that DIY participants tend to have more conservative portfolios, which were 15 percentage points lower than professionally managed portfolios, on average, holding everything else constant.

Participants with higher allocations to ESG funds had lower expected risk-adjusted returns (i.e., negative alpha) but had riskier portfolios (i.e., higher equity allocations) and, therefore, higher overall expected returns. ESG investors also tended to hold slightly more funds.

To provide more visual context for how ESG allocations were related to our variables of interest, we place participants into five groups based on their ESG fund allocations: those holding no ESG funds (7,929 participants), those with an allocation to ESG funds greater than 0% but less than 5% (138 participants), those with an

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[12] Accessible at https://www.pgimquantitativesolutions.com/outlook/2021-q4-capital-market-assumptions?pdfviewer=true.

[13] We are unable to identify the specific investment manager by participant, we only know if the participant was enrolled in retirement managed accounts.

EXHIBIT 9
Portfolio Efficiency Metrics by ESG Fund Allocation Group

Panel A: Expected Risk-Adjusted Return (Alpha)

Panel B: Expected Geometric Return

Panel C: Equity Allocation

Panel D: Number of Funds in Portfolio

■ Actual   ■ Controlled
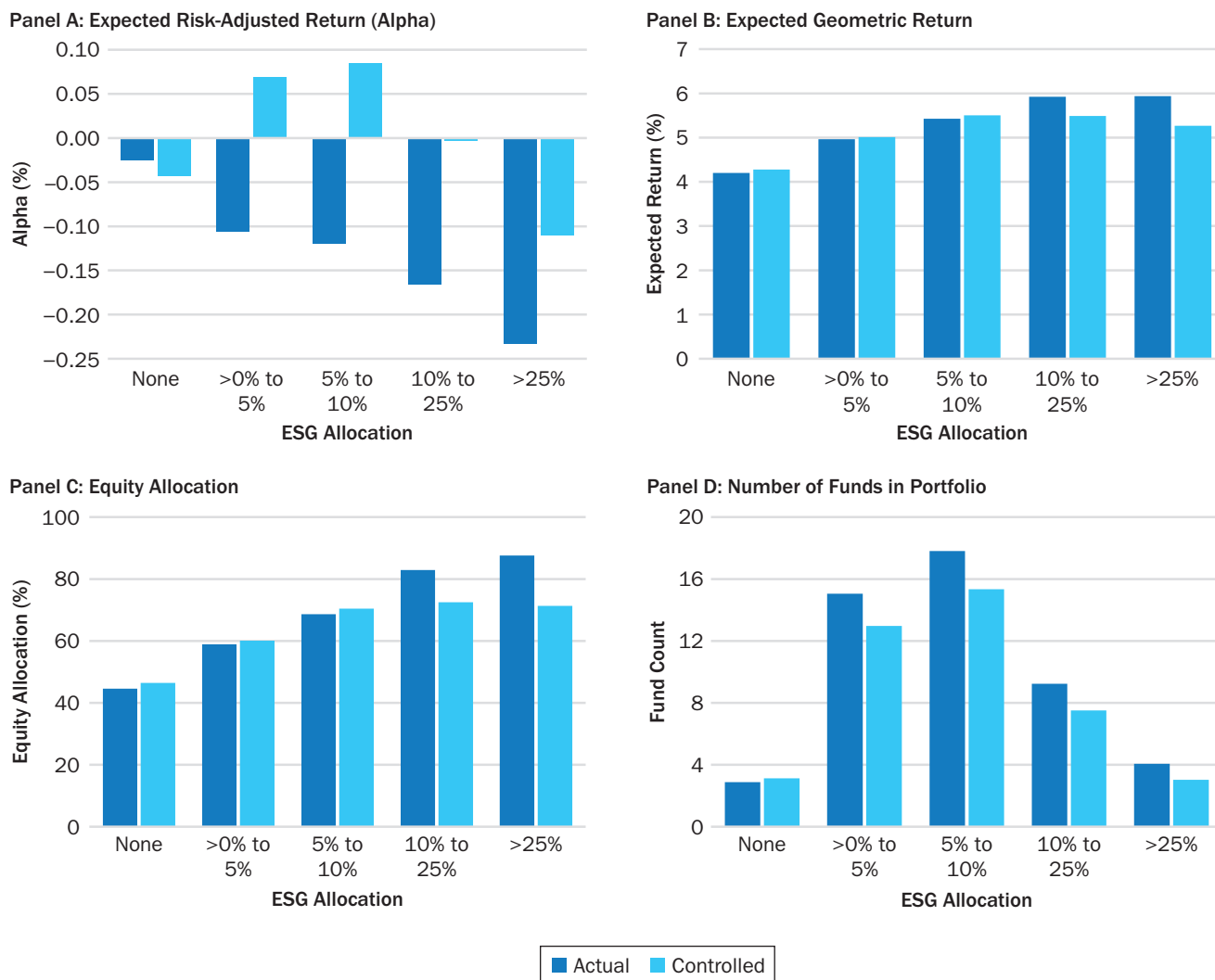
allocation to ESG funds greater than 5% but less than 10% (165 participants), those with an allocation to ESG funds greater than 10% but less than 25% (293 participants), and those with an allocation to ESG funds greater than 25% (183 participants).

We report two sets of values for each of the portfolio metrics, the actual average by group and a second set that controls for participant attributes (using the regression coefficients in Appendix H that are re-centered). The results are included in Exhibit 9.

Exhibit 9 also demonstrates that participants with higher ESG fund allocations tended to have lower expected risk-adjusted returns (although the demographic-controlled relationship is weaker than the simple average), higher expected geometric returns, which are driven by the higher equity allocations, and tended to hold more funds in their portfolios (again providing evidence of naïve diversification).

Overall, this particular analysis suggests that while ESG investors are building slightly less efficient portfolios than regular DIY investors, the larger overall issue with including ESG funds in the core menu is that it may drive participants to become DIY investors and build portfolios that are significantly less efficient than portfolios created by investment professionals (e.g., target-date funds or retirement managed accounts).

CONCLUSIONS

While ESG strategies are relatively popular internationally, they have yet to gain traction in the US, especially in the DC space, although recent surveys suggest this could change in the near future. This research explores the factors related to ESG fund usage among new DC participants who have access to ESG funds as part of their DC plan.

The analysis paints a mixed picture regarding actual interest in ESG funds. Allocations to ESG funds among the participants self-directing their accounts included in this analysis were lower than random chance would suggest. Additionally, there is significant evidence that naïve diversification could be a notable driver of current ESG fund allocations (among those participants allocating to ESG funds), given how the probability of owning an ESG fund increases considerably as the number of funds in the participant portfolio increases.

The analysis does suggest that allocations to ESG funds increase the more participants in the plan who decide to allocate to ESG strategies, which suggests overall plan interest effects could be critical for future asset growth for the strategies.

One important consideration for plan sponsors interested in adding ESG funds to a plan is that it will generally require the participant to opt out of the plan default investment (e.g., a target-date fund) and become a DIY investor, and there is a relatively large body of research suggesting that DIY investors are likely to underperform professionally managed investments, consistent with the findings of this analysis.

Overall, while the future of ESG is unclear, it is important for plan sponsors interested in including these options in a plan to take a thoughtful approach to their inclusion to ensure the outcome is really in the best interests of participants.

APPENDIX A

EXHIBIT A1
Descriptive Information about Quintile Groups

Panel A: Lower Threshold for Group Inclusion

		Age	Savings%	Income ($0,000s)	# Ppt Funds	Equity%	# Plan Funds	ESG % Total Funds	% Plan Ppts in ESG
Group #	1	16.0	0.0	2.8	1.0	0.0	2.0	0.0	0.0
	2	34.0	2.0	54.2	2.0	60.0	17.0	3.0	4.7
	3	46.0	4.0	59.9	3.0	75.0	100.0	3.1	6.0
	4	56.0	6.0	98.7	4.0	90.0	120.0	5.0	8.0
	5	64.0	10.0	162.8	5.0	100.0	125.0	7.0	15.0

Panel B: Count by Group

		Age	Savings%	Income	# Ppt Funds	Equity%	# Plan Funds	ESG % Total Funds	% Plan Ppts in ESG
Group #	1	1,692	6,281	753	4,420	5,407	1,816	278	4,931
	2	1,991	220	5,841	1,160	596	1,725	4,864	914
	3	1,724	590	871	850	697	246	1,136	572
	4	1,792	894	1,085	739	504	702	1,293	1,798
	5	2,125	1,339	774	2,155	2,120	4,835	1,753	1,109

APPENDIX B

EXHIBIT B1

OLS Regression, Dependent Variable = % of Balance in ESG Funds, All Participants

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	4.567***	−10.353***	−8.284***	−3.159	−8.098***
Age	−0.058***	0.051***	−0.024***	0.006	0.006
Savings%		1.241***	0.032**	−0.004	−0.010
Income			0.866***	0.234	0.334
# Ppt Funds		−0.040***	0.163***	0.172***	0.148***
Equity%			0.018***	0.013***	0.013***
# Plan Funds				−0.007**	0.014***
ESG % Total Funds				0.274***	0.150***
% Plan Ppts in ESG					0.294***
Observations	9,324	9,324	9,324	9,324	9,324
R Square	1.20%	2.25%	4.36%	6.08%	12.50%
Adjusted R Square	1.18%	2.22%	4.31%	6.01%	12.42%

NOTE: *p<.05; **p<.01; ***p<.001.

APPENDIX C

EXHIBIT C1

Probit Marginal Effects, 1 = Holding an ESG Fund, All Participants

	Model 1	Model 2	Model 3	Model 4	Model 5
Age	−0.171***	−0.117***	−0.079***	0.036*	0.035*
Savings%		0.132***	0.080***	−0.005	−0.005
Income		3.834***	1.880***	0.114	0.467
# Ppt Funds			1.149***	0.989***	0.148***
Equity%			0.050***	0.032***	0.032***
# Plan Funds				0.048***	0.022***
ESG % Total Funds				0.247***	0.111*
% Plan Ppts in ESG					0.242***

NOTE: *p<.05; **p<.01; ***p<.001.

APPENDIX D

EXHIBIT D1

OLS, % of Balance among Those Holding an ESG Fund

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	32.937***	−3.992	20.996	3.973	−14.871
Age	−0.311***	−0.274***	−0.017	−0.049	−0.039
Savings%		0.173*	−0.074	−0.032	−0.013
Income		3.017*	0.356	1.005	2.224*
# Ppt Funds			−1.283***	−1.379***	−1.374***
Equity%			0.117***	0.133***	0.146***
# Plan Funds				0.084***	0.113***
ESG % Total Funds				0.856***	0.660***
% Plan Ppts in ESG					0.196***
Observations	833	833	833	833	833
R Square	5.31%	7.35%	30.93%	34.22%	36.03%
Adjusted R Square	5.20%	7.01%	30.52%	33.66%	35.41%

NOTE: *p<.05; **p<.01; ***p<.001.

APPENDIX E

EXHIBIT E1

Allocation Funds, Equity Weights

Allocation Fund Group	Equity%
Allocation—15% to 30% Equity	25.00%
Allocation—30% to 50% Equity	40.00%
Allocation—50% to 70% Equity	60.00%
Allocation—70% to 85% Equity	80.00%
Allocation—85%+ Equity	95.00%
Target-Date 2000–2010	55.67%
Target-Date 2015	36.30%
Target-Date 2020	42.23%
Target-Date 2025	42.70%
Target-Date 2030	55.66%
Target-Date 2035	67.36%
Target-Date 2040	77.20%
Target-Date 2045	84.21%
Target-Date 2050	90.20%
Target-Date 2055	90.61%
Target-Date 2060+	90.85%
Target-Date Retirement	89.67%
World Allocation	32.07%
Tactical Allocation	44.70%

APPENDIX F

EXHIBIT F1

Allocation Funds, Equity and Fixed Income Style Weights

Category	Fixed Weight	Equity Weight
Money Market	10%	0%
Short-Term Bond	15%	0%
Intermediate Core Bond	45%	0%
Inflation-Protected Bond	10%	0%
High Yield Bond	10%	0%
World Bond	10%	0%
Large-Cap Growth	0%	15%
Large-Cap Blend	0%	17%
Large-Cap Value	0%	15%
Mid-Cap Growth	0%	4%
Mid-Cap Blend	0%	4%
Mid-Cap Value	0%	4%
Small-Cap Growth	0%	2%
Small-Cap Blend	0%	2%
Small-Cap Value	0%	2%
Real Estate	0%	5%
Foreign Large Growth	0%	5%
Foreign Large Blend	0%	10%
Foreign Large Value	0%	5%
Diversified Emerging Mkts	0%	10%
Total	**100%**	**100%**

APPENDIX G

EXHIBIT G1

Categories Considered, Including Expected Arithmetic Return and Expected Volatility

Category	Expected Arithmetic Return	Expected Volatility	Category	Expected Arithmetic Return	Expected Volatility
Bank Deposit Product	0.25	1.00	Large-Cap Blend	7.24	15.09
Bank Loan	0.80	1.81	Large-Cap Growth	7.45	17.05
Bear Market	2.63	5.79	Large-Cap Value	7.30	14.83
Bond Fund	2.40	5.61	Long Government	1.85	4.53
China Region	8.55	15.94	Long-Short Credit	2.40	5.61
Commodities Broad Basket	3.36	14.54	Long-Short Equity	2.63	5.79
Communications	7.24	15.09	Long-Term Bond	2.40	5.61
Consumer Cyclical	7.24	15.09	Managed Futures	2.63	5.79
Consumer Defensive	7.24	15.09	Market Neutral	2.63	5.79
Convertibles	7.00	13.29	Mid-Cap Blend	7.78	16.93
Core Plus Bond	2.40	5.61	Mid-Cap Growth	8.25	20.00
Corporate Bond	2.40	5.61	Mid-Cap Value	7.77	16.25
Diversified Emerging Mkts	10.53	23.60	Money Market	0.25	1.00
Diversified Pacific/Asia	8.55	15.94	Money Market–Taxable	0.25	1.00
Emerging Markets Bond	4.58	9.10	Multialternative	2.63	5.79
Emerging-Markets Local-Cur	4.58	9.10	Multisector Bond	2.40	5.61
Employer Stock	7.24	30.18	Muni Minnesota	2.40	5.61
Energy Limited Partnership	3.36	14.54	Natural Resources	3.36	14.54
Equity Energy	3.36	14.54	Nontraditional Bond	2.40	5.61
Equity Precious Metals	6.06	17.63	Option Writing	2.63	5.79
Europe Stock	8.03	17.20	Options-Based	2.63	5.79
Financial	7.24	15.09	Other–Capital Preservation	2.40	1.00
Fixed Income	2.40	5.61	Other Bond Fund	2.40	5.61
Foreign Large Blend	8.55	15.94	Pacific/Asia ex-Japan Stk	9.52	20.63
Foreign Large Growth	8.45	15.94	Preferred Stock	7.00	14.99
Foreign Large Value	8.65	15.94	Prime Money Market	0.25	1.00
Foreign Small/Mid Blend	8.55	15.94	Real Estate	6.68	17.39
Foreign Small/Mid Growth	8.55	15.94	Relative Value Arbitrage	2.63	5.79
Foreign Small/Mid Value	8.55	15.94	Short Government	0.80	1.81
General Account	2.40	1.00	Short-Term Bond	0.80	1.81
Global Real Estate	7.43	21.58	Small/Mid-Cap Blend	8.52	19.58
Health	7.24	15.09	Small-Cap Blend	8.52	19.58
High Yield Bond	3.53	8.47	Small-Cap Growth	9.01	22.39
Industrials	7.24	15.09	Small-Cap Value	8.30	17.88
Inflation-Protected Bond	2.14	5.49	Stable Value	2.40	1.00
Infrastructure	8.82	16.32	Technology	7.24	15.09
Insurance/Annuity Product	2.40	1.00	Ultrashort Bond	0.25	1.00
Intermediate Core Bond	2.40	5.61	US Treasuries	1.85	4.53
Intermediate Core-Plus Bond	2.40	5.61	Utilities	7.24	15.09
Intermediate Government	1.85	4.53	World Bond	1.33	5.42
Intermediate-Term Bond	2.40	5.61	World Large Stock	8.55	19.92
Intermediate-Term Bond	2.40	5.61	World Small/Mid Stock	8.55	15.94

APPENDIX H

EXHIBIT H1

OLS Regressions on Portfolio Efficiency

	Alpha	Expected Geometric Return	Equity%	Fund Count
Intercept	0.541***	7.656***	116.476***	7.842***
DIY	−0.332***	−0.986***	−15.171***	−4.508***
ESG%	−0.001***	0.026***	0.627***	0.043***
Age	−0.001***	−0.051***	−1.190***	−0.021***
Savings%	−0.005***	0.043***	1.096***	−0.069***
Income	−0.001***	0.004***	0.113***	−0.046***
Equity%	−0.016***	0.000***	0.000***	0.201***
Equity%^{2}	0.000***	0.000***	0.000***	−0.002***
Observations	58,708	58,708	58,708	58,708
R^2	32.63%	54.04%	49.60%	31.54%
Adjusted R^2	32.62%	54.04%	49.59%	31.53%

NOTE: *p<.05; **p<.01; ***p<.001.

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