

A Scientific Portfolio Publication

The Perceived Advantages of Self-Indexing for Institutional Equity Investors

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Abstract

Institutional asset owners increasingly seek to customize index-linked strategies in order to take their ESG and climate preferences into consideration. This trend away from cap-weighted benchmarks does, however, bring forth challenges for asset owners in fulfilling their fiduciary duties. To address these issues, a new self-indexing approach can provide investors with the tools to fully control the index design process and independently monitor the direct and indirect impacts of customization decisions. A 2023 EDHEC survey of institutional asset owners in North America and Europe reveals that less than half of respondents have the capacity to fully analyze their risk exposures, but more than 90% anticipate the further development of digitalized customization capabilities in the institutional passive investment industry. These findings highlight the significant potential for the use of self-indexing as a solution to help institutional asset owners fulfill their fiduciary responsibilities.

Key Takeaways

- Institutional investors who wish to implement ESG preferences and are looking for holistic risk analysis capabilities can currently follow a *self-indexing* approach and independently design customized indices to meet their needs. They can build on available direct indexing technology, in particular, the digitalized portfolio analysis and construction functionalities on offer.
- US large cap equity data reveals the presence of tradeoffs between finance and ESG objectives. A 2023 EDHEC survey revealed that the vast majority of survey respondents (68%) consider that they could establish a priority between their financial and ESG objectives, opening the way to transparent and systematic portfolio construction methodologies.
- Most respondents (over 90%) believe that the institutional passive investment industry is heading towards further customization capabilities and that digital customization services inspired by direct indexing can facilitate this evolution.

Introduction: The Long Road Towards Full Customization

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The history of equity indexing can be described as a long road from consensus-based investing towards full customization. This journey and the emergence of a customization-based paradigm naturally raise the question of the role and status of the index provider. We start by presenting a brief account of the history of passive equity investing and highlighting its main phases.

In the beginning was the broad market capitalization-weighted (CW) index. At the time, the objective was market representation, supported by the idea that there was only one possible representation, largely due to the influence of seminal academic works of Markowitz (1952), Tobin (1958), Sharpe (1964) and Lintner (1965). The theory offered a framework where all investors would hold a portion of the same market portfolio, comprised of all available risky assets weighted by their value. This led to the development of investment strategies based on a CW index (used as a proxy for the market portfolio) and ultimately to the creation of public investment vehicles such as the first index mutual fund launched by Vanguard (see Malkiel (2022)). The CW index provider was therefore the representative and the advocate of the market consensus. In this context, the index provider's intellectual property consisted of a methodology whose value resided in the consultation with investors and the transparency associated with the process. Major providers therefore derived their strength from their large client base.

The decade that followed the financial crisis saw the emergence of non-CW smart beta indices, as the efficiency of CW indices began to be questioned. Indeed, a portfolio of stocks weighted by capitalization is not necessarily a good proxy for the true market portfolio (which should in principle go beyond equities and include all assets in the universe, including non-tradable ones like human capital). Additionally, the true market portfolio is only optimal under unrealistic assumptions and may potentially be complemented depending on an investor's idiosyncratic aversion to changes in non-traded state variables such as labor income. This shift led academia and the industry to think about better (smart) indices. Unlike their predecessors, these indices no longer aimed to solely represent a market consensus but were instead the fruit of genuine research specific to the index provider. This new focus gave rise to new actors in the indexing world, showcasing their research either as asset managers or investment advisors (e.g., RAFI, Tobam, Robeco) or as representatives of the academic world (e.g., Scientific Beta), alongside traditional players with research capabilities (e.g., MSCI, Qontigo). Smart beta indices bear a reputational and fiduciary risk which institutional investors wish to minimize by controlling the distance relative to CW indices and by selecting methodologies backed by research grounded in academic consensus, as is the case for factor investing, or by original research validated by publication in respectable journals. For example, most of the highly successful smart beta indices in the US have been the subject of research in two industry-recognized journals (the Financial Analysts Journal and the Journal of Portfolio Management). It is worth noting that the reflection of investor preferences on the construction of a smart beta index is generally limited. For example, in the case of factor investing, which has represented a large share of the smart beta segment in the last 10 years, the choice offered to the investor is often limited to a factor menu or to sector control deviation options; the investor indeed relies on the index provider's proprietary research when it comes to the portfolio construction methodology and to the definitions and proxies of the selected factors. In this context and due to their focus on risk mitigation, institutional investors will wish to have a presentation of the

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simulated track record of the index and an analysis of the tracking error risk. Some observers have considered that the promise of outperformance made by index providers based on their research has de facto granted them a role that is not very different from that of an investment advisor, and as such, has assigned index providers a fiduciary responsibility to the extent their index methodology could lead to discretionary decisions, or at least decisions resulting from rules that were not known to and approved by the investor.

Finally, the last decade saw the arrival of non-CW indices integrating environment, social or governance (ESG) criteria. Even though these ESG indices are often derived from broad CW indices, their composition and/or weighting schemes use non-financial stock-level characteristics and may sometimes lead to fairly strong deviations from broad indices. This may be due to sector allocation, since some sectors are often strongly under-represented (e.g., oil & gas and more generally energy in climate indices), or to stock-level allocation, since some stocks may be under-weighted or excluded based on ESG criteria. For example, recent research carried out by EDHEC Business School as part of the Scientific Portfolio project has shown that complying with a “do no harm” (DNH) exclusion policy with respect to each of the 17 Sustainable Development Goals (defined by the United Nations) leads to an exclusion of almost 40% of the stocks in the world developed markets universe. Given the absence of either an academic or an industry-wide consensus with respect to the construction of ESG portfolios, the design of an ESG benchmark (and more generally the field of ESG investing) is more representative of an institutional investor’s preferences and notably the objectives defined by its governing body or managing board, than the result of the index provider’s internal research. Consequently, the value added by the main ESG index providers is ultimately more about access to new data than the imposition of a particular portfolio construction method. More recently in Europe, the newly adopted regulations (e.g., the Sustainable Financial Disclosure Regulation, or the Paris-Aligned Benchmarks) detailing the obligations pertaining to this data (e.g., disclosure and usage requirements) have also structured ESG, and particularly climate, index offerings.

Clearly, the predominance of investor preferences in index design has had considerable consequences on index offerings. These consequences not only include the development of strong customization capabilities, offered by players such as Solactive, but also the desire of major actors such as Qontigo or MSCI to offer client-driven indices that both reflect investor preferences and rely on proprietary index construction technical capabilities (e.g., powered by risk models such as Axioma or Barra). However, the alleged full customization of indices is ultimately a commercial offering from index providers who understandably aim to showcase the quality of their product. This can manifest through various means, whether it be via the selection of the most favorable metrics supporting the affirmed objectives of the index, the choice of the backtesting period, or more generally, the adoption of a framework to perform an index risk analysis. Therefore, although the investor indeed expresses customization choices, the implementation of these choices remains the responsibility of the index provider.

This phenomenon has been particularly pronounced recently, as many ESG index providers showcased the outperformance of ESG strategies. For example, some indicated that ESG strategies may have

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protected investors from the Covid crisis while omitting to mention that this performance resulted from implicit choices of factor exposures (overweighting the profitability factor which is typical of defensive strategies, and underweighting the value factor which is generally considered cyclical) and sectors (underweighting the energy sector and overweighting technology stocks). These exposure choices then had highly negative consequences on 2022 performance due to the value recovery and the energy crisis. See for instance Bruno, Esakia and Goltz (2022), who report that while the returns of ESG strategies look attractive between 2008 and 2020, 75% of their observed outperformance may be explained by quality factors (that are typically proxied by profitability measures).

It is in this context, characterized not only by the predominance of full customization but also by the necessity for investors to take ownership of their customization choices (and of their consequences), that the concept of *self-indexing*, already popular amongst retail and high net worth individual investors through direct indexing offerings, is beginning to emerge in institutional investment management.

The objective of this article is twofold, which is reflected in the organization of the remaining sections. First, in section 1, we highlight the commonalities and the differences between self-indexing and direct indexing, as the latter may intuitively be considered as a template and a source of inspiration for a digitalized index customization institutional offering. Then, in sections 2 and 3, we cover institutional self-indexing from two complementary perspectives, i) by reporting the key findings of our dedicated survey of institutional investors on the topic (full results are reported in the annex) and ii) by describing and illustrating the benefits of self-indexing for investors seeking to fulfill fiduciary responsibilities in the context of passive investment management.

1. Institutional Self-Indexing Versus Personal Direct Indexing

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Even though institutional investors are better equipped in terms of expertise and tools to exercise their fiduciary responsibility directly, it is paradoxically on the individual investor side that the shift to a disintermediation of the value chain has been the largest, through the concept of direct investing.

The direct indexing technology is generally considered to have contributed to an improvement of the retail and high net worth client experience by allowing advisors to personalize client portfolios and therefore accommodate individual circumstances and preferences. Cerulli Associates (2021) provides a general introduction to the direct indexing service and describes how it is used for individual investors; direct indexing primarily aims to deliver “*beta exposure*” and relies on “*customized separately managed accounts (SMA) that provide investors direct ownership of individual securities in an indexlike solution*.” The two distinctive features of this personalization service are therefore i) its “direct” nature and ii) its “customized” nature. The first feature, where investors directly own the underlying stocks of their portfolio, is common practice in the institutional space; however, it is an innovation in the retail and high net worth segment where investment through mutual funds and ETFs were historically the norm. This direct ownership structure creates tax efficiencies for individual investors seeking greater control to harvest gains and losses at the individual security level. The second feature adapts the investment strategy to each investor and is designed as a welfare-improving customization service that allows tailoring the portfolio based on ESG criteria, or exclusions of specific stocks or sectors. It should nevertheless be pointed out that direct indexing may carry some drawbacks for individual investors. These drawbacks include the risk associated with deviating from a consensus benchmark, an approach akin to active management in practice that could lead to overconfidence in one’s own abilities or require more frequent monitoring and resources.

The two main drivers of the development of direct investing are specific to the context of individual investors and are detailed below (see also Cerulli (2021) for a more granular list of benefits of direct indexing for individual and high net worth investors, as perceived by direct indexing providers; these benefits include on-going and transition-related tax optimization, ESG, factor or thematic investing).

First, direct indexing addresses some situations of tax sub-optimality generally associated with passive investing via ETFs. ETFs are generally considered to be tax efficient vehicles compared to index mutual funds because of their ability to meet redemptions thanks to in-kind delivery of securities, therefore generating fewer taxable events compared to traditional mutual funds. However, unlike direct indexing, ETFs do not allow individual investors to implement tax-loss harvesting strategies, which are often advertised by the industry as worth approximately 100 basis points per annum of after-tax returns. Additionally, direct indexing facilitates portfolio transition, which typically consists in the diversification of a concentrated portfolio that embeds large unrealized capital gains. With an ETF, the investor would be required to sell out of the entire concentrated portfolio and purchase an ETF (or a portfolio of ETFs) instead, while direct indexing would allow to *adjust* the portfolio line by line, thus minimizing the number of transactions and the amount of realized capital gains. Finally, direct indexing allows tax-optimal charitable giving, since the investor can decide to specifically donate highly appreciated securities that embed the largest unrealized capital gains.

1. Institutional Self-Indexing Versus Personal Direct Indexing

Second, ETFs are regulated collective investment vehicles and are therefore subject to high fixed operating costs, typically a few hundred thousand dollars per year. As a result, ETF sponsors generally want to consolidate assets in funds that have sufficient AUM in order to justify the fixed operating costs. ETFs' investment strategies will therefore be limited to a few consensus categories that will act as the default choice for a large group of investors. In other words, the fixed cost associated with ETFs makes the latter sub-optimal when it comes to customization. On the other hand, direct indexing allows individual investors to express their personal investment preferences, whether it be stock-specific or industry-specific choices driven by financial reasons (e.g., excluding one's employer or sector, or actively stock picking) or ESG reasons (e.g., excluding companies because of environmental issues or faith-based/political values).

Based on the above motivations, it clearly appears that the question of exercising fiduciary responsibilities, and therefore controlling risks, is much less present in direct indexing than in the institutional context. Individual investors consider direct indexing as a means to expand their investment opportunities, and thereby their wealth creation opportunities, and to a lesser extent as a capacity to express non-financial preferences. They do not necessarily ex-ante consider the financial consequences of such preferences, which sometimes leads them to modify their index or choice of index ex-post based on the performance observed.

As far as the expression of ESG preferences is concerned, we observe that direct indexing players often provide individual investors with a simple choice between a small number of pre-constructed ESG indices reflecting the most popular themes, with some providers implementing the same idea via a pre-defined list of filters or tilts (linked to popular themes) that the investor may apply to a broader index. Providers technically allow for discretionary single stock exclusions but, unlike for financial preferences where individual investors, rightly or wrongly, believe they are sufficiently informed to engage in stock picking, it is unlikely individuals will have an independent access to the relevant extra-financial data to contemplate discretionary single stock ESG exclusions.

In contrast, institutional investors have a focus on fiduciary issues. As a reminder, fiduciaries are required to act prudently and to diversify their investment portfolio in order to minimize the risk of large losses. Therefore, the capacity for them to integrate, analyze and select the risks associated with their index-based investments is essential. Moreover, when it comes to ESG objectives, most institutional investors are not content with off-the-shelf offerings and wish to be able to express their preferences in a very precise way, either in the form of proprietary customized investment lists that are aligned with ESG objectives (e.g., SDGs, climate change mitigation, climate risk), or aligned with their engagement strategy.

Based on the above considerations and to conclude, the foundations of institutional self-indexing are i) the ability to address investors' need to "self-implement" high levels of customization in various dimensions (financial, ESG risk, ESG impact), and ii) the ability to holistically "self-analyze" the proposed investment strategies independently from any commercial consideration, and therefore the capacity to control not only the design of the index but also the consequences of any design decision.

2. EDHEC Self-Indexing Survey: Motivations and Expectations of Institutional Asset Owners

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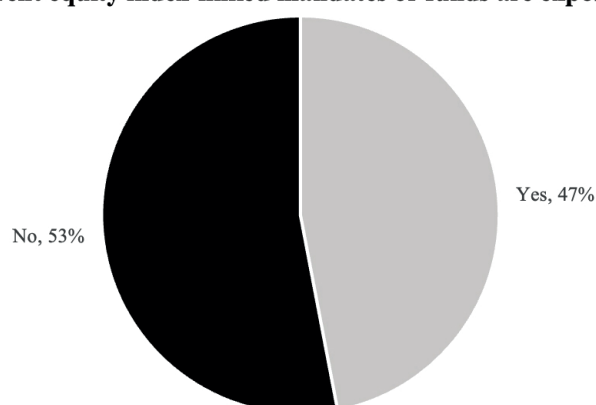
Following the strong growth of direct indexing for individual investors, EDHEC conducted a survey on self-indexing with the aim of identifying and highlighting the potential advantages of self-indexing for institutional equity investors who are pursuing specific objectives and facing certain constraints. The exhibits presented in this section are based on the responses gathered during the survey period from April to May 2023. The survey was conducted using an online questionnaire specifically targeted at institutional asset owners in North America and Europe. A total of 45 asset owners participated in the survey, collectively overseeing an estimated total AUM of USD2.5 trillion and are therefore deemed to be a reasonable representation of the global institutional asset owner universe. Percentages (%) of respondents reported hereafter for a given question refer to the proportion of the subset of participants that answered the question.

In this section, we present the key findings and highlights of the survey. The complete set of survey results is provided in the annex for further reference. The choice of questions in the survey was a direct consequence of our focus on risk management, a primary concern and responsibility of institutional asset owners, and the ability for the latter to conduct an independent and comprehensive risk analysis of their index-linked investments, considering that index providers do not bear any fiduciary responsibility. In this context, a self-indexing approach not only refers to strong, institutional-grade customization capabilities, but also, and more importantly, to the ability to exercise full and direct control over each aspect of the index construction process. A self-indexing process should also in principle benefit from the latest advances in technology so that a large part of the process is digitalized, somewhat similarly to what has been achieved for direct indexing. Our survey is therefore structured in four sections, each relating to a particular topic: i) the capacity of asset owners to comprehensively analyze risk, ii) the ability of asset owners to reconcile their finance and ESG objectives in a single framework, iii) the relationship between asset owners and their index providers or investment solutions providers and iv) the asset owners' view on the evolution of the passive investment industry and the potential role of digitalized services.

Factor Risk Analysis Capabilities

Exhibit 1

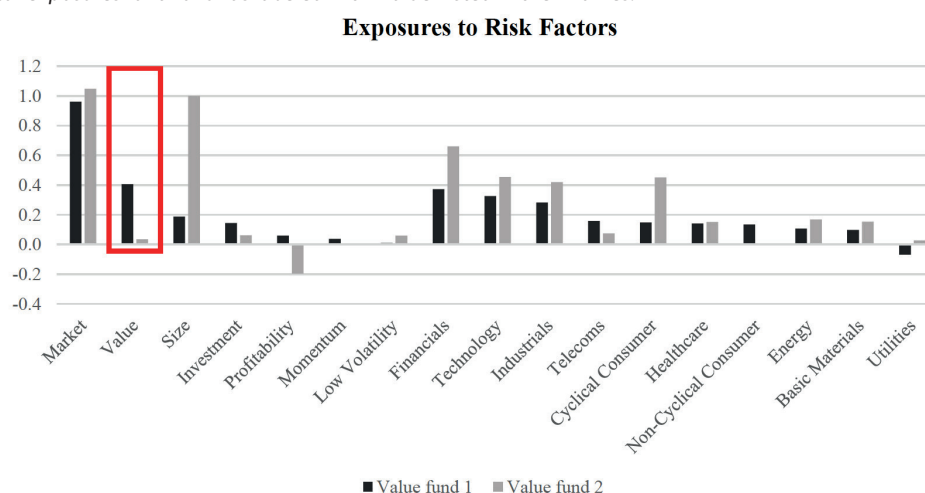
Do you have your own capacity to analyse the risk factors to which your current equity index-linked mandates or funds are exposed?



2. EDHEC Self-Indexing Survey: Motivations and Expectations of Institutional Asset Owners

Based on our survey findings, less than half (21 out of 45) of the respondents have the capacity to analyze the risk factors to which their current equity index-linked mandates or funds are exposed, as shown in Exhibit 1. To emphasize the importance of analyzing a portfolio's risk factor exposures, we present an illustrative example in Exhibit 2. In this scenario, two providers offer ETFs with “value” mentioned in the name. Evaluating these funds through the same lens allows for a standardized comparison that can uncover unexpected exposures and highlight potential inconsistencies between a fund's name and its risk profile.

Exhibit 2: Risk factor exposures for two funds labeled with “value” listed in their names.



NOTE: The factor exposures (betas) displayed above are computed in accordance with the methodology described in Vaucher (2023). The horizontal axis represents 17 risk factors, including seven asset pricing factors (Market, Value, Size, Investment, Profitability, Momentum and Low Volatility) and 10 industry risk factors based on The Refinitiv Business Classification (TRBC) Level 1 sectors from 2012. The vertical axis represents the factor exposure (beta) of the fund measured with daily returns over a five-year period, ending on May 5, 2023. Value fund 1 is the iShares MSCI USA Value Factor ETF – USD and Value fund 2 is the iShares Russell 2000 Value ETF – USD. Time series of returns are sourced from Trackinsight for ETFs.

Despite both funds being categorized as value-focused, their “value” exposures differ significantly. Value fund 2 demonstrates negligible exposure to the value risk factor, whereas Value fund 1 exhibits a notably positive exposure to it (for completeness, a separate unreported analysis controlling for the difference in the underlying investment universe did not explain the large discrepancy in value exposures¹). The reported exposures in Exhibit 2 were calculated in accordance with Vaucher (2023), based on a version of the value factor (and other asset pricing factors) that is in line with the standard academic literature.² The construction rules of an index-linked fund, and to a greater extent, the name of the fund, are not always transparent indicators of its actual exposures; therefore, using a single risk model will help determine the actual exposures (whether absolute or relative) and alert investors when a customization may introduce new unwanted exposures.

Unintended risk exposures also tend to appear in ESG strategies. Indeed, Exhibit 3 shows the relative risk factor exposures (i.e., the exposures pertaining to the excess returns with respect to the CW benchmark) of an equally weighted basket of sustainable US equity funds. There are material betas

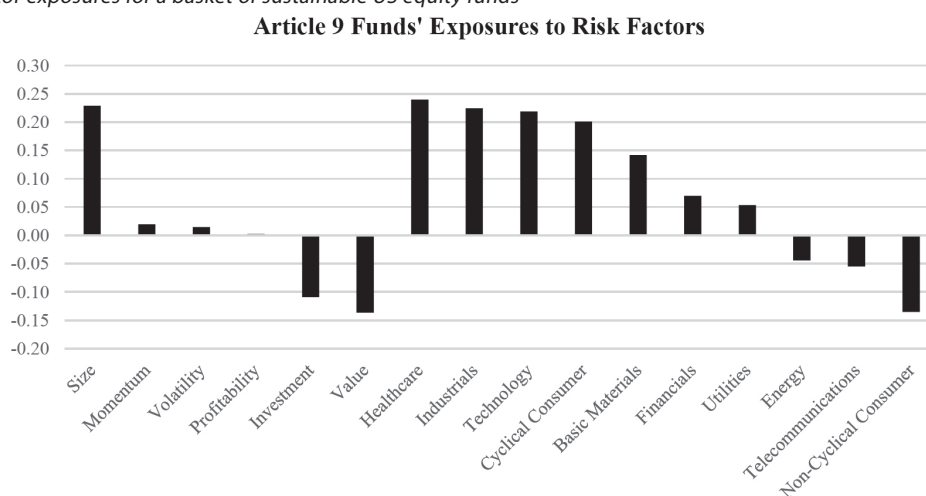
1 - It is possible that this observation is caused by different conventions in the definition of the value risk factor. Indeed, there is no standardized approach within the industry for defining a given factor and implementing a factor-tilted portfolio (see Amenc and Goltz (2016)). Consequently, these differences in convention can lead to differences in exposure measurement. Such differences are not necessarily problematic provided the risk model used for analysis is coherent and robust enough to consistently explain the risk and the performance of diversified portfolios, facilitating meaningful comparisons.

2 - Adopting such an approach offers several advantages. Firstly, it allows us to manipulate factors that have been widely tested and documented, thus limiting the risk of data mining in the analysis and increasing out-of-sample robustness. Additionally, this approach makes it possible to easily rely on the findings of academia to enrich an analysis. For instance, the possible cause for the absence of a positive value exposure associated with Value fund 2 could be the negative Profitability exposure reported by this fund in Exhibit 3. This is consistent with the documented negative relationship between value and profitability (see Novy-Marx (2013)). It is therefore possible that Value fund 2 has achieved a lower price-to-book ratio by primarily selecting unprofitable firms, although a stock-level fundamental analysis of the fund would be necessary to confirm this hypothesis.

2. EDHEC Self-Indexing Survey: Motivations and Expectations of Institutional Asset Owners

both with respect to several academic factors (e.g., size, investment and value) and several industry risk factors (e.g., healthcare, industrials, technology). This example once again illustrates the need for investors to conduct a comprehensive risk analysis that enables all exposures to be revealed (including unexpected ones) rather than an analysis focused on verifying that the targeted exposures or characteristics have indeed been achieved.

Exhibit 3: Risk factor exposures for a basket of sustainable US equity funds

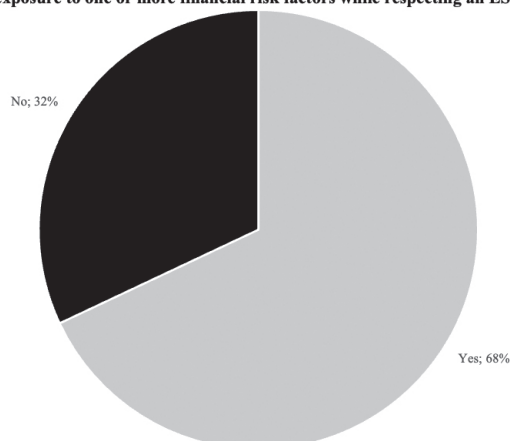


NOTE: The horizontal axis represents sixteen risk factors, including six asset pricing factors (Value, Profitability, Low Volatility, Momentum, Size and Investment) and ten industry risk factors based on The Refinitiv Business Classification (TRBC) Level 1 sectors from 2012. The vertical axis represents the factor exposure (beta) of the fund measured with weekly returns, ending on April 27, 2023. The factor exposures displayed are based on excess returns and are obtained through two block-wise regressions as in Vaucher (2023), the first one aimed at measuring asset-pricing factor exposures (to the Value, Momentum, Size, Low Volatility, Profitability, Investment factors) and the second industry risk factor exposures (as per the first level of the 2012 The Refinitiv Business Classification). An OLS multivariate regression is performed on weekly excess returns of the fund's net asset value in USD against the S&P 500 (net total return). We create an equally weighted portfolio based on the four equity open-ended funds and ETFs classified as Article 9 Funds with respect to the SFDR regulation and which are benchmarked against the S&P 500 index as per Bloomberg as of May 2023. Two of the funds have data going back to January 3, 2020 until April 27, 2023. Two of the funds have data only starting in June 2021. Average portfolio returns are computed using available data.

Finance Versus ESG Tradeoffs

Exhibit 4

In principle, could your financial and ESG objectives be prioritized, for example maximizing the impact on one or more ESG dimensions while respecting a factor exposure or a tracking error constraint, or maximising exposure to one or more financial risk factors while respecting an ESG constraint?

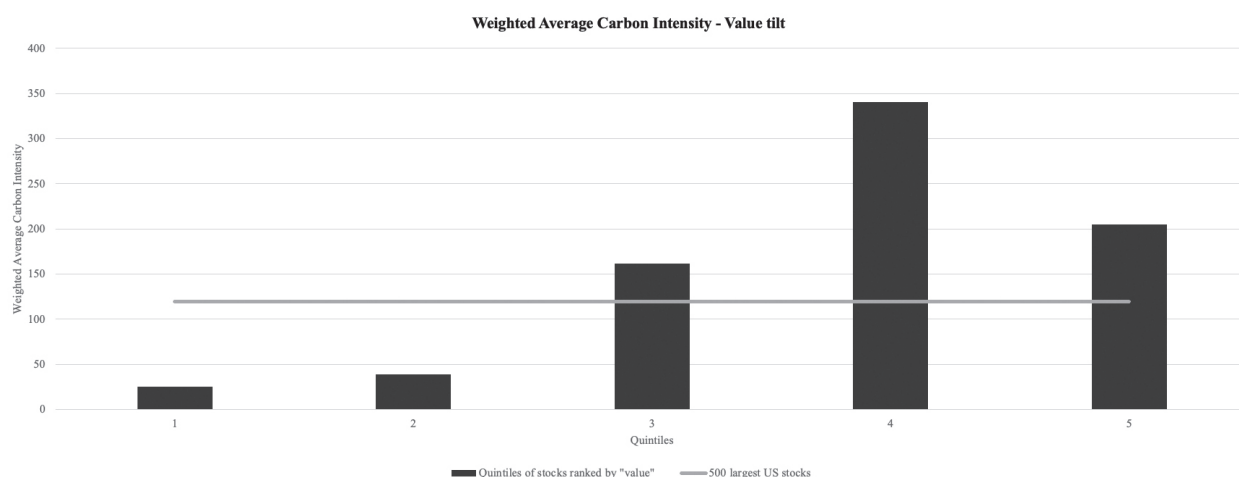


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In view of the significant development in ESG customizations, it was interesting to investigate investors' capabilities in reconciling financial and non-financial objectives. Indeed, optimizing a portfolio solely based on financial objectives without considering the ESG impact could potentially result in a worsened ESG position for the portfolio. At the same time, optimizing a portfolio based on an ESG objective may have financial implications. In other words, there is a tradeoff between making a financial or ESG decision, so prioritization is necessary. According to the survey (see Exhibit 4), 68% of respondents (19 out of 28) stated that they could prioritize their financial and ESG objectives, such as maximizing the impact on one or more ESG dimensions while respecting a factor exposure or tracking error constraint or maximizing exposure to one or more financial risk factors while respecting an ESG constraint.

We conducted a study to understand the ESG implications of a factor tilt. We report results for a value tilt and for a profitability tilt. Specifically, we group the 500 largest US stocks into quintiles based on their book to market value and analyze the weighted average carbon intensity for each quintile. Exhibit 5 shows that quintiles four and five, which consist of stocks with the highest book to market ratio (and therefore represent the highest value-based quintiles) have a significantly higher weighted average carbon intensity compared to that of the 500 largest US stocks. This finding is in line with the results reported by Christiansen and Esakia (2018), who provide evidence that increasing the exposure to value stocks leads to a significant increase in the carbon intensity of a portfolio, an effect the authors deem consistent with the costly reversibility of fixed assets explanation usually associated with the value risk premium. The practical consequence of our finding is that prioritizing a value tilt can lead to negative ESG consequences. Therefore, ESG-sensitive investors may want to implement the value tilt in the context of a tradeoff by imposing a constraint on the deterioration of the weighted average carbon intensity. Such constraint may be implemented via the carbon intensity metric but also indirectly: Christiansen and Esakia (2018) report that imposing a sector neutrality constraint (indirectly) mitigates the deterioration observed in the weighted average carbon intensity of value portfolios.

Exhibit 5: Weighted average carbon intensity of the 500 largest US stocks, grouped into quintiles based on the book to market ratio

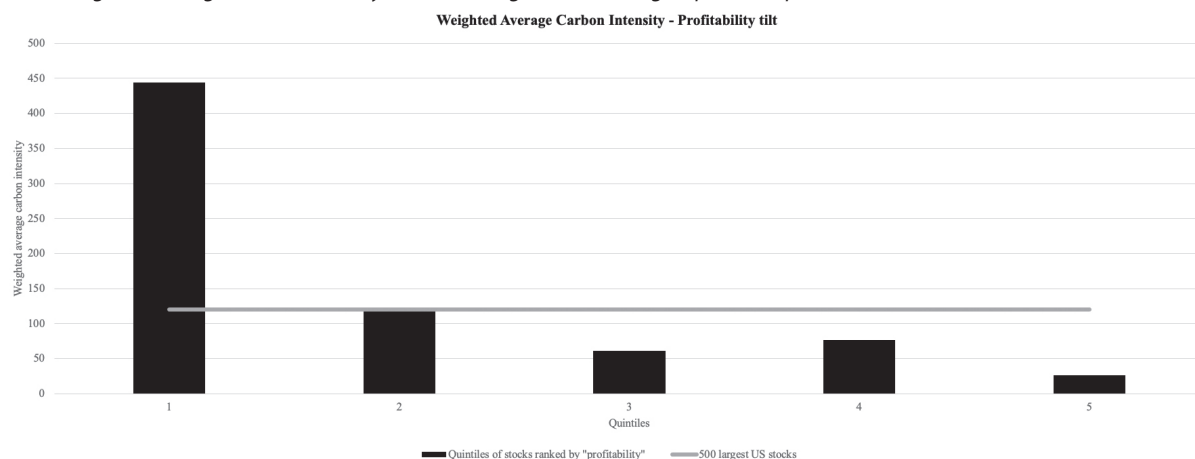


NOTE: The horizontal axis represents five quintiles created based on the 2021 book value of a company divided by its 2021 market capitalization. The quintiles range from quintile 1, which is comprised of growth stocks, to quintile 5, which is comprised of value stocks. The vertical axis shows the weighted average carbon intensity. Carbon intensity is computed by dividing a company's 2021 Climate Total Emissions by their 2021 Revenues. The selection of stocks and their respective weights are based on the composition of the Scientific Beta United States Cap-Weighted Index (an index comprised of the 500 largest US stocks) as of March 7, 2023. The Book Value, Market Capitalization, and Revenues data is sourced from Standard and Poor's while the Climate Total Emissions is equal to scope 1+2 emissions as reported when available (either directly by companies or through the Carbon Disclosure Project).

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When applying the same experiment but sorting companies based on their revenue to total assets ratio (as a measure of profitability), it is observed that inclusion of the most profitable companies does not result in a deterioration of the weighted average carbon intensity, as shown in Exhibit 6, and would therefore not require any carbon intensity-related constraint.

Exhibit 6: Weighted average carbon intensity of the 500 largest US stocks, grouped into quintiles based on the revenue to total assets ratio



NOTE: The horizontal axis represents five quintiles created based on the 2021 revenue of a company divided by its 2021 total assets. The quintiles range from quintile 1, which is comprised of the least profitable stocks, to quintile 5, which is comprised of the most profitable stocks. The vertical axis shows the weighted average carbon intensity. Carbon intensity is computed by dividing a company's 2021 Climate Total Emissions by their 2021 Revenues. The selection of stocks and their respective weights are based on the composition of the Scientific Beta United States Cap-Weighted Index (an index comprised of the 500 largest US stocks) as of March 7, 2023. The Revenue and Total Assets data is sourced from Standard and Poor's while the Climate Total Emissions is equal to scope 1+2 emissions as reported when available (either directly by companies or through the Carbon Disclosure Project).

The above results on the empirical relationship between value, profitability and carbon intensity indicate that an *unconstrained* customization aimed at mitigating the carbon intensity of a portfolio would likely generate a short value tilt and a long profitability tilt, two exposures that have historically been reported in the design of climate impact indices (see Hao et al. (2018)) and that happened to be sources of market outperformance and then subsequently market underperformance in the last three years. Our illustration therefore provides strong evidence of the benefits that self-indexing could bring by integrating both ESG and financial considerations in a single independent analysis, recognizing that these aspects are interconnected and should be addressed together.

Relationship with Providers of Customized Investment Solutions

Among the survey respondents (see Exhibit 7), 63% (17 out of 27) indicated that they occasionally seek to customize a chosen reference index to align with their personal preferences. For those individuals that did seek customizations, they were asked to select all methods they use to verify whether the customization objectives were achieved. The results show that 59% (see Exhibit 8) of respondents (10 out of 17) utilize internal technology, while 29% (5 out of 17) rely on third-party technology. Furthermore, 29% (5 out of 17) selected a third-party investment solution provider, and 24% (4 out of 17) reported using a consultant to assist in the customization process.

2. EDHEC Self-Indexing Survey: Motivations and Expectations of Institutional Asset Owners

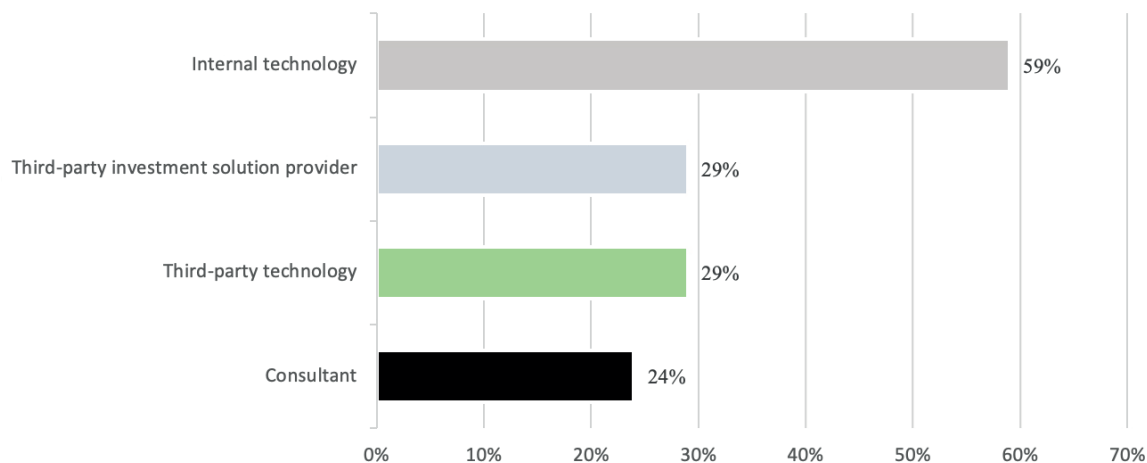
Exhibit 7

Do you occasionally request a customization of the chosen reference index to reflect personal preferences?



Exhibit 8

If you occasionally request a customization of the chosen reference index to reflect personal preferences, how do you verify that the customization objectives have been met?



As per Exhibit 9, only 56% (15 out of 27) of respondents' investor solutions providers offered to adapt to the respondents' financial and ESG reporting formats. Among the remaining 44% (12 out of 27) who were not offered this service, they responded with the various approaches they currently employ to manage the resulting discrepancies. Specifically, as shown in Exhibit 10, 67% (8 out of 12) use a manual process, 33% (4 out of 12) utilize internal technology, 8% (1 out of 12) rely on third-party technology, and 25% (3 out of 12) chose "other" as their preferred approach.

2. EDHEC Self-Indexing Survey: Motivations and Expectations of Institutional Asset Owners

Exhibit 9

Do your investment solutions providers offer to adapt to your financial and ESG reporting formats?

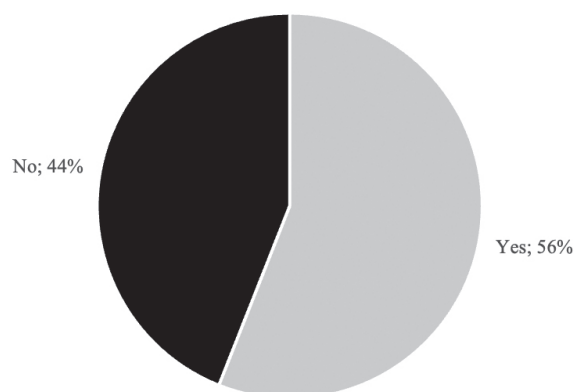
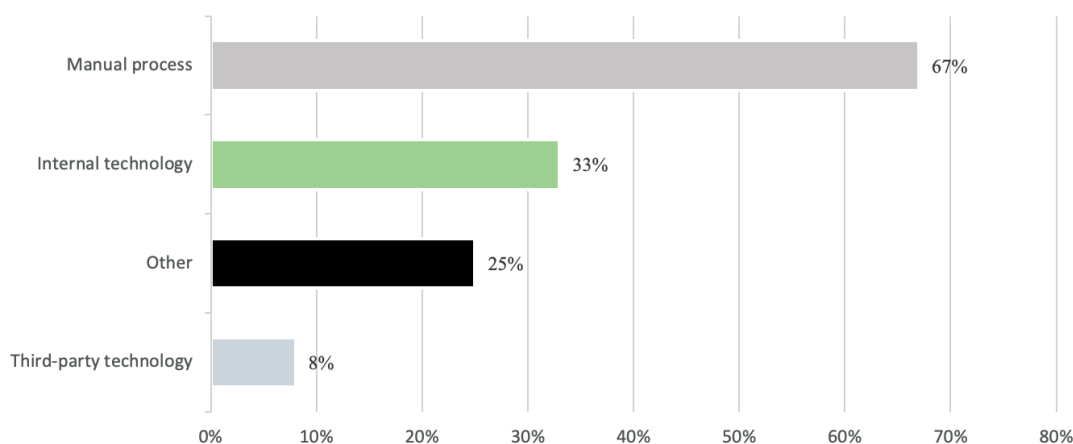


Exhibit 10

If your investment solutions providers do not offer to adapt to your financial and ESG reporting formats, how do you currently manage the resulting discrepancies?



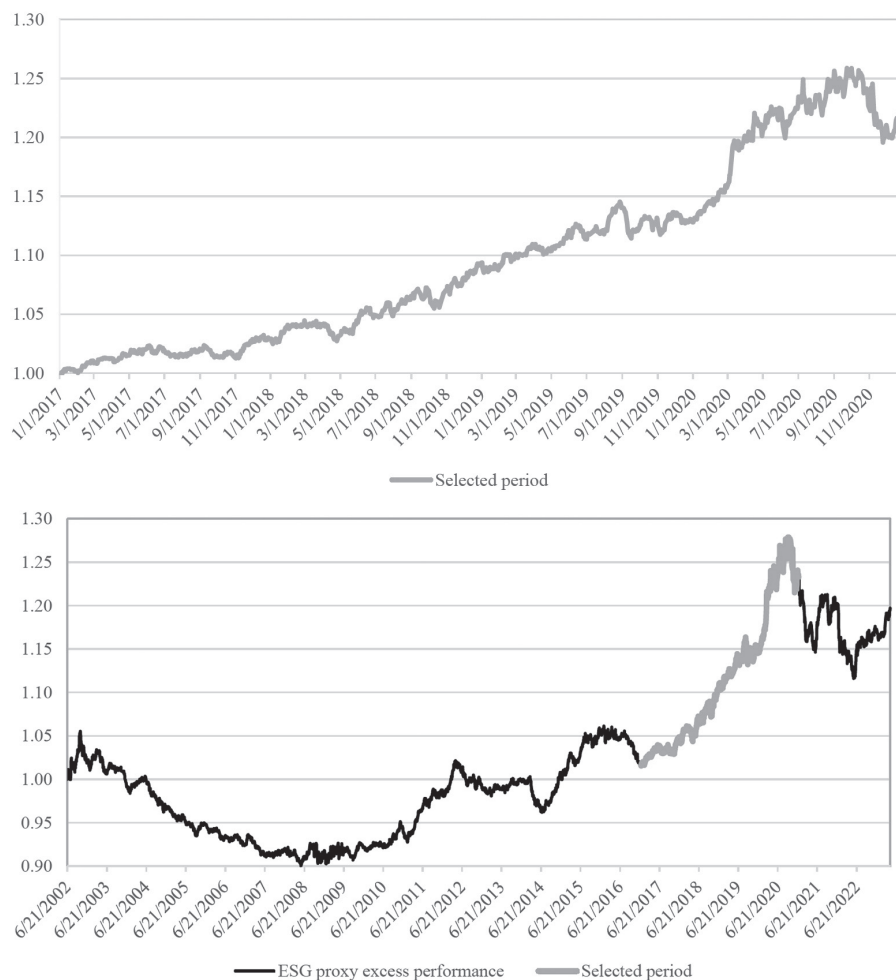
It is important that institutional asset owners exercising a fiduciary responsibility verify that their customization objectives have been met, although in the most holistic sense. This means verifying that intended consequences are indeed observed (e.g., improvement of targeted metrics), but also looking for unintended consequences (e.g., unexpected deterioration of other metrics). Indeed, the backtesting results published by an investment solutions provider are only a regulatory minimum and not a comprehensive risk analysis. It is therefore critical for the investor to be able to “go beyond” a historical sample (generally selected by the solutions provider) and test the robustness of a customized strategy in various market environments. This may be done simply by selecting a different historical period for the analysis (which requires the ability to perform long-dated historical simulations) or by going one step further and generating hypothetical scenarios (which requires the ability to perform

2. EDHEC Self-Indexing Survey: Motivations and Expectations of Institutional Asset Owners

out of sample simulations). Forthcoming research by EDHEC Business School (as part of the Scientific Portfolio project) will elaborate further on the various quantitative risk and simulation techniques that could be integrated into a comprehensive self-indexing toolkit.

To illustrate the dependence of a backtesting result to the selected sample period, we produce a stylized example consistent with our findings as well as those of Christiansen and Esakia (2018) or Hao et al. (2018), that a positive exposure to the Profitability factor and negative exposure to the Value factor are a natural pattern of unconstrained climate strategies. We analyze the performance of a hypothetical strategy long a CW benchmark (namely the Scientific Beta United States Cap-Weighted Index, comprised of the 500 largest US stocks) and 20% of a long/short between the Profitability and Value factors (constructed in accordance with Vaucher (2023)), and observe that the four-year track record that an investor might have been presented immediately after the Covid crisis would have looked quite impressive (see Exhibit 11). However, put in perspective using longer-term series we see sell-offs and a long period of underperformance (2002-2008). This illustrates the importance of out-of-sample simulations when assessing the performance potential of a strategy.

Exhibit 11: Historical analysis of a stylized unconstrained climate strategy



NOTE: Both charts represent the total return portfolio value of a stylized unconstrained climate strategy rebased at 1.00 respectively on January 2, 2017, and June 21, 2002. The stylized climate strategy is calculated as a 100% long position in the Scientific Beta United States Cap-Weighted Index plus a 20% long/short overlay between the Profitability factor (long the quarterly rebalanced, equally-weighted basket of the 20% highest return on asset ratios and short the 20% lowest) and the Value factor (long the quarterly rebalanced, equally-weighted basket of the 20% highest book-to-market ratios and short the 20% lowest).

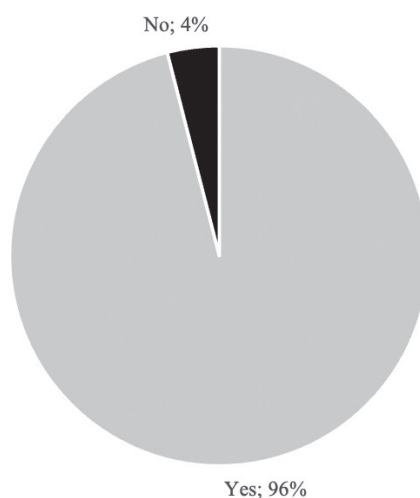
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Anticipated Evolution of the Passive Investment Industry

According to the survey findings (see Exhibit 12), 96% of respondents (26 out of 27) hold the belief that the institutional passive investment industry is headed toward further customization capabilities.

Exhibit 12

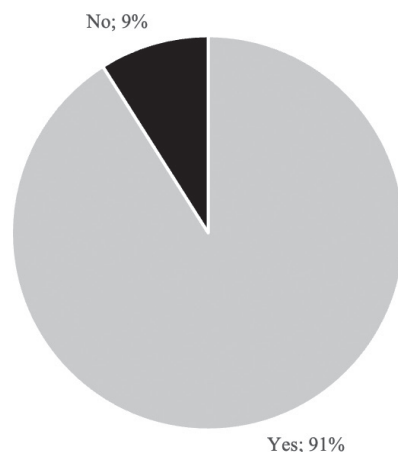
Do you think the institutional passive investment industry is headed towards further customization capabilities?



Moreover, as per Exhibit 13, a substantial proportion (91%, (21 out of 23)) of participants acknowledged the potential role of customized digital services, such as direct indexing, in achieving this customization. When respondents were asked about the primary reasons driving institutional asset owners' interest in self-indexing, they were provided with the opportunity to select multiple choices.

Exhibit 13

Do you think digital services such as direct indexing could play a role in the next evolutions of institutional passive equity investing?

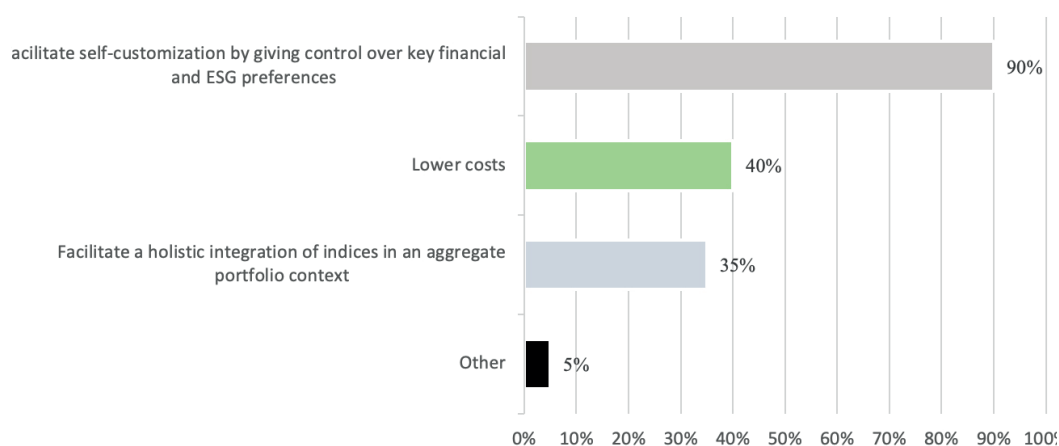


2. EDHEC Self-Indexing Survey: Motivations and Expectations of Institutional Asset Owners

As shown in Exhibit 14, the primary reason, selected by 90% of participants (18 out of 20), was the desire for self-customization, allowing investors to have control over their key financial and ESG preferences. Additionally, 35% (7 out of 20) of respondents recognized the potential of self-indexing in facilitating the holistic integration of indices within an aggregate portfolio context. Lower costs were also identified as a significant driver, with 40% of respondents (8 out of 20) emphasizing the potential cost advantages associated with self-indexing. These findings highlight the growing appetite for a customization service akin to self-indexing among institutional asset owners.

Exhibit 14

If you think digital services such as direct indexing could play a role in the next evolutions of institutional passive equity investing, do you expect institutional investors to be interested in direct indexing for its ability to:



Conclusion

Conclusion

Equity institutional investors regularly seek exposure to passive index-linked strategies that deviate from market-capitalization weighted (CW) benchmarks by targeting specific characteristics that are more aligned with their preferences. This new industry paradigm of full customization, largely caused by ESG and climate indices, is nevertheless not conducive to an appropriate fulfillment of fiduciary duties by asset owners. An instruction communicated to an index provider to customize with respect to a given objective does not guarantee that the objective will be met. Additionally, verification based on the sole observation of metrics or characteristics specifically designed to monitor the achievement of the objective cannot be considered exhaustive. Only a holistic and independent analysis capable of uncovering and highlighting possibly unintended exposures will provide assurance to an asset owner that prudent risk management has been implemented. The new concept of self-indexing addresses this issue directly and suggests providing investors with the analytical tools to fully control the index design process and monitor (at any time) the direct and indirect impacts of any customization decision. Institutional self-indexing differs from the direct indexing service popularized among retail and high net worth individual investors, because the two targeted audiences have fundamentally different preoccupations. While institutional asset owners are mainly in need of solutions that enhance their risk management processes, individual investors expect direct indexing to become an improved substitute for ETFs, especially to further optimize their personal tax position. This being said, self-indexing could benefit from the digitalization that facilitated the adoption of direct indexing, as confirmed by our survey of institutional asset owners located in North America and in Europe (representing approximately USD2.5 trillion of AUM). More generally, while only 40% of respondents report having the ability to fully analyze their risk exposures, more than 90% of respondents believe that the institutional passive investment industry is headed toward further customization capabilities, indicating a strong need for a self-indexing approach.

Annex — EDHEC Self-Indexing Survey

Annex — EDHEC Self-Indexing Survey

The following section presents a comprehensive overview of the survey, including the complete set of questions and corresponding results. The survey encompasses three types of questions: yes/no questions ([Y/N]), multiple-choice questions ([MCQ]), and a free-text response ([Free Text]).

Section 1: Taking the existing allocation into account

- Do you have your own capacity to analyze the risk factors to which your current equity index-linked mandates or funds are exposed? [Y/N] yes: 47%, no: 53%

o If 'yes', do you also have the capacity to check how your index-linked mandates or funds contribute to your factor risk exposures at an aggregate portfolio level? [Y/N] yes: 86%, no: 14%

o If 'no', would it be important for you to acquire such capacity? [Y/N] yes: 54%, no: 46%

Section 2: Reconciling financial and non-financial objectives

- As part of your index selection or mandate design process, are you capable of simulating the financial consequences (e.g., absolute or relative risks, exposure to risk factors, extreme risks) of ESG choices and conversely, the ESG impacts (e.g., exposure to climate or SDG issues) of your financial choices? [Y/N] yes: 47%, no: 53%

o If 'yes', are you conducting the simulation analysis internally? [Y/N] yes: 69%, no: 31%

■ If 'no', are you in a position to independently assess the information and the analyses presented by third party investment solution providers (i.e., asset managers or index providers)? [Y/N] yes: 60%, no: 40%

o If 'no', would it be important for you to be able to do this independently of the third party providing the investment solution? [Y/N] yes: 71%, no: 29%

- In principle, could your financial and ESG objectives be prioritized, for example maximizing the impact on one or more ESG dimensions while respecting a factor exposure or a tracking error constraint, or maximising exposure to one or more financial risk factors while respecting an ESG constraint? [Y/N] yes: 68%, no: 32%

o If 'yes', would it be important for you to be able to test different prioritization schemes independently of third-party investment solution providers? [Y/N] yes: 74%, no: 26%

Section 3: Your relationship with investment solution providers

- Do you personally select the reference index for the funds or mandates that you use? [Y/N] yes: 71%, no: 29%

o If no, do you delegate this task to: i) a consultant, ii) an asset manager, iii) an index provider, iv) other (-> free text to fill in)? [MCQ] consultant: 50%, asset manager: 38%, index provider: 25%, other: 0%

- Do you occasionally request a customization of the chosen reference index to reflect personal preferences? [Y/N] yes: 63%, no: 37%

o If 'yes', is the customization of your mandate carried out by i) sponsoring the launch of a custom

Annex — EDHEC Self-Indexing Survey

version of the Index, ii) implementing a customised mandate under a tracking error constraint with respect to the original index, iii) other (-> free text to fill in)? **[MCQ]** sponsoring the launch of a custom version of the Index: 53%, implementing a customised mandate under a tracking error constraint with respect to the original index: 47%, other: 18%

o If 'yes', how do you verify that the customization objectives have been met: i) internal technology, ii) third-party technology, iii) consultant, iv) third party investment solution provider, v) other (-> free text to fill in)? **[MCQ]** internal technology: 59%, third-party technology: 29%, third party investment solution provider: 29%, consultant: 24%, other: 6%

o If 'yes', are you satisfied with the level of explanation and transparency you are getting from your investment solution provider regarding the financial or ESG consequences of the requested customization? **[Y/N]** yes: 59%, no: 41%

- Do you use an ESG reference dataset that is independent of your investment solutions providers? **[Y/N]** yes: 48%, no: 52%

- Do your investment solutions providers offer to adapt to your financial and ESG reporting formats? **[Y/N]** yes: 56%, no: 44%

o If 'no', how do you currently manage the resulting discrepancies: i) internal technology, ii) third party technology, iii) manual process, iv) other (-> free text to fill in)? **[MCQ]** manual process: 67%, internal technology: 33%, third party technology: 8%, other: 25%

Section 4: The passive investment economy

- Do you think the institutional passive investment industry is headed towards further customization capabilities? **[Y/N]** yes: 96%, no: 4%

o If 'yes', over which aspects would it be important for institutional investors to regain control? **[Free text]** portfolio and index construction, tracking of performance versus customized benchmarks, better knowledge of long-term consequences, ESG compliance, economic thought instead of ESG overload, exclusions and risk factor exposures, risk management.

- Do you think digital services such as direct indexing could play a role in the next evolutions of institutional passive equity investing? **[Y/N]** yes: 91%, no: 9%

o If 'yes', do you expect institutional investors to be interested in direct indexing for its ability to i) lower costs, ii) facilitate self-customization by giving control over key financial and ESG preferences, iii) facilitate a holistic integration of indices in an aggregate portfolio context, iv) other (->free text to fill in)? **[MCQ]** facilitate self-customization by giving control over key financial and ESG preferences: 90%, lower costs: 40%, facilitate a holistic integration of indices in an aggregate portfolio context: 35%, other: 5%

References

References

- Amenc, N., and F. Goltz. 2016. "Long-Term Rewarded Equity Factors: What Can Investors Learn from Academic Research?" *Journal of Index Investing* 7(2): 39–56.
- Bruno, G., M. Esakia, and F. Goltz. 2022. "Honey I Shrunk the ESG Alpha: Risk-Adjusting ESG Portfolio Returns". *Journal of Investing* 31(3): 45–61.
- Cerulli Associates. 2021. "Improving Client Experience: Customizing with Direct Indexing." Cerulli Associates White Paper. <https://www.cerulli.com/knowledge/white-paper-improving-client-experience-customizing-with-direct-indexing>
- Christiansen, E., and M. Esakia. 2018. "The Link between Factor Investing and Carbon Emissions". Scientific Beta Publication.
- Hao, B., A.M. Soe and K. Tang. 2018. "Carbon Risk Integration in Factor Portfolios". S&P Global Publications.
- Lintner, J. 1965. "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets". *Review of Economics and Statistics* 47(1): 13–37.
- Malkiel, B. 2022. "Jack Bogle: American Business Hero". *Journal of Beta Investment Strategies* 13 (1): 14–18.
- Markowitz, H. 1952. "Portfolio selection". *Journal of Finance* 7(1): 77–91.
- Martellini, L., and V. Milhau. 2015. "Factor Investing: A Welfare-Improving New Investment Paradigm or Yet Another Marketing Fad?". EDHEC-Risk Institute Publication.
- Novy-Marx, R. 2013. "The other side of value: The gross profitability premium". *Journal of Financial Economics* 108(1): 1–28.
- Sharpe, W. 1964. "Capital asset prices: A theory of market equilibrium under conditions of risk". *Journal of Finance* 19(3): 425–442.
- Tobin, J. 1958. "Liquidity Preference as Behavior Toward Risk". *Review of Economic Studies* 25(2): 65–86.
- Vaucher, B. 2023. "The Scientific Portfolio Risk Model." Scientific Portfolio Publication. <https://scientificportfolio.com/knowledge-center/>

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2023 Publications

- Herzog, B., Jones, J., Safaee, S. The Perceived Advantages of Self-Indexing for Institutional Equity Investors. (September).
- Bouchet, V. Decomposition of Greenhouse Gas Emissions Associated with an Equity Portfolio. (May).
- Herzog, B., Jones, J., Safaee, S. Remember to Diversify Your Active Risk: Evidence from US Equity ETFs. (March).

2022 Publications

- Bouchet, V., Vaucher, B., Herzog, B. Look up! A Market-Measure of the Long-Term Transition Risks in Equity Portfolios. (December).

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