ESG Investing: *From Sin Stocks to Smart Beta*

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> **KEY FINDINGS**
> - The authors show that environmental, social, and governance (ESG) screening can substantially improve ESG scores for both otherwise passive and smart beta portfolios without reducing risk-adjusted returns.
> - Starting from initially passive multicountry portfolios, ESG screening may lead to substantial regional tilts, such as overweighting Europe and underweighting the US and emerging countries or sectoral bets, for instance in favor of information technology and against financial and energy stocks.
> - Although the broad conclusion of improved ESG profile without affecting risk-adjusted performance also holds for smart beta portfolios, aggressive exclusion of ESG low-scoring firms may lead to some reduction in exposure to targeted factors.

ABSTRACT: *Research on socially responsible investment in equity markets initially focused on sin stocks. Since then, the availability of data has been extended substantially and now covers environmental, social, and governance (ESG) criteria. Using ESG scores of firms belonging to the MSCI World universe, the authors measure the impact of score-based exclusion on both otherwise passive investment and smart beta strategies. They find that exclusion leads to improved scores of initially standard portfolios without deterioration of the risk-adjusted performance. Smart beta strategies exhibit a similar pattern, often in a more pronounced way. Moreover, the results demonstrate that exclusion also implies regional and sectoral tilts as well as (possibly undesirable) risk exposures of the portfolios.*

TOPICS: *Portfolio theory, portfolio construction, ESG investing**

Socially responsible investing (SRI), which is commonly defined as an investment approach that incorporates environmental, social, and governance (ESG) factors, is becoming increasingly important in the asset management industry. Several not-for-profit organizations that monitor the evolution of this segment of the industry report impressive inflows.[1] There is also increasing pressure from regulators,

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[1] The Global Sustainable Investment Alliance (2018) reports that worldwide the total assets under management based on some form of sustainable investment strategy amounted to US\$30.7 trillion in 2018, a 34% increase over the two previous years. The Principles for Responsible Investment, a private initiative supported by the United Nations, have been signed by an increasing number of asset owners, investment managers, and service providers, from 63 in 2006 to 2,898 in 2018 (United Nations 2018).

which now require institutional investors to report publicly how they address SRI issues. This trend is taking place at a time of major structural changes in investment styles, with the rise of passive investment on one hand and smart beta approaches on the other. The move toward passive investment can be clearly observed by the massive increase in assets invested in exchange-traded funds. Smart beta approaches, although still smaller than passive investments, are gaining traction because investors can expose their portfolios to different investment styles and avoid excessive exposure to capitalization-weighted indexes.[2] An important question that arises is how ESG integration affects the nature of the otherwise passive and smart beta portfolios. A fundamental concern is that improving the score of the portfolio may result in the deterioration of its performance. For passive investors, using weights departing from market capitalization may increase the level of tracking errors with respect to the benchmark. For smart beta, the ESG integration may reduce the efficiency of the factor that is targeted by the strategy.[3]

In this article, we analyze how the properties of an otherwise standard portfolio are affected by the use of an ESG filter.[4] We implement a simple procedure that restricts the investment universe by excluding the companies with the lowest ESG scores. Our analysis reveals that the ESG profile of initially passive portfolios can be improved without deteriorating their overall performance. Similarly, adding an ESG filter in a smart beta strategy does not eliminate the exposure to the desired risk factor, while improving the ESG profile of the portfolio. However, ESG screening also implies regional and sectoral tilts as well as some (possibly undesirable) risk exposure. For instance, almost all the otherwise passive portfolios that we consider are negatively exposed to the small-minus-big factor because large firms usually have higher scores than small firms. These results are robust to several dimensions of the investment strategy, such as the regional coverage, the focus on specific ESG criteria, the definition of the exclusion filter, and the choice of the smart beta strategy.

A fundamental question for institutional investors is how to integrate an ESG screening into their investment strategy. Exclusion is a relatively common way to implement ESG strategies. The easiest and still most favored approach is through the exclusion of *sin* industries, such as alcohol, tobacco, or gaming (Fabozzi, Ma, and Oliphant 2008; Hong and Kacperczyk 2009). However, the impact may be small because the number and the relative size of the firms excluded remain limited with respect to the overall market. Another approach applies a negative screening directly on firms according to their ESG score or rating (De and Clayman 2015; Bender et al. 2018). A drawback is that some firms that are engaged in sustainable activities but belong to an industry with low scores, on average, are often excluded from the ESG portfolio. One way to cope with this issue consists in rescaling the score of a firm according to the score of its peers within the same industry. This approach fosters a positive screening and is called the best-in-class approach (Kempf and Osthoff 2007; Statman and Glushkov 2009).[5]

Our analysis is based on a complete dataset collected, constructed, and distributed by MSCI. These data cover the 2007–2018 period and include companies that are covered and rated by MSCI analysts around the world. The sample starts with more than 1,700 companies at the beginning of the period and covers more than 7,000 stocks at the end of the period. Every stock in the sample receives scores on the environmental (E), social (S), and governance (G) issues, which are each composed of specific subcategories. Scores are available on a monthly basis (even if they are usually updated

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[2]Boston Consulting Group (2018) estimates the total assets under management of the asset management industry at US$79.2 trillion in 2017. Of those, US$16 trillion, that is, approximately 20%, is passively managed. In contrast, smart beta is estimated at US$430 billion but has been growing by 30% per year since 2012.

[3]A recent survey by FT Russell (2018) highlights the convergence between the ESG and smart beta trends. In their sample of 185 respondents worldwide, the adoption rate of smart beta amounts to 48% in 2018, up from 26% in 2015. Among the asset owners currently implementing smart beta strategies or planning to do so in the near future, 38% of them anticipated applying ESG considerations to their smart beta allocation.

[4]As we demonstrate in the article, once the ESG filter is implemented, the portfolio is no longer passive and may actually consist of very active bets. Kurtz and diBartolomeo (2011) and Branch, Goldberg, and Hand (2019) found that ESG portfolios exhibit substantial active weights. Nagy, Kassam, and Lee (2016) and Jacobsen, Lee, and Ma (2019) reported that ESG portfolios have different financial characteristics than non-ESG portfolios, in particular, in terms of industry and risk factor exposures.

[5]Some investors choose to voice their concern through active engagement. Even if this approach clearly has some merits (Dimson, Karakas, and Li 2015; Gollier and Pouget 2014), it might prove costly to implement within a global portfolio.

once per year), which is particularly relevant from the perspective of building dynamic portfolios.

We first analyze the impact of ESG screening on the risk and return characteristics of otherwise passive portfolios across two main dimensions: (1) Robustness across regions: Most of the research has focused on the US market, and little evidence has been given on whether geography matters. We analyze the properties of the portfolios based on ESG screening both worldwide and across large regions (the United States, Europe, the Pacific, and emerging countries). (2) Robustness across ESG criteria: We consider two types of screening mentioned previously: the negative exclusion of firms based on their E, S, and G scores and the positive (or best-in-class) screening based on the industry-adjusted average score. The objective is to determine whether these approaches have a different impact on the characteristics of the portfolios after the ESG screening.

RELEVANT LITERATURE

At this stage, the literature is still inconclusive on the relationship between SRI and the risk–return profile of a portfolio. At first glance, ethical screening should result in lower performance. From a theoretical perspective, this practice reduces the universe to a subset of stocks by excluding some bad companies. For instance, Heinkel, Kraus, and Zechner (2001) wrote an equilibrium model with polluting firms. The authors showed that the practice of negative screening reduces the pool of available investors, which limits risk sharing and leads to a higher cost of capital. Adler and Kritzman (2008) showed in a simulation exercise that excluding some firms necessarily imposes some costs and that investors should expect lower performance. Empirically, firms that are generally screened out tend to perform better over time. Fabozzi, Ma, and Oliphant (2008); Hong and Kacperczyk (2009); Dimson, Marsh, and Staunton (2015); and Luo and Balvers (2017) provided empirical evidence that so-called sin stocks (typically, alcohol, tobacco, and gambling) enjoy historically superior performance. Furthermore, El Ghoul et al. (2011) found that firms with a high level of corporate social responsibility enjoy lower cost of equity and that companies in sin sectors are subject to higher cost of capital. Chava (2014) also reported that investors demand significantly higher returns for stocks screened out on an environmental basis.

Going beyond screening out companies, several papers have investigated the effect of building a portfolio based on socially responsible criteria. Most of these studies report mixed results and found no evidence of either overperformance or underperformance. Humphrey and Tan (2014) and Statman and Glushkov (2009) reported that there is a negative effect from excluding some stocks, which, however, is compensated by a positive effect from overweighting good companies. Mixing negative and positive screenings therefore results in no significant improvement in performance due to SRI. Fernando, Sharfman, and Uysal (2010) provided mixed evidence on the effect of environmental spending by firms because the stock market does not reward either greenness or toxicity. In contrast, Kempf and Osthoff (2007) presented a trading strategy that consists of buying stocks with a high ESG rating and selling stocks with a low ESG rating, providing substantial abnormal positive returns. Furthermore, Edmans (2011) showed that firms with the best employee satisfaction levels deliver superior returns, and therefore, a positive screen based on that specific issue might prove beneficial in terms of performance. Finally, there are also some interesting arguments made about potential time-varying effects, which may explain these contrasting results. Nofsinger and Varma (2014) studied the performance of socially responsible mutual funds over the business cycle and found that these funds tend to underperform in good time but outperform during market crises.
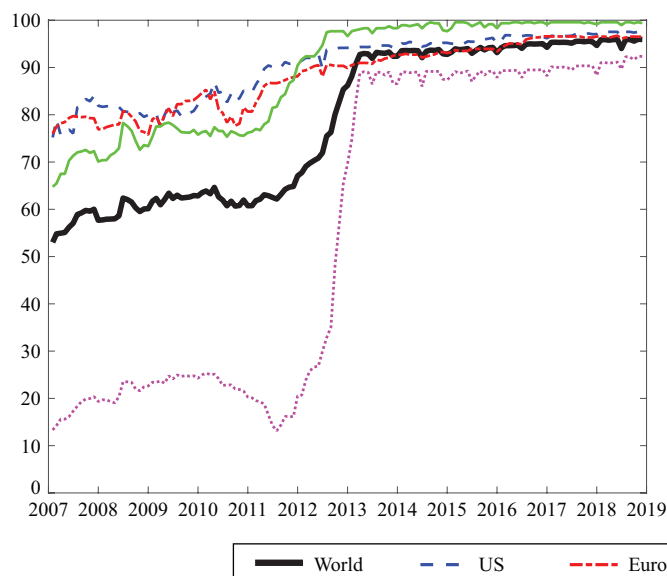
DATA AND PRELIMINARY ANALYSIS

We use ESG scores for a large set of firms covered by the MSCI ESG database over the period from January 2007 to December 2018. This database has been previously used by Bender et al. (2018); Dunn, Fitzgibbons, and Pomorski (2018); and Pollard, Sherwood, and Klobus (2018), among others. Each firm is evaluated according to its exposures or externalities in three complementary areas: (1) environmental, which includes climate change, natural resources, pollution and waste, and environmental opportunities; (2) social, which includes human capital, product liability, stakeholder opposition, and social opportunities; and (3) governance, which includes corporate governance and corporate behavior. For each area, a score (between 0 and 10, 10 representing the best) summarizes the assessment of several key issues selected by MSCI. These scores may suffer from industry biases.
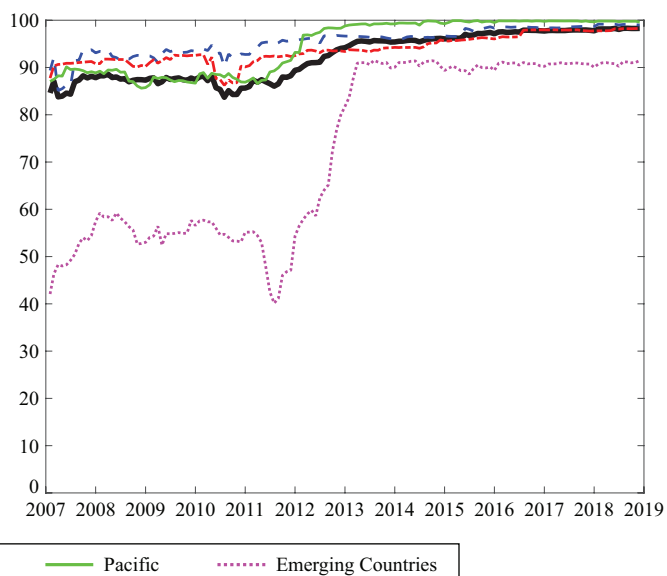
EXHIBIT 1

Coverage of the Regional Standard MSCI Indexes by Firms with an ESG Score

Panel A: Coverage in Terms of Number of Firms (in %)   Panel B: Coverage in Terms of Market Capitalization (in %)

Notes: This exhibit reports the temporal evolution of the coverage of firms belonging to a given regional MSCI index by firms with an ESG score. MSCI indexes correspond to the World (ACWI index), the United States, Europe, the Pacific, and emerging countries.

For instance, the energy sector is given a particularly low score, on average, according to the environmental criterion. To mitigate these biases, another score, called the industry-adjusted average ESG score, combines the three E, S, and G scores but accounts for the position of the firm relative to its peers within the industry.

The database covers a large cross section of companies around the world. The number of firms has increased from 1,700 in January 2007 to more than 7,000 in December 2018. To compare the performance of the strategies to a global benchmark portfolio, we reduce the pool of firms to the firms belonging to the MSCI All Countries World Index (ACWI), which covers large- and mid-cap stocks across 23 developed and 24 emerging markets. In addition to the world market, we consider four large zones, namely, the United States, Europe, the Pacific, and emerging countries, and use the corresponding MSCI index as a regional benchmark portfolio. As Exhibit 1, Panel A, demonstrates, the coverage of firms belonging to the MSCI index with an ESG score is similar for the United States and Europe (from 80% of all firms in the regional index in 2007 to 96% in 2018). Until 2012, the coverage was

low for the Pacific (below 80%) and emerging countries (below 30%). At the end of the sample, the coverage is at least 90% for all regions. The overall number of firms with an ESG score represents 60% of the number of firms in the MSCI ACWI index at the beginning of the sample and 90% or above since 2013.

Panel B also reveals that the firms with an ESG score represent more than 95% of the market capitalization of the corresponding MSCI index for the United States, Europe, and the Pacific. The coverage of emerging countries ranges between 40% and 60% until 2012 and is close to 90% afterward.

In Exhibit 2, we display the temporal evolution of the score of a given criterion averaged over the firms in a given region. Panel A indicates that worldwide, the industry-adjusted average ESG score has been relatively stable over the last 10 years, with an average value equal to 5.6. However, there are large discrepancies between regions: Europe is the region with the highest average grade (6.8 on average), and the Pacific is close to the world average (5.7), whereas the United States and emerging countries are below the average (5 and 4.5, respectively). Therefore, everything else equal,
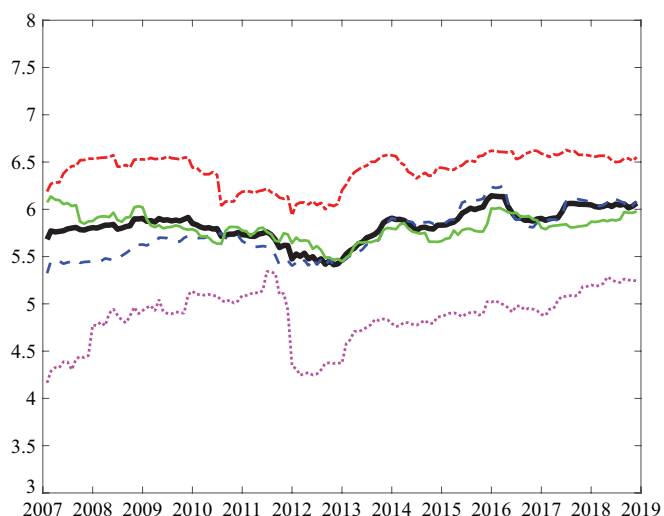
EXHIBIT 2

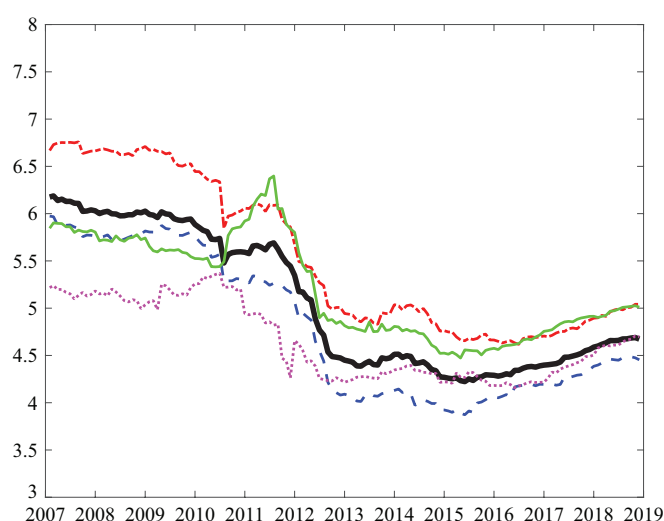**Evolution of the Average ESG Score for Different Regions and Different ESG Criteria**
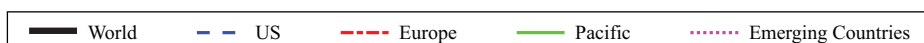
Panel A: Industry-Adjusted Average ESG Score
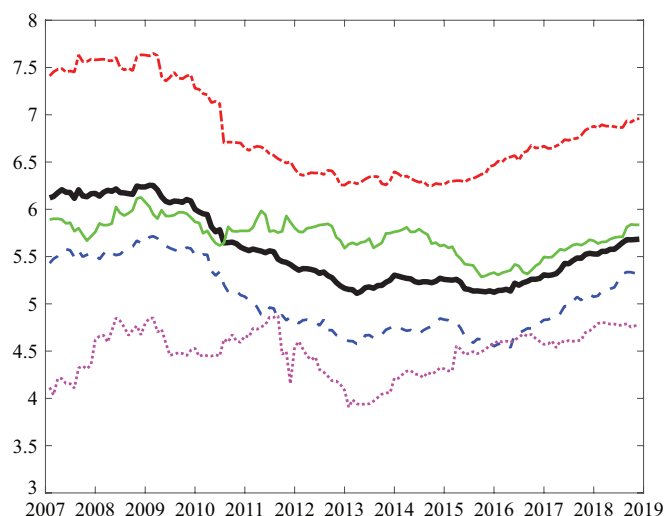
Panel B: Environmental Score

Panel C: Social Score

Panel D: Governance Score

World	US	Europe	Pacific	Emerging Countries
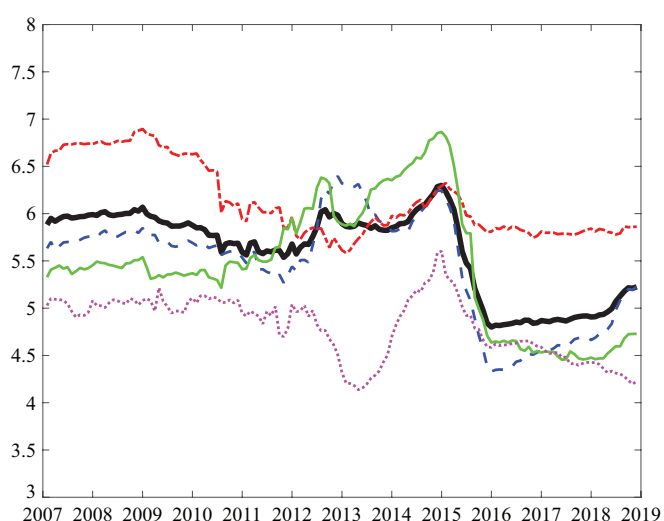
Notes: This exhibit reports the temporal evolution of the average ESG score of the firms belonging to a given region. The pool of firms corresponds to the standard MSCI ACWI benchmark. Panels A to D correspond to the industry-adjusted average ESG score, the environmental score, the social score, and the governance score, respectively.

investors willing to increase the score of their portfolio will tend to overweight firms in Europe and the Pacific. One explanation of why European firms have higher grades than US firms arises from the more stringent regulation in Europe. In particular, the European Union requires firms with more than 500 employees to publish a nonfinancial statement, whereas the United States does not.

The scores of the three criteria exhibit different trends. The environmental score is stable, as it varies in a range between 5.6 and 6.1 for the world index (Panel B). The average score of firms in emerging countries increases

EXHIBIT 3
Evolution of the Industry-Adjusted Average ESG Score for Different Industries
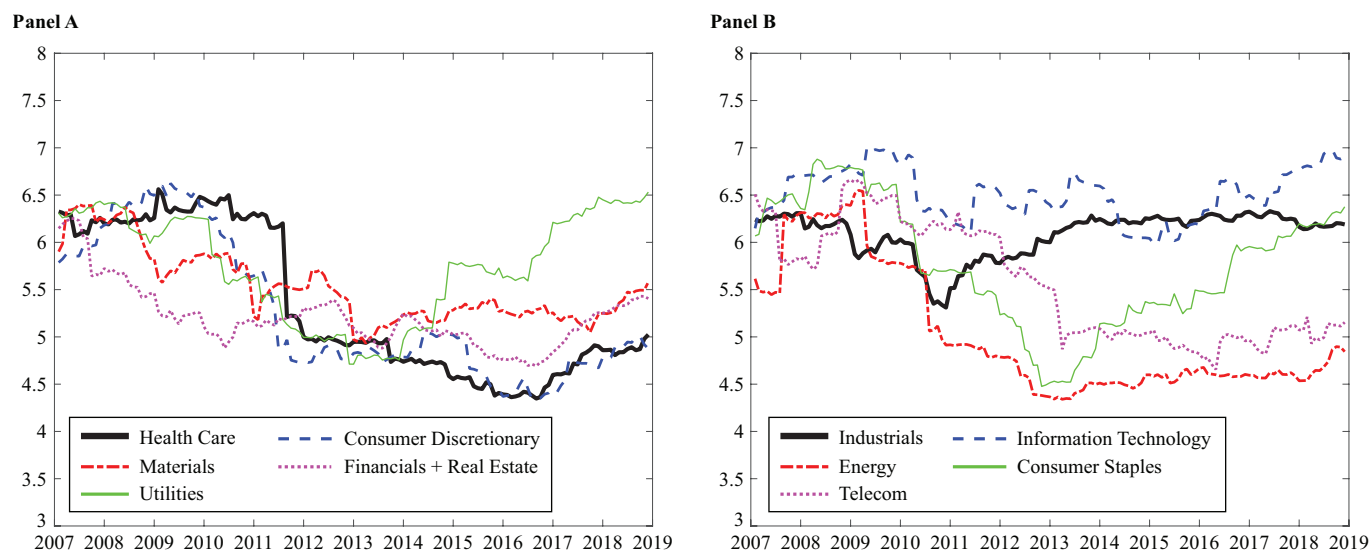
Panel A

Panel B

Notes: This exhibit reports the temporal evolution of the industry-adjusted average ESG score of the firms belonging to a given industry. The pool of firms corresponds to the standard MSCI ACWI benchmark. Panels A and B display the scores according to the MSCI sector classification, with Financials and Real Estate firms put together.

substantially from 4.1 to 5.2, although it remains below that of the other regions. In contrast, the social score decreases over the sample, from 6.2 to 4.7 for the world index (Panel C). US and European firms are the most affected, such that over the recent period the average scores of firms in Europe and the Pacific are close to each other (approximately 5) and the average scores of firms in the United States and emerging countries are close to each other (approximately 4.5). Last, the methodology of the governance score changed in January 2015, and the comparison of the scores before and after this date is not reliable (Panel D). In the recent period, the average scores of firms in the United States, Pacific, and emerging countries are in the same ballpark, close to 4.5, whereas European firms have a score close to 6.

Exhibit 3 displays the evolution of the industry-adjusted average ESG score across industries worldwide. Because these scores are partly adjusted for differences between industries, we do not observe large trends in their temporal evolution, although there is a trough in 2013 in several sectors. Despite the industry adjustment, some industries, such as information technology and industrials, have above–average scores (above 6), whereas

other industries, such as energy and financials, have below-average scores (below 5.2).[6]

This preliminary analysis indicates that regions and industries exhibit substantial differences in terms of ESG scores. This finding suggests that there is room for constructing portfolios that improve the ESG score relative to the standard MSCI benchmark. At the same time, the finding also highlights that a screening of firms based on their ESG score may result in substantial regional and sectoral biases.

EMPIRICAL RESULTS

Recently, several approaches have been proposed to take ESG criteria into account. Early research has focused on excluding some categories of stocks. For instance, Fabozzi, Ma, and Oliphant (2008) and Hong and Kacperczyk (2009) studied the impact on portfolio performance of excluding sin industries. In both papers, the authors reported that sin stocks generate excess performance rela-

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[6] As expected, for E, S, and G criteria, which are not adjusted for industries, we find even more substantial biases. For instance, the average environmental score is 4.6 for energy and 6.9 for telecommunications.

tive to the market on a risk-adjusted basis. To avoid systematically filtering out all firms in a given sin industry, negative screening considers the ESG scores at the individual level.[7] To reduce the impact on portfolio performance of the exclusion of firms in sin industries, another approach consists of controlling for the industry effect by adjusting scores within each industry. In this best-in-class approach, investors select the best firms within each industry. Kempf and Osthoff (2007) and Statman and Glushkov (2009) found that portfolios built on the best-in-class approach generate higher risk-adjusted performance than portfolios built on negative screening.[8]

We consider both negative screening and best-in-class approaches. We construct portfolios based on the E, S, and G criteria (exclusion approach) and on the industry-adjusted average ESG score (best-in-class approach). We precisely evaluate the impact of exclusion by building a sequence of portfolios that exclude firms with the lowest 1% of scores, with the lowest 2% of scores, and so on, up to firms with the lowest 50% of scores. The portfolio weights are based on the market capitalization of the remaining firms.

Our first objective is to assess the consistency of the performances of the otherwise passive portfolios built on ESG criteria along several dimensions: regions, industries, ESG criteria, and risk factor exposures. For comparability purpose, we consider all our portfolio analyses in US dollars over the 2007–2018 period.

Robustness across Regions

An important question about applying ESG screening is whether its impact on the resulting portfolio is consistent and uniform across markets. As most of the studies mentioned above focus on the US market, little evidence is known about whether geography matters. In particular, there may be substantial differences between developed and emerging markets. We address this question using a filter based on the industry-adjusted

average ESG score and will discuss the effect of using a filter based on E, S, and G scores by comparing the best-in-class and exclusion approaches.

In Exhibit 4, Panel A, we report performance statistics on several portfolios of interest for the world, the United States, Europe, the Pacific, and emerging countries. The portfolios are the standard MSCI index for the given zone, the value-weighted portfolio with all firms of the index that have a score at a given point in time (0% exclusion), and finally, the value-weighted portfolios that exclude the firms with the lowest 10%, 25%, and 50% industry-adjusted average ESG score. As expected, the average score improves as more firms with low scores are filtered out. The interesting feature is the magnitude of the improvement. If we first consider the world market, the exhibit reveals that the average score increases from 5.57 for the portfolio with 0% exclusion to 7.16 for the portfolio with the 50% exclusion. This increase translates into an almost 30% improvement. This magnitude of improvement is consistent across regions. For regions with relatively lower average scores (e.g., emerging countries), the improvement is as high as 35%, whereas those with relatively higher scores (e.g., Europe) have a more modest but still substantial improvement above 20%.

In this analysis, we consider in parallel the performance of the portfolio. The ESG score is improved without worsening the risk-adjusted performance. For the world portfolio, the annualized return remains roughly constant at levels close to 5.6%, even when more firms are excluded. However, the standard deviation tends to decrease so that the annualized Sharpe ratio is essentially unaffected at 0.31.

When interpreting these results at the world level, the regional distribution matters. Exhibit 5 displays the temporal evolution of the weights of the four regions in the world portfolios with 0%, 10%, 25%, and 50% exclusion.[9] We observe two contrasting trends: On the one hand, the weights of the United States and emerging countries in the ESG portfolio increase substantially over time (by approximately 10% and 5%, respectively). For the United States, this evolution reflects the

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[7] MSCI ESG Universal Indexes follow a similar logic by excluding companies found to be in violation of international norms and involved in controversial weapons. The weight of the remaining firms is tilted away from the capitalization weight based upon ESG metrics.

[8] MSCI ESG Leaders Indexes are based on a similar principle. They target companies that have the highest ESG scores in each sector of the parent benchmark standard index. These indexes target a 50% sector representation.

[9] We also report the weights of the regions in the standard MSCI ACWI index. For the United States, Europe, and the Pacific, the difference with the portfolio with 0% exclusion is negligible. However, for emerging countries, we observe a more substantial difference due to the lower coverage of this zone before 2013.

Performance of Portfolios Based on ESG Scores

	MSCI Benchmark	Panel A: Industry-Adjusted Average Score				Panel B: Environmental Score				Panel C: Social Score				Panel D: Governance Score			
		0% excl.	10% excl.	25% excl.	50% excl.	0% excl.	10% excl.	25% excl.	50% excl.	0% excl.	10% excl.	25% excl.	50% excl.	0% excl.	10% excl.	25% excl.	50% excl.
World																	
Average score	–	5.57	5.92	6.36	7.16	5.83	6.07	6.39	6.98	5.06	5.32	5.66	6.23	5.61	5.93	6.27	7.01
Ann. return (%)	5.84	5.74	5.54	5.60	5.63	5.74	5.70	5.88	6.33	5.74	5.59	5.48	5.51	5.74	5.44	5.40	5.62
Ann. std. dev. (%)	16.06	15.70	15.67	15.61	15.62	15.70	15.68	15.67	15.51	15.70	15.69	15.73	15.87	15.70	15.63	15.56	15.77
Sharpe ratio	0.32	0.32	0.31	0.31	0.31	0.32	0.32	0.33	0.36	0.32	0.31	0.30	0.30	0.32	0.30	0.30	0.31
Tracking error (%)	–	0.65	0.84	1.05	1.43	0.65	0.78	1.00	1.44	0.64	0.74	0.93	1.42	0.68	0.93	1.11	1.42
United States																	
Average score	–	5.05	5.38	5.84	6.62	5.74	5.99	6.32	6.93	4.80	5.05	5.39	5.91	5.46	5.83	6.19	6.94
Ann. return (%)	8.05	8.13	8.05	8.03	8.31	8.13	8.14	8.52	8.66	8.13	7.97	7.79	7.62	8.13	7.65	7.83	8.37
Ann. std. dev. (%)	14.65	14.54	14.39	14.32	14.05	14.54	14.42	14.40	14.18	14.54	14.56	14.38	14.31	14.54	14.40	14.33	14.56
Sharpe ratio	0.50	0.51	0.51	0.51	0.54	0.51	0.51	0.54	0.56	0.51	0.50	0.49	0.48	0.51	0.48	0.50	0.53
Tracking error (%)	–	0.47	0.72	1.21	1.86	0.48	0.69	1.09	1.73	0.48	0.72	1.14	1.88	0.52	0.97	1.18	2.04
Europe																	
Average score	–	6.80	7.10	7.51	8.32	6.42	6.66	6.95	7.57	5.52	5.78	6.16	6.77	6.13	6.49	6.87	7.53
Ann. return (%)	3.63	3.64	3.73	4.04	4.42	3.64	3.54	3.67	4.17	3.64	3.77	3.71	3.90	3.64	3.64	4.15	4.46
Ann. std. dev. (%)	18.93	18.88	18.88	18.62	18.23	18.88	18.90	18.65	18.56	18.88	18.91	19.08	18.97	18.88	18.62	18.25	17.84
Sharpe ratio	0.15	0.15	0.16	0.18	0.20	0.15	0.15	0.16	0.19	0.15	0.16	0.16	0.17	0.15	0.16	0.19	0.21
Tracking error (%)	–	0.42	0.66	1.03	2.25	0.42	0.68	1.05	1.92	0.43	0.82	1.48	2.65	0.42	1.00	1.62	2.43
Pacific																	
Average score	–	5.71	6.05	6.49	7.34	5.80	6.12	6.48	7.13	5.20	5.46	5.74	6.25	5.46	5.83	6.17	6.79
Ann. return (%)	3.72	3.42	3.38	3.44	3.42	3.42	3.32	3.46	3.43	3.42	3.32	3.53	3.95	3.42	3.66	3.55	3.95
Ann. std. dev. (%)	15.84	15.61	15.48	15.51	15.37	15.61	15.62	15.52	15.16	15.61	15.58	15.69	16.01	15.61	15.50	15.48	15.76
Sharpe ratio	0.19	0.17	0.17	0.18	0.18	0.17	0.17	0.18	0.18	0.17	0.17	0.18	0.20	0.17	0.19	0.18	0.21
Tracking error (%)	–	0.78	1.12	1.59	2.29	0.77	1.00	1.45	2.76	0.78	1.01	1.22	2.06	0.81	1.22	1.65	2.69
Emerging Countries																	
Average score	–	4.49	4.86	5.30	6.08	4.87	5.17	5.56	6.15	4.65	4.93	5.28	5.77	4.81	5.15	5.47	6.12
Ann. return (%)	6.00	5.49	5.17	5.70	6.53	5.48	4.92	4.94	5.80	5.49	5.42	6.07	6.93	5.49	5.25	5.40	4.65
Ann. std. dev. (%)	22.44	21.77	21.79	21.98	22.17	21.77	22.04	22.06	22.50	21.77	21.86	21.91	21.94	21.77	21.69	21.63	21.71
Sharpe ratio	0.24	0.22	0.20	0.23	0.26	0.22	0.19	0.19	0.23	0.22	0.22	0.24	0.28	0.22	0.21	0.22	0.18
Tracking error (%)	–	2.32	2.88	3.02	4.13	2.37	2.57	3.06	3.98	2.37	2.71	3.10	4.25	2.33	2.75	3.33	4.69

Notes: This exhibit reports summary statistics on portfolios based on the ESG screening based on the industry-adjusted average ESG score, the environmental score, the social score, and the governance score, in Panels A to D, respectively. Statistics are the average score, the annualized average return, the annualized standard deviation, the Sharpe ratio, and the annualized tracking error (relative to the standard MSCI benchmark of the respective region). Column 1 corresponds to the MSCI benchmark for the region considered. For each panel, columns correspond to the portfolio with no exclusion and the portfolios excluding the firms with the 10%, 25%, and 50% lowest scores.

higher performance of the stock market, which implies a relatively larger market capitalization for US firms. The increase in the weight of emerging countries in ESG portfolios is probably due to both an improvement of the scores relative to the other regions and the increased coverage of that region. On the other hand, when more firms are excluded in the ESG portfolio, the weights

of firms in the United States and emerging countries decrease, whereas more European firms are included. This evolution reflects the lower scores of firms in the United States and emerging countries relative to firms in Europe and the Pacific. As a result, over the period considered, being more aggressive in the ESG screening implies an overweighting of firms in Europe and the
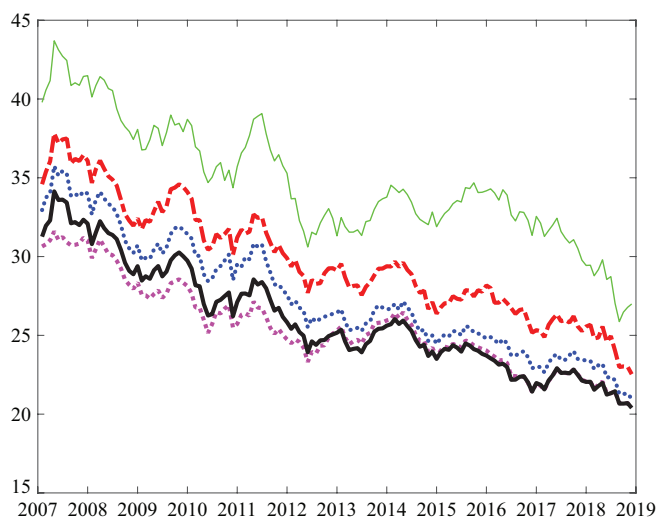
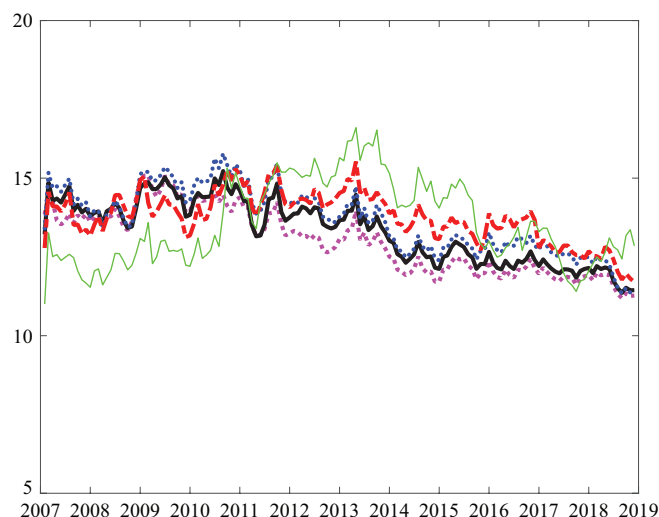**Weight of Some Regions in the Standard MSCI ACWI Benchmark and in Portfolios with Different Levels of ESG Screening**
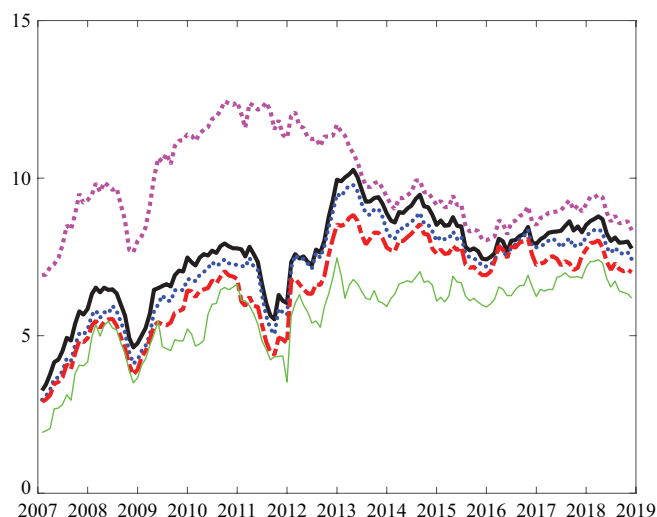
Panel A: United States (in %)
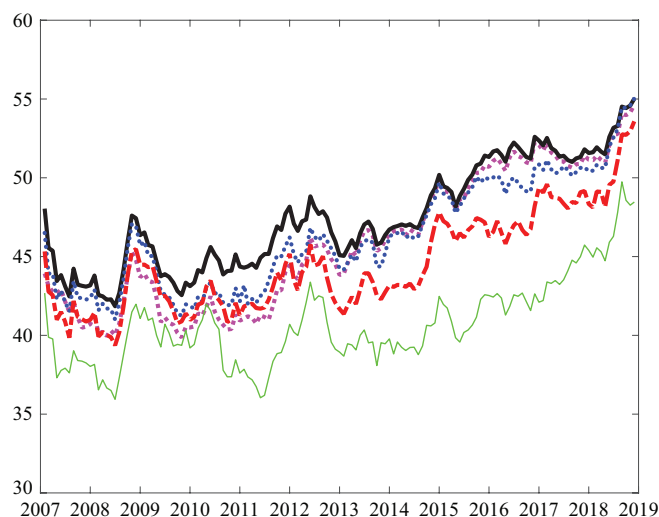
Panel B: Europe (in %)

Panel C: Pacific (in %)

Panel D: Emerging Countries (in %)

Legend: Standard MSCI ACWI Index · · · · · · · · 0% Exclusion ───── 10% Exclusion · · · · · · · · 25% Exclusion ─ · ─ · ─ 50% Exclusion ─────

Notes: This exhibit reports the temporal evolution of the cumulated weight of the firms belonging to a given region for the standard MSCI ACWI benchmark and for portfolios with different levels of ESG screening. The pool of firms corresponds to the standard MSCI ACWI benchmark. The screening is based on the industry-adjusted average ESG score.

Pacific and an underweighting of firms in the United States and emerging countries. It is worth noting that, although Europe considerably lagged the United States in terms of market return over the sample, this trend does not affect the performance of ESG portfolios.

When we turn to specific regions, the broad conclusion that the ESG score of otherwise passive port‐folios can be improved without deteriorating their risk-adjusted performance should be qualified because results are no longer influenced by geographical considerations.

As Exhibit 4 indicates, excluding more firms with low scores has a limited impact on the Pacific and emerging countries portfolios: Returns and standard deviations vary in parallel so that the Sharpe ratio is barely affected. For the United States and Europe, the Sharpe ratios clearly increase due to both improving performance and decreasing risk levels.

The tracking error relative to the benchmark portfolio is also an important dimension of risk, especially for institutional investors. Importantly, the exhibit reveals that the tracking error is low for the United States, Europe, and the Pacific and slightly higher for emerging countries. This evidence indicates that excluding more firms in emerging countries may generate higher dispersion of the portfolio performance relative to the benchmark.[10]

Overall, preliminary evidence indicates that the ESG screening is able to improve the ESG profile substantially without deteriorating the risk–return profile of the portfolios. Moreover, this improvement is obtained without taking excessive relative risk as tracking-error levels remain at low level. This result is consistent with the conclusion of Statman and Glushkov (2009) that one can build a socially responsible portfolio doing good while doing well.

Robustness across Industries

Another potential bias implied by the portfolios built using ESG screening is due to sector imbalances. Some industries, such as energy, suffer from below-average scores, in particular for the environmental criterion. Using the industry-adjusted average ESG score partly corrects for such an industry bias. However, the resulting portfolio may be more or less exposed to some industries compared to the benchmark portfolio, and in turn, risk and return characteristics may be affected by those industry bets. To investigate this issue, we proceed as follows. For each month of the sample, we determine the industry exposure of portfolios based on excluding a given proportion of low-score firms. We then compare these exposures to the industry exposures of the corresponding MSCI benchmark portfolio.

Exhibit 6, Panel A displays the weights of some industries of particular interest for four portfolios (with 0%, 10%, 25%, and 50% exclusion) relative to the MSCI benchmark, based on the industry-adjusted average ESG scores. These industries correspond to a large positive or negative biases. ESG portfolios have a relatively lower weight in the financial and energy sectors, in particular when the exclusion is large. The underweighting is below 2.5% for financials for most of the sample with 50% exclusion.[11] Energy is on average slightly overweighted at the beginning of the sample, but after 2010, the weight of this industry is on average 2% below the benchmark portfolio. In contrast, information technology and industrials benefit from large overweighting. In particular, the weight of information technology is on average 3.6% higher than its weight in the benchmark portfolio (15.3% versus 11.6%).

Panel B displays the relative weight of the financials and energy sectors when the ESG screening is based on the environmental criterion. The underweighting of the energy sector is even more pronounced with this criterion. Financials suffer from an even lower weight after the 2008–2009 financial crisis but compensates afterward. After 2013, the weight of financials in the portfolio with 50% exclusion is even higher than the weight in the benchmark portfolio.

To the extent that the period covered is particularly favorable to the technology sector and less favorable to financials and energy stocks, the sectoral biases, just like the regional biases, certainly play an important role in the risk–return profile of the ESG-filtered portfolios.

Best-in-Class versus Exclusion Approaches

We now assess the impact of excluding firms with low E, S, and G scores without adjustment for the industry (negative exclusion). Several authors have focused on specific areas of ESG investing, for instance Fernando, Sharfman, and Uysal (2010) or Chava (2014) on environmental issues and Edmans (2011) on social norms. As in the previous section, we construct portfolios by excluding firms with the

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[10] The large tracking error for emerging countries is to a large extent due to the relatively low coverage of the ESG database before 2013. When the sample starts in January 2013, the tracking error of the portfolio with 25% of firms excluded is equal to 0.9%, 1%, 0.8%, and 1.2% in the United States, Europe, the Pacific, and emerging countries, respectively.

[11] The average weight of financials (including real estate) is equal to 21.1% for the benchmark and 17.9% for the ESG portfolio with 50% of firms excluded.

lowest scores. Because individual scores are not adjusted for the industry, portfolios are more likely to be biased toward some industries. Results reported in Exhibit 4 (Panels B to D) reveal important differences according to the criterion adopted for the screening. On average, when we exclude the firms with the 10%, 25%, and 50%

lowest scores, the score improves by 6%, 12%, and 25%, respectively, independently of the ESG criterion.

The case of the environmental criterion (Exhibit 4, Panel B) strengthens some of the evidence observed for the industry-adjusted average ESG score. For all regions, the average return increases and/or the volatility

Exhibit 6

Weight of Some Industries in Portfolios with Different Levels of ESG Screening Relative to the Standard MSCI ACWI Benchmark

Panel A: Industry-Adjusted Average ESG Score Portfolio
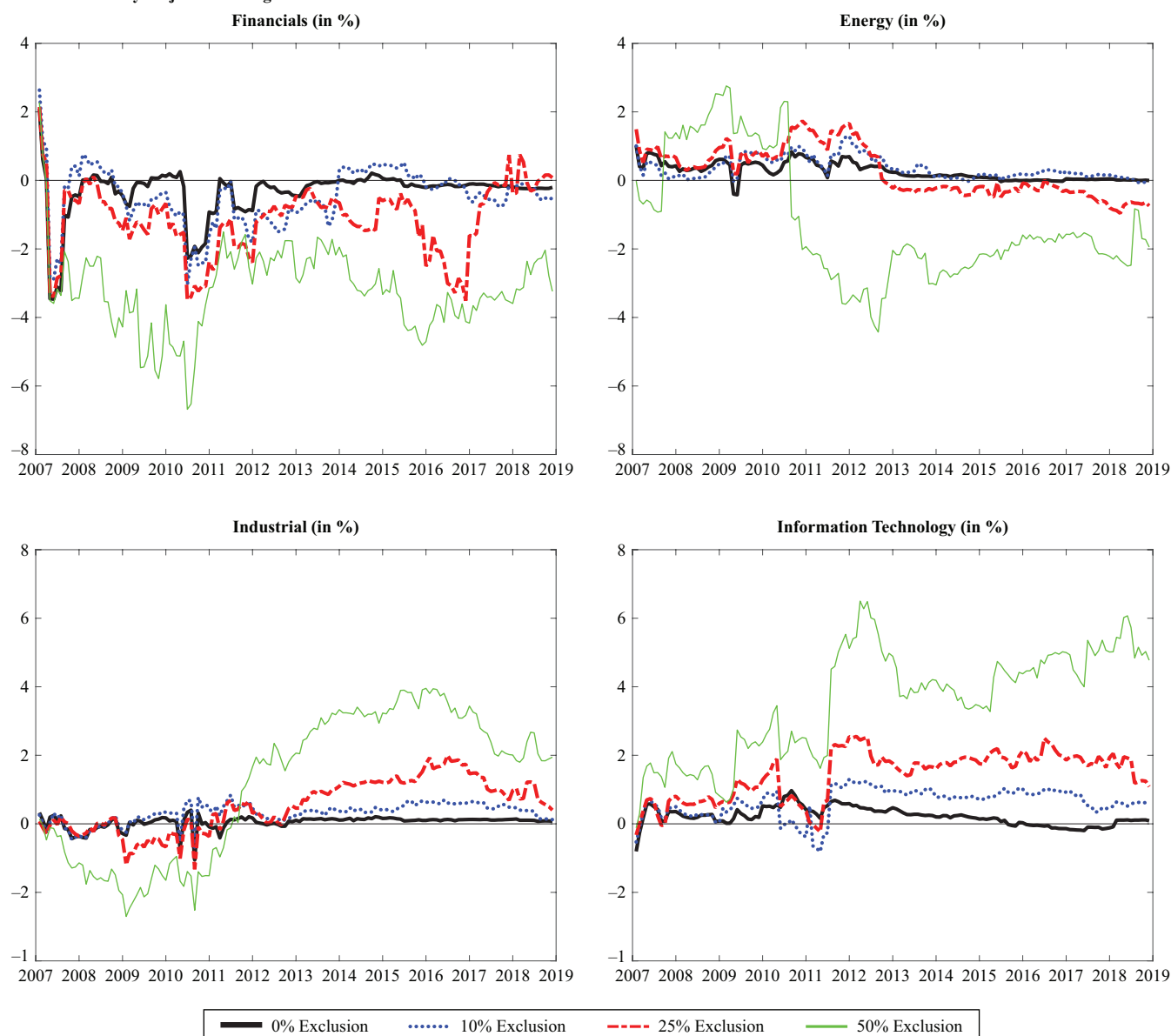
(continued)

Weight of Some Industries in Portfolios with Different Levels of ESG Screening Relative to the Standard MSCI ACWI Benchmark

Panel B: Environmental Score Portfolio

Notes: This exhibit reports the temporal evolution of the cumulated weight of the firms belonging to a given industry for portfolios with different levels of ESG screening relative to the standard MSCI ACWI benchmark. The pool of firms corresponds to the standard MSCI ACWI benchmark. The screening is based on the industry-adjusted average ESG score (Panel A) and the environmental score (Panel B).

decreases when we exclude low-score firms. The Sharpe ratio increases accordingly in all regions. For instance, in the United States, when we exclude firms with the 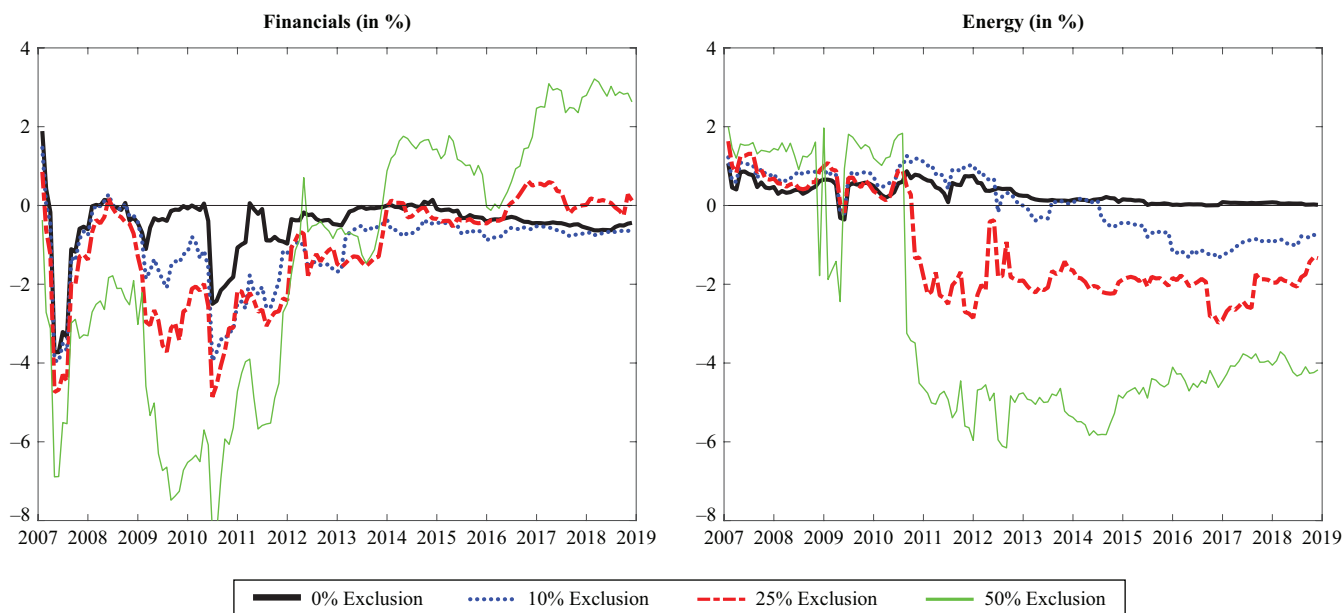lowest 50% of scores, the environmental score increases from 5.7 to 6.9 relative to the 0% exclusion portfolio and the Sharpe ratio increases from 0.51 to 0.56. Similar improvements hold for all regions. We note that industry biases are usually more pronounced than those reported for the industry-adjusted average score.

For the social score (Panel C), results indicate that, overall, excluding more low-score firms also allows investors to improve the score of their portfolios without deteriorating risk-adjusted performance. The Sharpe ratio is slightly reduced in the United States but improves in other regions. The gain is substantial for the Pacific and emerging countries for the 50% exclusion portfolio relative to the 0% exclusion portfolio, with a Sharpe ratio gain of 0.03 and 0.06, respectively.

The picture is similar for the governance score (Panel D). For instance, when more low-score firms

are excluded, Europe benefits from a higher return and lower volatility. A possible explanation for this result is that in Europe, financials are severely underweighted in the governance portfolio (−5.9%). Because the performance of financial firms has been lower than other industries in Europe over the period, the portfolio has benefited from a higher average return. In contrast, the filter based on the G score reduces the average return and increases the volatility in emerging countries so that the Sharpe ratio is lower after the exclusion of low-score firms.

All these results indicate that switching to ESG portfolios has different implications in terms of performance depending on the screening criterion. Excluding firms with low scores improves the portfolio performance in most regions for the environmental criterion and has limited impact for the social and governance criteria.[12] The heterogeneity that we observe in terms of

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[12] In online Appendix A (Exhibit A1), we report results based on the 2013–2018 sample, which corresponds to the period

performance across regions, industries, and ESG criteria is likely due to a different exposure to risk factors. We now turn to this point.

Factor Exposure

An important issue in considering portfolios based on an ESG screening is whether this filter generates (possibly undesirable) exposures to some risk factors. There are several reasons why portfolios based on ESG screening may be correlated with risk factors. For instance, Hong and Kacperczyk (2009) found that sin stocks suffer from lower valuations with respect to the broad market, leading to a potential value effect on those companies. Edmans (2011) mentioned that companies with higher employee satisfaction enjoy higher earnings, which might correlate with profitability or quality factors. A size effect is also expected. Large and well-established companies generally spend considerable resources for reporting on ESG matters. Smaller firms are often more reluctant to spend as much, even if they fully comply with all ESG dimensions.

We now explore the consequences of ESG screening on the exposure to standard risk factors. We consider two sets of factors: the four-factor model, that is, the three Fama–French factors plus momentum (Fama and French 1993; Carhart 1993) and the five Fama–French factors (Fama and French 2015).[13] Exhibit 7 reports the risk exposures for the portfolios based on the industry-adjusted average score, whereas results for the E, S, and G scores are reported in the online Appendix B (Exhibits A2 to A4).

We begin with the analysis of the four-factor model for the world portfolio (Panel A). Almost all world portfolios have a significantly negative exposure

to the SMB factor. Most of this effect can be attributed to the fact that all ESG-filtered portfolios (included the case with 0% exclusion) contain firms with a score, which are on average bigger than the average firm belonging to the corresponding MSCI index. In addition, the loadings are usually more negative when more low-score firms are excluded, which can be explained by the fact that large firms on average exhibit higher scores.

With no exclusion, we also observe a significant positive exposure to the value factor, which reflects that firms with scores tend to be cheaper than the average firm belonging to the MSCI index. However, as for the size factor, the exposure to the HML factor tends to be more negative for more stringent levels of exclusion, for US and European firms. The exclusion process therefore leads to an increased allocation to more expensive stocks. This result is consistent with the argument of Hong and Kacperczyk (2009) in the preceding. Last, we also observe negative exposures to the momentum factor, in particular for the Pacific and emerging countries.

When we consider the five-factor Fama–French model (Panel B), the observations made about the SMB and HML factors remain largely valid. Among quality factors, we first note that in most cases ESG portfolios do not exhibit any particular exposure to the RMW factor, which reflects highly profitable firms. The only exception is Europe, where loadings are positive and increasing when more low-score firms are excluded. For the other regions, we find a positive exposure to the CMA factor, which reflects the investment policy of the firm. Factor loadings tend to increase when more firms are excluded, suggesting that ESG-filtered portfolios include more conservative firms.

We note that for all regions, the annualized alpha is insignificantly different from 0. This result suggests that there is no indication that the ESG filtering creates or destroys value for investors. All these results remain broadly valid when we consider individual E, S, or G dimensions. In particular, we do not find significant alpha, except under very few instances.

In summary, the factor analysis highlights that ESG screening might lead to substantial style biases, with portfolios more exposed to large, relatively expensive, more conservative and profitable companies. Although there is no evidence of a positive alpha linked to ESG overall, the screening procedure does not lead to a negative alpha, while still improving considerably the ESG profile of the portfolios.

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following the financial crisis and the substantial increase of the ESG coverage for firms in emerging countries. We reach essentially the same conclusions.

[13] The three Fama–French factors include the market portfolio, the small-minus-big (SMB) factor, and the high-minus-low (HML) factor. The five Fama–French factors additionally include the robust-minus-weak (RMW) factor and the conservative-minus-aggressive (CMA) factor. All factors are constructed using all firms belonging to the MSCI index of the given region. For this reason, the exposures on the MSCI portfolios are not reported in Exhibit 7 because they are very close to 0. In contrast, the portfolio with 0% exclusion can exhibit some significant factor loadings because firms with scores do not necessarily exactly reflect the population of firms in the index.

Factor Exposure of Portfolios Based on Industry-Adjusted Average ESG Score

	Panel A: 3 FFF + Momentum					Panel B: 5 FFF			
	0% excl.	10% excl.	25% excl.	50% excl.		0% excl.	10% excl.	25% excl.	50% excl.
World					**World**				
Ann. α	0.09	0.01	0.08	0.04	Ann. α	0.15	0.08	0.08	−0.16
Market	0.98*	0.98*	0.98*	0.98*	Market	1.07*	1.10*	1.06*	0.95*
SMB	−0.07*	−0.09*	−0.10*	−0.09*	SMB	−0.01	−0.02	−0.06*	−0.13*
HML	0.02*	0.03*	0.03*	0.02	HML	0.02*	0.03*	0.03	0.04
MOM	−0.01*	−0.02*	−0.01*	0.00	RMW	0.00	0.00	0.01	0.05
					CMA	0.09*	0.12*	0.08*	−0.03
United States					**United States**				
Ann. α	0.15	0.13	0.03	0.03	Ann. α	0.18	0.17	0.11	−0.06
Market	0.99*	0.99*	0.99*	0.98*	Market	1.05*	1.07*	1.12*	0.98*
SMB	−0.02*	−0.03*	−0.07*	−0.13*	SMB	0.01	0.02	0.00	−0.13*
HML	0.01*	0.00	−0.02	−0.10*	HML	0.00	−0.01	−0.03*	−0.07*
MOM	−0.01	−0.01	−0.01	−0.02*	RMW	0.01	0.01	0.01	0.03
					CMA	0.06*	0.09*	0.14*	−0.01
Europe					**Europe**				
Ann. α	0.03	0.09	0.41	0.45	Ann. α	0.00	0.01	0.26	0.30
Market	1.00*	1.00*	1.00*	1.00*	Market	1.01*	1.01*	1.00*	0.97*
SMB	−0.02*	−0.04*	−0.07*	−0.07*	SMB	−0.01	−0.04*	−0.08*	−0.15*
HML	0.00	−0.01	−0.02*	−0.06*	HML	0.00	0.00	−0.01	−0.06*
MOM	0.00	0.00	−0.01	0.04*	RMW	0.02*	0.03*	0.04*	0.07
					CMA	0.01*	0.01	0.00	−0.03
Pacific					**Pacific**				
Ann. α	−0.38	−0.43	−0.42	−0.26	Ann. α	−0.36	−0.35	−0.27	−0.15
Market	0.99*	0.98*	0.98*	0.96*	Market	0.99*	1.04*	1.11*	1.13*
SMB	0.01	0.01	0.03	0.00	SMB	0.03*	0.07*	0.12*	0.09
HML	0.04*	0.05*	0.06*	0.04	HML	0.04*	0.05*	0.06*	0.03
MOM	−0.01*	−0.02*	−0.01	0.00	RMW	0.01	0.02	0.03	−0.02
					CMA	0.00	0.07*	0.14*	0.19*
Emerging Countries					**Emerging Countries**				
Ann. α	−0.24	−0.32	0.17	1.15	Ann. α	0.20	0.03	0.25	1.16
Market	0.97	0.96	0.97	0.98	Market	0.96*	0.94*	0.94*	0.91*
SMB	−0.23*	−0.26*	−0.27*	−0.33*	SMB	−0.27*	−0.30*	−0.30*	−0.40*
HML	−0.02	−0.01	0.00	**−0.05**	HML	−0.04	−0.03	−0.01	−0.06
MOM	−0.06*	−0.07*	−0.08*	−0.07*	RMW	−0.04	−0.03	0.00	0.01
					CMA	−0.03	−0.05	−0.05	−0.10*

Notes: This exhibit reports summary statistics on portfolios based on the industry-adjusted average ESG score. Statistics are the annualized alpha (in %) and the sensitivity to risk factors. Columns 1 to 4 correspond to the four-factor model; columns 5 to 9 correspond to the five-factor model. Columns correspond to the portfolio with no exclusion and the portfolios excluding the firms with the lowest 10%, 25%, and 50% of scores.

* indicates that the parameter estimate is significant at the 5% level.

SMART BETA APPROACH

Smart beta investing is based on the following logic: The investor builds a portfolio that passively fol-lows an index whose weights are independent from the market capitalization but reflect the exposure to some systematic factor. A well-known example is fundamental indexing (see Arnott, Hsu, and Moore 2005), in which weights are derived from some variables that proxy for the fundamental value of a company. Current weighting

schemes in smart beta focus on traditional factors that have been well documented, such as size (Banz 1981), value (Basu 1983), momentum (Jegadeesh and Titman 1993), quality (Novy-Marx 2013), and low risk (Frazzini and Pedersen 2014). For instance, the value smart beta strategy would overweight firms with a low price-to-book ratio and underweight firms with a high price-to-book ratio. Our previous analysis demonstrates that there are significant relationships between ESG and the traditional factors used in typical smart beta approaches.

We now investigate whether applying an ESG screening in the construction of smart beta portfolios affects the performance of the strategy. To address this question, we run the same type of analysis as before, that is, we exclude progressively the firms with the lowest scores, and we measure the impact of this preliminary screening on a given smart beta strategy. We consider some of the most popular factors in the smart beta world, that is, portfolios based on size, low beta, high dividend, value, quality, and momentum. Because the objective is not to build the best version of the respective smart beta strategy but rather to assess the broad impact of the ESG filter, we consider versions of smart beta portfolios that do not include any refinements. In each case, we apply the ESG screening (based on the industry-adjusted average ESG score) and then build an equally weighted portfolio of the 100 firms that have the best metric.[14]

Results are reported in Exhibit 8. As in the otherwise passive case discussed previously, we report the performance of equally weighted smart beta portfolios based on all the firms that have a score and excluding firms with the lowest 0%, 10%, 25%, and 50% of scores. Observations made for the ESG strategies implemented for initially passive portfolios generally hold and are sometimes even accentuated for smart beta strategies. Starting again with the scores, excluding low-score firms usually results in even larger improvements than in the passive case. The magnitude nevertheless varies

according to the type of smart beta strategy. As smaller firms generally record lower scores, the size strategy with no exclusion has a very low average score, much lower than the corresponding benchmark index. At the world level, the strategy has an average score equal to 3.94 (see Exhibit 8, Panel A), whereas the benchmark portfolio has a score equal to 5.57 (see Exhibit 4). The exclusion process improves massively the score by more than 2.6 points, reaching a level slightly below the score of the index portfolio when 50% of the firms are excluded (6.57). This result holds for all regions.

For the other smart beta strategies, such as momentum, the improvement in the score is less spectacular but still very much present. Unlike size or quality, the momentum factor has less stable fundamental characteristics both over time and in the cross section. As a result, there are no obvious intuitive reasons for momentum to structurally correlate in one way or another with ESG portfolios. However, at the world level, the momentum strategy has a relatively low score (4.36) with 0% exclusion, but its score increases up to 6.82 when 50% of firms are excluded, for a score improvement by 56% (Panel F). The low-beta, value, and high-dividend strategies are in the same category as the momentum strategy with a substantial score improvement.

The most interesting feature of implementing smart beta strategies with an ESG screening is again that the large increase in the average score does not deteriorate risk–adjusted performances. In contrast, the ESG screening results in an increase in the Sharpe ratio of most of the smart beta strategies in most regions. Those improvements are usually due to a decrease in the volatility of the strategy and, in some cases, to an increase in returns. The high-dividend-yield strategy in the United States illustrates this result (Panel C). The annualized return increases from 7.7% with 0% exclusion to 8.5% with 50% exclusion. In parallel, the portfolio volatility decreases from 16.5% to 15.7%, leading to an increase of the Sharpe ratio from 0.42 to 0.5.

Such a massive improvement in the risk–adjusted performance is not observed across all the smart beta strategies, but Sharpe ratios are either unchanged or higher in the vast majority of strategies and regions. Two exceptions are the size and value strategies for emerging countries, for which we obtain a lower average return as more low-score firms are excluded. Our interpretation is that in emerging countries, the ESG filter excludes more and more small and value firms and results in a lower

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[14] For the size approach, we take the companies with the lowest market capitalization. For low beta, we take the companies with the lowest beta, the latter being computed on the last 48 months. For the high-dividend approach, we take the companies with the highest dividend yield. For value, we select the companies with the lowest price-to-book ratio. For quality, we take the companies with the highest return on equity. For momentum, we take the firms with the highest difference between the past 12-month return and the last month return. Each strategy is rebalanced on a monthly basis with equal weights.

performance because the portfolio benefits less from the size and value premiums. For this zone, the filter leads to the exclusion of the most profitable stocks.

To investigate further the properties of smart beta strategies and in particular identify the reasons for the improvement in risk-adjusted returns, we ran a factor analysis similar to the one implemented on otherwise passive investment. Results reported in the online Appendix C (Exhibits A5 to A10) indicate that, for all smart beta strategies, factor exposures confirm the profile of the strategy by loading on the associated factor.

However, the exclusion process leads quite often to a decrease in the loading of the factor associated with a given smart beta strategy. For instance, for the smart beta strategy based on size, in the world portfolio, the loading on the SMB factor decreases from 1.48 (0% exclusion) to 1.23 (50% exclusion) in the four-factor model, although it remains highly significant. Similarly, for the momentum strategy, the momentum factor loading remains positive but decreases from 0.75 to 0.54. It also decreases for all the regional portfolios. For the value strategy, in all regions the factor loading on HML

EXHIBIT 8
Performance of Smart Beta Portfolios Based on Industry-Adjusted Average ESG Score

	Panel A: Size Strategy				Panel B: Low-Beta Strategy				Panel C: High-Yield Strategy			
	0% excl.	10% excl.	25% excl.	50% excl.	0% excl.	10% excl.	25% excl.	50% excl.	0% excl.	10% excl.	25% excl.	50% excl.
World												
Average score	3.94	4.53	5.32	6.57	4.77	5.18	5.81	6.88	5.01	5.53	6.19	7.06
Ann. return (%)	5.23	5.47	5.74	7.27	4.62	5.02	5.68	6.42	4.93	5.10	5.68	6.04
Ann. std. dev. (%)	24.58	24.29	23.36	22.54	10.59	10.65	10.77	11.33	22.76	22.62	22.17	21.76
Sharpe ratio	0.18	0.20	0.22	0.29	0.37	0.40	0.46	0.50	0.19	0.19	0.22	0.24
Tracking error (%)	10.70	10.67	10.95	12.16	2.16	2.45	2.95	3.66	4.16	4.67	4.97	5.70
United States												
Average score	3.74	4.27	4.91	5.95	4.51	4.86	5.40	6.31	4.59	4.97	5.50	6.33
Ann. return (%)	9.93	10.17	10.94	10.21	7.85	7.98	8.32	9.02	7.70	7.70	8.10	8.52
Ann. std. dev. (%)	22.65	22.13	21.22	21.51	11.78	11.82	12.02	11.90	16.47	16.57	15.96	15.71
Sharpe ratio	0.41	0.43	0.48	0.44	0.61	0.61	0.63	0.70	0.42	0.42	0.46	0.50
Tracking error (%)	2.51	3.29	4.50	5.65	1.28	1.68	2.49	3.26	1.29	1.63	2.59	3.74
Europe												
Average score	6.06	6.57	7.17	8.06	6.38	6.86	7.41	8.21	6.69	7.02	7.43	8.14
Ann. return (%)	3.20	3.60	3.96	4.39	4.73	4.95	4.82	5.02	3.35	3.58	3.58	3.59
Ann. std. dev. (%)	23.56	23.54	23.34	22.65	15.86	15.87	16.29	16.16	22.70	22.73	22.34	21.77
Sharpe ratio	0.11	0.12	0.14	0.16	0.25	0.27	0.25	0.27	0.12	0.13	0.13	0.13
Tracking error (%)	2.45	2.86	3.64	4.61	1.00	1.46	2.18	2.73	1.06	1.49	1.99	2.93
Pacific												
Average score	4.72	5.17	5.83	6.82	5.17	5.53	6.11	7.07	5.37	5.83	6.38	7.20
Ann. return (%)	8.13	7.84	7.50	8.96	6.31	6.34	7.00	7.56	7.99	7.84	8.01	8.32
Ann. std. dev. (%)	18.54	18.11	17.91	18.30	12.11	12.22	12.38	12.68	19.50	18.86	18.27	18.66
Sharpe ratio	0.40	0.39	0.38	0.45	0.46	0.46	0.51	0.54	0.37	0.38	0.40	0.41
Tracking error (%)	2.80	3.24	3.69	4.47	1.46	2.00	2.67	3.87	1.50	2.31	3.33	3.84
Emerging countries												
Average score	3.74	4.08	4.73	5.59	4.50	4.76	5.28	5.99	4.14	4.50	5.06	5.94
Ann. return (%)	8.94	8.54	6.53	7.15	3.47	3.66	5.34	6.23	9.08	8.98	9.77	9.79
Ann. std. dev. (%)	24.33	24.44	24.63	24.77	17.83	17.67	17.78	18.24	20.26	20.26	20.61	20.36
Sharpe ratio	0.34	0.32	0.24	0.26	0.15	0.17	0.26	0.30	0.41	0.41	0.44	0.45
Tracking error (%)	8.38	8.60	9.04	9.88	3.82	3.89	3.87	4.98	4.61	5.16	5.48	6.90

(continued)

Performance of Smart Beta Portfolios Based on Industry-Adjusted Average ESG Score

	Panel D: Value Strategy				Panel E: Quality Strategy				Panel F: Momentum Strategy			
	0% excl.	10% excl.	25% excl.	50% excl.	0% excl.	10% excl.	25% excl.	50% excl.	0% excl.	10% excl.	25% excl.	50% excl.
World												
Average score	4.68	5.09	5.66	6.87	5.11	5.55	6.13	7.06	4.36	4.98	5.70	6.82
Ann. return (%)	4.30	3.98	3.80	5.10	6.60	6.81	7.45	7.41	5.30	4.57	4.91	5.86
Ann. std. dev. (%)	21.56	21.24	20.52	19.84	17.69	17.79	17.52	16.71	17.73	17.32	16.96	15.70
Sharpe ratio	0.17	0.15	0.15	0.22	0.33	0.34	0.38	0.40	0.26	0.22	0.25	0.33
Tracking error (%)	5.64	5.64	6.40	7.36	2.72	2.83	3.22	4.03	5.98	6.56	7.15	8.52
United States												
Average score	4.07	4.53	5.15	6.10	4.71	5.12	5.57	6.38	4.25	4.69	5.29	6.24
Ann. return (%)	6.38	6.17	5.95	6.65	10.06	9.82	10.14	10.37	9.11	9.38	9.22	8.96
Ann. std. dev. (%)	18.95	18.69	18.49	18.41	16.36	16.11	15.80	15.75	15.36	14.97	14.68	14.52
Sharpe ratio	0.30	0.29	0.28	0.32	0.57	0.57	0.60	0.61	0.55	0.58	0.58	0.57
Tracking error (%)	1.71	2.14	3.32	4.37	1.64	2.07	2.58	2.77	2.54	3.29	4.40	4.99
Europe												
Average score	6.28	6.72	7.35	8.20	6.48	6.93	7.44	8.26	6.41	6.86	7.43	8.25
Ann. return (%)	1.85	2.09	2.91	3.53	6.43	6.71	6.83	6.99	5.32	5.68	5.29	5.90
Ann. std. dev. (%)	25.40	25.26	24.56	23.94	18.35	18.20	18.29	18.24	17.89	17.92	17.90	18.05
Sharpe ratio	0.04	0.05	0.09	0.12	0.31	0.33	0.33	0.34	0.26	0.28	0.26	0.29
Tracking error (%)	1.69	2.37	3.48	4.61	1.33	1.76	2.25	2.72	1.56	1.85	2.56	3.18
Pacific												
Average score	4.92	5.40	6.08	7.12	4.97	5.52	6.16	7.09	5.10	5.62	6.18	7.11
Ann. return (%)	7.33	7.31	6.98	7.93	6.38	6.48	6.23	5.23	4.03	3.71	3.68	3.77
Ann. std. dev. (%)	16.96	16.56	16.20	16.28	18.63	18.27	18.10	18.32	15.64	15.65	15.31	15.13
Sharpe ratio	0.39	0.40	0.39	0.44	0.30	0.32	0.30	0.25	0.21	0.19	0.19	0.20
Tracking error (%)	1.75	2.18	2.98	4.27	1.83	2.59	3.22	4.16	2.39	3.02	3.71	3.98
Emerging countries												
Average score	4.00	4.31	4.81	5.67	4.33	4.63	5.24	6.08	4.00	4.39	4.96	5.85
Ann. return (%)	5.33	3.98	4.29	4.05	7.29	7.75	8.42	10.09	3.75	3.75	3.82	5.22
Ann. std. dev. (%)	23.83	24.07	23.82	23.03	22.06	22.16	22.52	22.32	20.02	19.74	20.04	19.90
Sharpe ratio	0.19	0.14	0.15	0.14	0.30	0.32	0.34	0.42	0.15	0.15	0.16	0.23
Tracking error (%)	6.34	6.55	6.67	8.51	3.59	3.85	3.63	5.18	6.01	6.48	6.65	7.91

Notes: This exhibit reports summary statistics on smart beta portfolios based on the industry-adjusted average ESG score. Smart beta strategies are size, low beta, high yield, value, quality, and momentum, as reported in Panels A to F, respectively. Statistics are the average score, the annualized average return, the annualized standard deviation, the Sharpe ratio, and the annualized tracking error (relative to the standard MSCI benchmark of the respective region). For each panel, columns correspond to the portfolio with no exclusion and the portfolios excluding the firms with the 10%, 25%, and 50% lowest scores.

is positive and highly significant but decreases when more firms are excluded. Even if they are not universal, these results suggest that the ESG screening in general leads to a less intensive use of the targeted factor. Thus, the ESG screening does not reverse the profile of the smart beta strategy but makes it less effective.[15]

CONCLUSION

Using data over the last 12 years, we broaden the analysis of SRI in equities from the initial exclusion of sin industries to a more general and systematic ESG screening on both otherwise passive investment and

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[15] We also observe that, in most cases, smart beta strategies do not generate significantly positive alpha. Exceptions are the strategy

based on dividend yield in the Pacific and emerging countries, and the strategy based on quality in Europe and the Pacific.

active smart beta strategies. Our results demonstrate that the ESG profile of both otherwise passive portfolios and smart beta portfolios can be substantially improved without reducing risk-adjusted returns.

Over the period under study, applying an ESG screening to an initially passive portfolio improves the portfolio ESG scores and records unchanged or improved Sharpe ratios. However, ESG screening also leads to substantial regional bets in multicountry portfolios, in favor of Europe and against the United States and emerging countries. This approach also implies large sectoral bets in favor of information technology stocks and against financial and energy stocks. Finally, the ESG screening magnifies some risk exposures relative to the standard MSCI benchmark. In particular, the exposure to the SMB factor is more negative as larger firms usually benefit from higher ESG scores.

Our results also indicate that the popular smart beta approaches would have benefited from an ESG screening over the period. Even with aggressive exclusions, the targeted factors remain in place. We observe some reduction in the exposure to the targeted factor, but it appears to be compensated by an increase in the ESG profile of the portfolio.

Our main result that the ESG profile of otherwise passive investment and smart beta strategies can be improved without deteriorating risk–return performances holds for most regions and for most ESG criteria. This outcome may be at least partly driven by the sample used for the analysis. The period corresponds to a massive transfer of funds toward ESG investing, a process that may have increased the value of firms with high ESG scores and therefore improved the performance of portfolios built upon ESG filters. The (possibly undesirable) exposure of ESG portfolios to some regional or sectoral tilts or to some risk factors may be mitigated by building algorithms that optimize the ESG profile while keeping the exposures to various risk factors under control.

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The Cost of Socially Responsible Investing

TIMOTHY ADLER AND MARK KRITZMAN

The Journal of Portfolio Management

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ABSTRACT: *In this article, the authors estimate the cost of practicing socially responsible investing. Using these results, investors may determine whether imposing restrictions on the available investment universe is the most cost-efficient method for promoting the particular social ideal. The authors design and execute a Monte Carlo simulation to compare the performance of a skillful investor in an unrestricted investment universe with the performance of the same investor in a restricted investment universe. They repeat this for a variety of skill levels and investment universes and find that the cost of socially responsible investing is substantial for even moderately skilled investors.*

A Guide to ESG Portfolio Construction

MICHAEL BRANCH, LISA R. GOLDBERG, AND PETE HAND

The Journal of Portfolio Management

https://jpm.pm-research.com/content/45/4/61

ABSTRACT: *In this article, the authors explore six quantitative environmental (E), social (S), and governance (G) strategies to provide insights into best practices for ESG portfolio construction. These strategies offer different approaches to the trade-off between desired ESG attributes and investment performance. They conclude that fully understanding the dynamics of these trade-offs will allow investors to select the strategy that best matches their ethical and financial views.*

The Benefits of Socially Responsible Investing: *An Active Manager's Perspective*

INDRANI DE AND MICHELLE R. CLAYMAN

The Journal of Investing

https://joi.pm-research.com/content/24/4/49

ABSTRACT: *There has been a lot of research on the predictive power of environmental, social, and governance (ESG) ratings, the relationship between ESG ratings and subsequent stock performance, and whether using ESG data in stock analysis and portfolio management was value-additive or valuedetracting. In this article, the authors examine the relationship between the ESG ratings of a company and its stock returns, volatility, and risk-adjusted returns in the post-2008 financial crisis era. They explore the negative relationship between ESG and volatility in greater depth, given the well-documented low-volatility anomaly (outperformance of low-volatility stocks). Both (high) ESG rating and (low) volatility positively impact stock returns, but the ESG effect is independent of the low-volatility effect, and ESG is a positive contributor in its own right. Given the controversy surrounding the effect of ESG-based investment restrictions, the authors test the effect of restricting the investible universe by deleting the lower tail of ESG companies on portfolio performance. Asset managers can thus actively use the association between corporate ESG ratings and stock return, volatility, and risk-adjusted return to enhance their stock-picking and portfolio-construction abilities.*