

Research Report

# Performance of ESG Equity Indices Versus Traditional Equity Indices



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## SUMMARY

“ESG” stands for “Environment”, “Social” and “Governance”. ESG investment refers to financial investment taking into consideration these three performance areas to support sustainable long-term economic and business development. Related international efforts, including the Paris Agreement to address climate change and the United Nations Sustainable Development Goals, together with the growing market demand for sustainable development, have driven the evolution of ESG investment. Investors have allocated their ESG investment mostly in equities and bonds among other asset classes. Since the launch of the first ESG index in the US in 1990, ESG indices have become increasingly popular to meet investors’ growing appetite for ESG investment. Over the past three decades, ESG equity indices have evolved to cover global markets beyond the US and adopt different investment strategies.

ESG indices are usually constructed from parent indices with the incorporation of ESG investment styles. The construction process may include the screening of companies with negative ESG impacts and the inclusion of companies with positive ESG impacts, possibly with adjustment in their relative weights. The risk-return performances of these indices may therefore be different from those of their parent indices with traditional investment strategies. The risk-return performances of 23 pairs of blue-chip equity indices and their corresponding ESG equity indices covering global, regional and home country markets for different investment horizons and market conditions were examined in this paper.

The empirical results showed that the investment return and return volatility, i.e. the risk-return performance, of ESG indices in many cases were found to be similar to that of their parent indices for different investment horizons and under different market conditions. Some ESG indices, mainly regional ESG indices, had shown better return and/or lower volatility than their parent indices at times. In other words, in many cases, ESG indices tended to have similar, if not better, risk-return performances than their parent indices.

The empirical findings may imply that individual ESG indices may have their own specific characteristics contributing to their outperformance relative to their parent indices, which would not be common across the whole spectrum of ESG indices. As constituents of ESG indices are companies regarded to have better ESG performance, the potential outperformance of ESG indices relative to their parent indices may owe to the better corporate financial performance and/or the higher investor valuation of constituents with better ESG performance, or investors’ preferences for specific ESG investment strategies. ESG indices of different ESG investment strategies in different markets would therefore offer alternative investment choices with potentially better returns to global investors. By and large, supported by empirical findings, ESG investment does not necessarily sacrifice financial returns, and may even enjoy better returns, while pursuing ethical investment.

## 1. ESG INVESTMENT ON THE RISE

“ESG” stands for “Environment”, “Social” and “Governance”. ESG investment refers to financial investment taking into consideration these three performance areas to support sustainable long-term economic and business development. This is sometimes called “socially responsible investment”, “sustainable investment”, “ethical investment” or “impact investment”.

In 2015, United Nations (UN) member countries reached a consensus on the 2030 Agenda for Sustainable Development and the Paris Agreement (within the United Nations Framework Convention on Climate Change (UNFCCC) to address global climate change (subsequently signed in 2016). The 2030 Agenda includes 17 Sustainable Development Goals (SDGs) to link up with different aspects of ESG issues<sup>1</sup> (see Table 1). These international efforts became global drivers of the speedy advancement in ESG investment.

No.	SDG	Relevance in		
		Environmental	Social	Governance
1	End Poverty		✓	
2	Zero Hunger		✓	
3	Good Health and Well-Being	✓	✓	
4	Quality Education		✓	✓
5	Gender Equality		✓	✓
6	Clean Water and Sanitation	✓	✓	
7	Affordable and Clean Energy	✓	✓	
8	Decent Work and Economic Growth	✓	✓	✓
9	Industry, Innovation, and Infrastructure	✓	✓	
10	Reduced Inequalities		✓	✓
11	Sustainable Cities and Communities	✓	✓	
12	Responsible Consumption and Production	✓	✓	✓
13	Climate Action	✓		✓
14	Life Below Water	✓		
15	Life on Land	✓		
16	Peace, Justice, and Strong Institutions		✓	✓
17	Partnerships for the Goals			✓

Source: “ESG to SDGs: Connected Paths to a Sustainable Future”, webpage on SustainoMetric’s website (sustainometric.com), viewed on 1 September 2020.

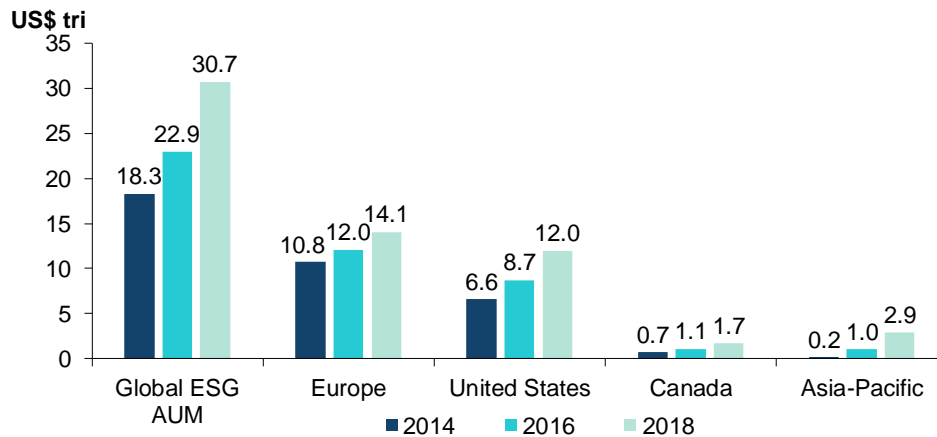
At practical level, an increasing number of asset owners, investment managers and market intermediaries became the signatories of UN Principles of Responsible Investments (UN PRI) to demonstrate their commitments to integrate ESG factors into their investment policies. The UN PRI was launched in 2006 to promote responsible investment and the number of signatories rose from 1,013 institutions in 2014 to 3,311 institutions in August 2020<sup>2</sup>. In terms of scale, the total assets under management (AUM) of global sustainable investments rose from US\$18.3 trillion in 2014 to US\$30.7 trillion in 2018. Europe and the US dominated the

<sup>1</sup> See “Transforming our world: the 2030 Agenda for Sustainable Development”, published on the website of United Nations, 21 October 2015.

<sup>2</sup> Source: “Signatory directory”, webpage on the website of UN PRI, viewed on 1 September 2020.

market in 2018 while the Asia-Pacific region has the highest 4-year growth rate in asset size (13.6 times). (See Figure 1.)

**Figure 1. Total assets of global sustainable investments by region (2014 – 2018)**



Source: "Global sustainable investment review", 2016 and 2018 issues, published on the website of Global Sustainable Investment Alliance.

Global sustainable investments may follow seven strategies to take into account ESG considerations<sup>3</sup>:

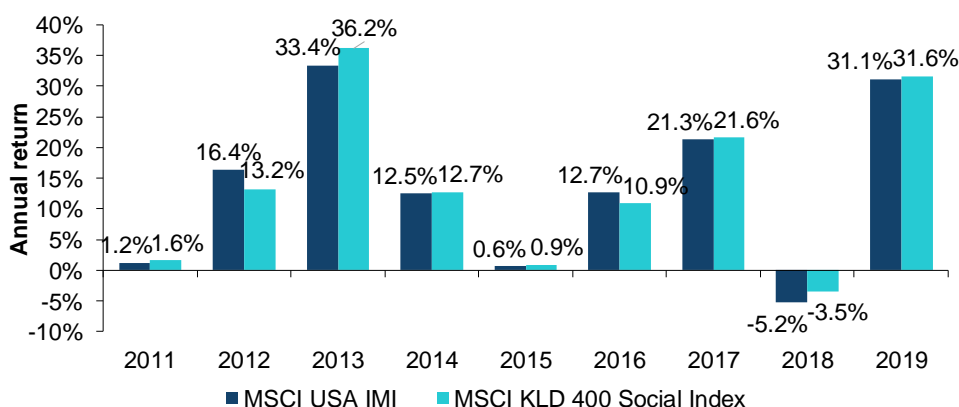
- (1) **Negative/exclusionary screening:** the exclusion from a fund or portfolio of certain sectors, companies or practices based on specific ESG criteria;
- (2) **Positive/best-in-class screening:** investment in sectors, companies or projects selected for positive ESG performance relative to industry peers;
- (3) **Norms-based screening:** screening of investments against minimum standards of business practice based on international norms, e.g. the United Nations Global Compact (UNGC) principles;
- (4) **Integration of ESG factors:** the systematic and explicit inclusion by investment managers of environmental, social and governance factors into traditional financial analysis;
- (5) **Sustainability themed investing:** investment in themes or assets specifically related to sustainability, e.g. clean energy, green technology or sustainable agriculture;
- (6) **Impact/community investing:** targeted investments, typically made in private markets, aimed at solving social or environmental problems, and including community investing, where capital is specifically directed to traditionally underserved individuals or communities, as well as financing that is provided to businesses with a clear social or environmental purpose; and
- (7) **Corporate engagement and shareholder action:** the use of shareholder power to influence corporate behaviour, including through direct corporate engagement (i.e., communicating with senior management and/or boards of companies), filing or co-filing shareholder proposals, and proxy voting that is guided by comprehensive ESG guidelines.

<sup>3</sup> Source: "Global sustainable investment review", 2016 and 2018 issues, published on the website of Global Sustainable Investment Alliance.

The asset allocation of ESG investment are mostly in equities and bonds, which accounted for 51% and 36% respectively of total global sustainable investment assets as of end-2018<sup>4</sup>. The rest of 13% were allocated to other asset classes covering real estate/property, private equity/venture capital, hedge funds, cash/deposits, commodities and infrastructure. There are more than 1,000 ESG indices to meet investors' growing appetite for ESG investment<sup>5</sup>.

The first ESG index is MSCI KLD 400 Social Index launched in 1990<sup>6</sup>. The index comprises 400 stocks listed in the United States (US) with outstanding ESG ratings from the constituents of MSCI USA Investable Market Index (IMI) excluding companies whose products have negative social or environmental impacts. In seven years out of the past nine years, the annual returns of MSCI KLD 400 Social Index outperformed those of MSCI USA IMI (see Figure 2). ESG investment therefore does not necessarily sacrifice financial returns while pursuing ethical investment.

**Figure 2. Comparison of annual returns between MSCI KLD 400 Social Index and MSCI USA IMI (2011 – 2019)**



Source: "Fact sheet of MSCI KLD 400 Social Index (USD)", published on the website of MSCI, 30 June 2020.

Over the past three decades, ESG equity indices have evolved to cover global markets beyond the US and adopt different investment strategies. The risk-return patterns of these indices are different from those of traditional investment strategies (see Section 3).

## 2. ESG EQUITY INDICES AS A TOOL TO INCORPORATE ESG FACTORS INTO THE INVESTMENT PROCESS

ESG equity indices are used as benchmarks for ESG investment and as the underlying assets of passive ESG investment tools such as exchange-traded funds (ETFs). Related risk management can be conducted using ESG index futures.

The investment styles of ESG indices are generally divided into "avoid" and "advance". For "avoid" style, the exposures to controversial sectors/companies that have significant negative impact on ESG performance are excluded (in line with sustainable investment strategies of negative screening or norms-based screening). For "advance" style, capital will be allocated to exposures to specific business activities/sectors in hope of achieving desired ESG outcomes (ESG achievement can be measured by ESG scores) and expected positive ESG

<sup>4</sup> Source: "Global sustainable investment review", 2018 issue, published on the website of Global Sustainable Investment Alliance.

<sup>5</sup> Source: "An evolution in ESG indexing", published on Blackrock's iShares website, viewed on 1 September 2020.

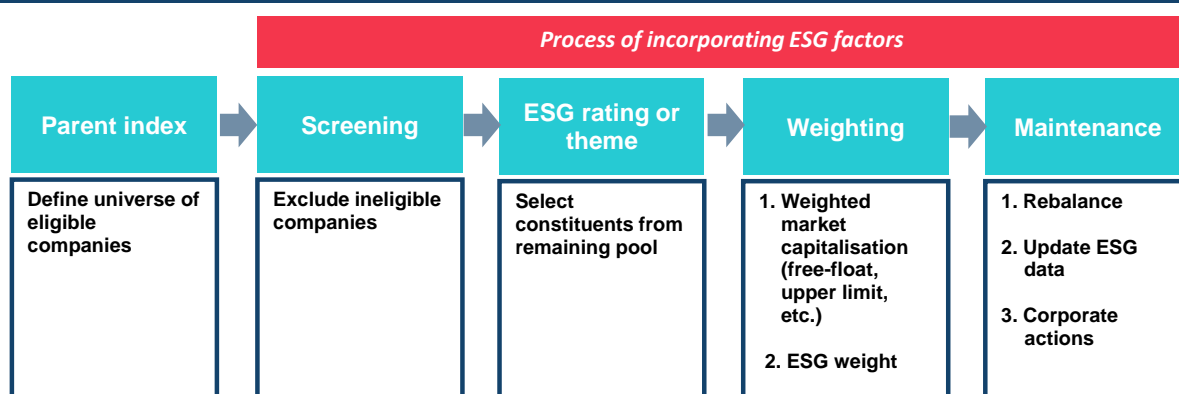
<sup>6</sup> It was previously called the Domini 400 Social Index. Source: "Fact sheet of MSCI KLD 400 Social Index (USD)", published on the website of MSCI, 30 June 2020.

impacts of investments (in line with sustainable investment strategies of positive screening, sustainability themed investing or impact investing).

ESG equity indices are usually constructed from parent equity indices to align with ESG investment styles through the following five-step process (see Figure 3):

- (1) **Selecting a parent index:** A non-ESG benchmark equity index is selected; the constituents of the parent index are eligible to be selected as constituents of the ESG version of this index.
- (2) **Screening:** Ineligible companies (e.g. companies producing nuclear weapons) will be excluded with reference to international standards, e.g. the UNGC principles. The thresholds for exclusion of a company owing to its involvement in controversial business activities vary across index providers.
- (3) **ESG rating or theme:** Index providers usually compile their own ESG ratings based on their proprietary or public sources of information, which include listed companies' ESG reporting disclosure in accordance with international standards e.g. Global Reporting Initiative (GRI), Task Force on Climate-Related Financial Disclosures (TCFD) or Carbon Disclosure Project (CDP). Eligible companies with high ESG ratings will be included into an ESG index. In addition, sustainability themes (e.g. low carbon emission) may be used to select constituents.
- (4) **Weight tilts:** The weightings of the constituents of an ESG index are mainly based on free-float market capitalisation and can be adjusted based on the constituents' ESG scores (weight tilts).
- (5) **Maintenance:** To keep the original investment style of the parent index, an ESG index may maintain the relative weights of sector exposures and impose limit of maximum exposure of a single constituent. The maintenance of an ESG index also includes rebalancing constituents, updating and reviewing ESG data and conducting corporate actions.

**Figure 3. The general process of constructing an ESG index from a parent index**



Source: "An Evolution in ESG Indexing", published on Blackrock's iShares website, viewed on 1 September 2020.

A number of blue-chip equity indices covering global, regional and home country markets have become parent indices of ESG equity indices. Table 2 shows examples of 24 pairs of parent equity indices and their corresponding ESG equity indices. Some of the ESG indices have related futures products traded on exchanges.

Table 2. List of selected ESG equity indices and their parent indices		
Parent equity indices	ESG equity indices	ESG index short name (used in this report)
<b>Global</b>		
MSCI World Index	<ul style="list-style-type: none"> <li>• MSCI World ESG Leaders Index*</li> <li>• MSCI World ESG Screened Index*</li> </ul>	<ul style="list-style-type: none"> <li>• MSCI World L</li> <li>• MSCI World S</li> </ul>
FTSE Developed Index	<ul style="list-style-type: none"> <li>• FTSE Developed ESG Low Carbon Emission Select Index</li> </ul>	<ul style="list-style-type: none"> <li>• FTSE Dvp</li> </ul>
S&P Global LargeMidCap Index	<ul style="list-style-type: none"> <li>• S&amp;P Global LargeMidCap ESG Index</li> </ul>	<ul style="list-style-type: none"> <li>• S&amp;P Global</li> </ul>
<b>Regional</b>		
MSCI EM Index	<ul style="list-style-type: none"> <li>• MSCI EM ESG Leaders Index*</li> <li>• MSCI EM ESG Screened Index*</li> </ul>	<ul style="list-style-type: none"> <li>• MSCI EM L</li> <li>• MSCI EM S</li> </ul>
FTSE Emerging Index	<ul style="list-style-type: none"> <li>• FTSE Emerging ESG Low Carbon Emission Select Index</li> </ul>	<ul style="list-style-type: none"> <li>• FTSE EM</li> </ul>
S&P Emerging LargeMidCap Index	<ul style="list-style-type: none"> <li>• S&amp;P Emerging LargeMidCap ESG Index</li> </ul>	<ul style="list-style-type: none"> <li>• S&amp;P EM</li> </ul>
MSCI Europe Index	<ul style="list-style-type: none"> <li>• MSCI Europe ESG Leaders Index*</li> <li>• MSCI Europe ESG Screened Index</li> </ul>	<ul style="list-style-type: none"> <li>• MSCI Eur L</li> <li>• MSCI Eur S</li> </ul>
Stoxx Europe 600 Index	<ul style="list-style-type: none"> <li>• Stoxx Europe 600 ESG-X Index*</li> </ul>	<ul style="list-style-type: none"> <li>• Stoxx Eur 600</li> </ul>
Stoxx Europe Select Dividend 30 Index	<ul style="list-style-type: none"> <li>• Stoxx Europe ESG Leaders Select 30 Index*</li> </ul>	<ul style="list-style-type: none"> <li>• Stoxx Eur S</li> </ul>
MSCI EAFE Index	<ul style="list-style-type: none"> <li>• MSCI EAFE ESG Leaders Index*</li> <li>• MSCI EAFE ESG Screened Index*</li> </ul>	<ul style="list-style-type: none"> <li>• MSCI EAFE L</li> <li>• MSCI EAFE S</li> </ul>
<b>Home country</b>		
MSCI USA	<ul style="list-style-type: none"> <li>• MSCI USA ESG Leaders Index*</li> <li>• MSCI USA ESG Screened Index*</li> </ul>	<ul style="list-style-type: none"> <li>• MSCI USA L</li> <li>• MSCI USA S</li> </ul>
Stoxx USA 500 Index	<ul style="list-style-type: none"> <li>• Stoxx USA 500 ESG-X Index*</li> </ul>	<ul style="list-style-type: none"> <li>• Stoxx USA 500</li> </ul>
S&P 500	<ul style="list-style-type: none"> <li>• S&amp;P 500 ESG Index*</li> </ul>	<ul style="list-style-type: none"> <li>• S&amp;P 500 ESG</li> </ul>
FTSE 100 Index	<ul style="list-style-type: none"> <li>• FTSE UK 100 ESG Select Index</li> </ul>	<ul style="list-style-type: none"> <li>• FTSE UK 100</li> </ul>
MSCI Japan Index	<ul style="list-style-type: none"> <li>• MSCI Japan ESG Leaders Index</li> <li>• MSCI Japan ESG Screened Index*</li> </ul>	<ul style="list-style-type: none"> <li>• MSCI Jpn L</li> <li>• MSCI Jpn S</li> </ul>
CSI 300 Index	<ul style="list-style-type: none"> <li>• CSI 300 ESG Index</li> </ul>	<ul style="list-style-type: none"> <li>• CSI 300</li> </ul>
Hang Seng Index (HSI)	<ul style="list-style-type: none"> <li>• HSI ESG Index</li> </ul>	<ul style="list-style-type: none"> <li>• HSI ESG</li> </ul>
Hang Seng China Enterprises Index (HSCEI)	<ul style="list-style-type: none"> <li>• HSCEI ESG Index</li> </ul>	<ul style="list-style-type: none"> <li>• HSCEI ESG</li> </ul>

\* ESG equity indices with index futures available for trading on exchange(s).

Source: Bloomberg.

These parent indices can be classified into the following categories:

- **Global market indices** — These are dominated by large-and-mid-cap companies listed on developed markets.
- **Regional market indices** — These include indices on emerging markets, Europe, Australasia and the Far East (EAFE).



- **Home country market indices** — These include indices tracking the market performance of major financial centres, including the US, the UK, Japan, the Mainland and Hong Kong.

### 3. RISK-RETURN PERFORMANCE OF ESG EQUITY INDICES VERSUS THEIR PARENT INDICES

Do ESG equity investments outperform traditional equity investments? An analogue is: do ESG equity indices outperform their respective parent equity indices? To answer this question, the return performance of ESG indices and parent indices listed in Table 1 (except CSI ESG 300 Index<sup>7</sup>) are compared. The study period covers 10 years spanning from 1 July 2010 to 30 June 2020. Due to different launch dates of the ESG indices, the actual study period for analysis varies across index pairs — only 12 out of 23 index pairs got observations throughout the entire 10 years' period.

The measures used for comparison are the daily returns and the standard deviation (SD) of daily returns (a measure of return volatility) of the indices. Statistical tests were conducted to test for the significance of differences in the returns and SDs of the ESG indices and their parent indices:

- (1) **t-test for difference in daily returns:** The daily returns were calculated for all available observations for each of the 23 ESG indices and their parent indices. *t*-test was conducted to see if the daily returns of the ESG indices were higher than those of their parent indices.
- (2) **F-test for difference in volatility of daily returns:** The SD of daily returns were calculated for each of the 23 ESG indices and their parent indices, for all ESG/parent indices in each of the three index categories of “global”, “regional” and “home country”, and for all ESG/parent indices under study. *F*-tests were conducted to see if the SDs of the ESG indices were larger than those of their parent indices.

The above *t*-test and *F*-test were conducted to examine the risk and return performances of ESG indices relative to their parent indices for the entire study period, for different investment horizons, and under different market conditions. The analysis results of each of these are presented in the following sub-sections.

#### 3.1 Index performance over the entire study period

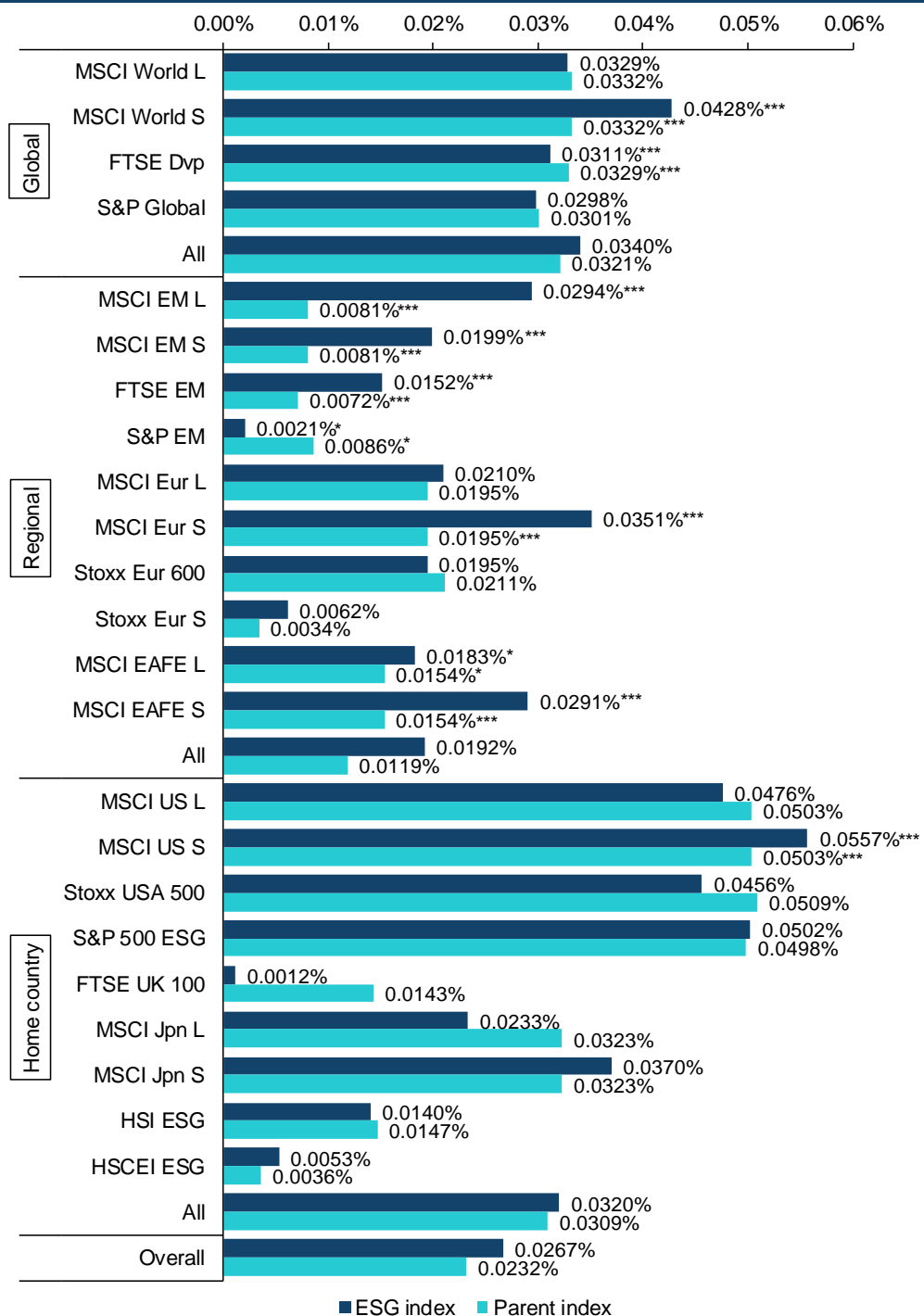
##### (1) Daily return

To perform *t*-test, the average of the daily returns of each of the ESG indices and their parent indices during the entire study period<sup>8</sup> were computed. Independent sample *t*-test was then performed on the difference in the average daily returns for (1) each ESG-parent index pair; (2) all ESG indices against all parent indices in each of the three index categories; and (3) all ESG indices against all parent indices under study. Figure 4 presents the average daily returns of the indices and the test results.

<sup>7</sup> As the study aims to examine the risk-return performance of ESG indices in a reasonably long investment horizon, indices included in the study shall have data of at least 5 years. The CSI ESG 300 Index, launched on 30 April 2020, is not included because it has data back to 30 June 2017 only. (See “Announcement on the launch of 5 indices including CSI ESG benchmark indices” (關於發佈滬深 300 ESG 基準指數等 5 條指數的公告), published on the website of China Securities Index Company Limited, 8 April 2020).

<sup>8</sup> Noting that the study period with data of each ESG-parent index pair available for the analysis may be different.

**Figure 4. Average daily returns of ESG indices and their parent indices**



Note: Each ESG-parent index pair may have different length of study period ending 30 June 2020.

\*\*\* Statistically significant difference at 0.1% level.

\*\* Statistically significant difference at 1% level.

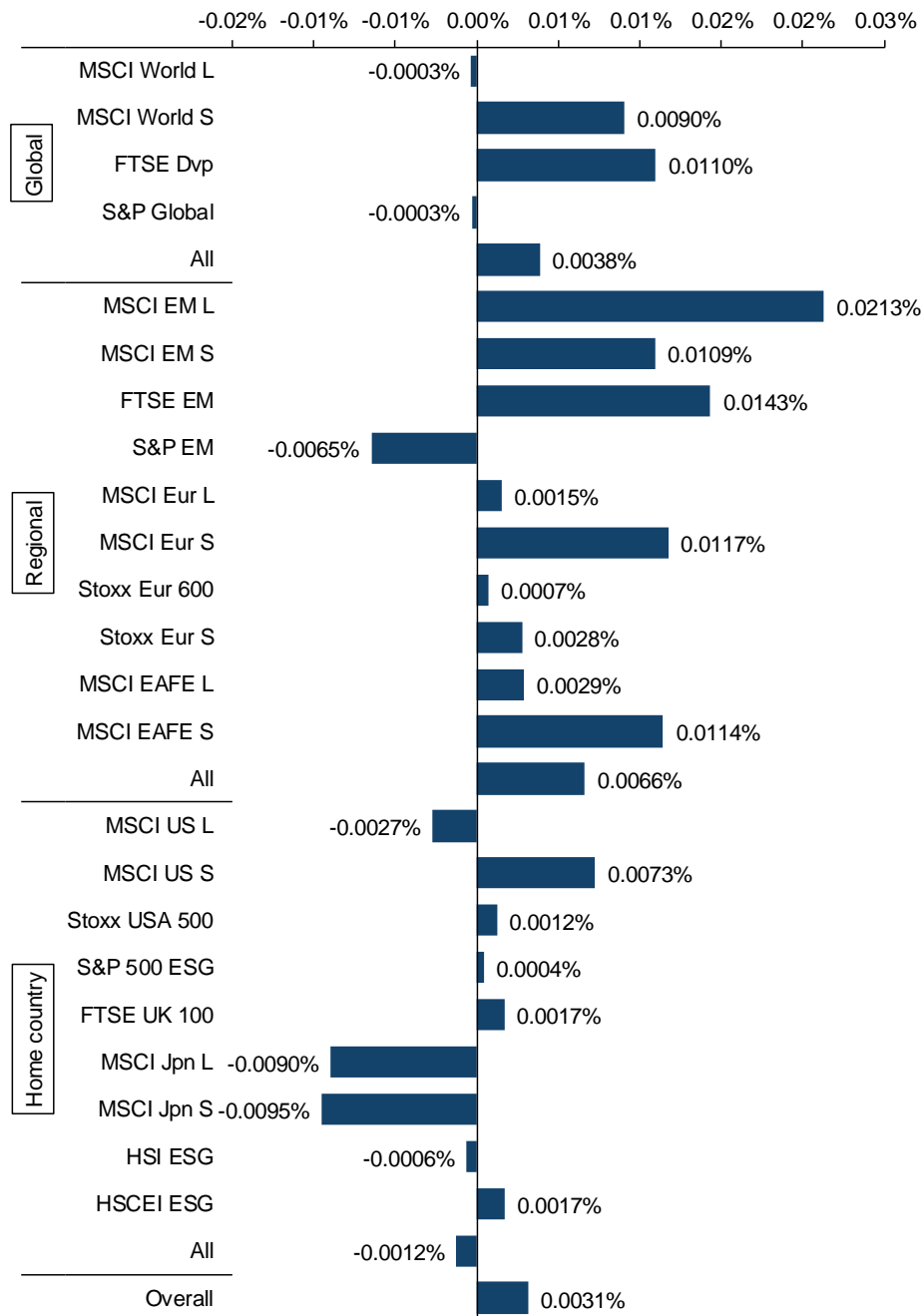
\* Statistically significant difference at 5% level.

Source: Computed from daily closings of indices obtained from Bloomberg.

The average daily returns of ESG indices were higher than those of their parent indices for 13 out of the 23 index pairs under study; of these, statistical significance in the difference were found for eight pairs (one global, six regional and one home country). Alongside, two index pairs (one global and one regional) were found to have the ESG index having a lower average daily return than its parent index, with statistically significant difference.

However, test for difference in the **average** daily returns of the ESG-parent index pairs may not be able to reflect the true return performance of an ESG index relative to its parent index on a daily basis, i.e. their relative return performance under the market conditions on the same day. To examine this, paired *t*-test was performed on the difference in returns on the same day for (1) each ESG-parent index pair; (2) all index pairs in each of the three index categories; and (3) all index pairs under study. Figure 5 presents the averages of these daily return differences and the test results.

**Figure 5. Average of daily return differences between ESG indices and their parent indices**



Note: Each ESG-parent index pair may have different length of study period ending 30 June 2020. None of the daily return differences was found to be statistically significant.

Source: Computed from daily closings of indices obtained from Bloomberg.

It was found that the differences between the returns of the ESG indices and their corresponding parent indices on the same day, whether for each index pair or for all ESG indices against all parent indices in each of the index categories or for all ESG indices against all parent indices under study, were not statistically significant.

(See Table A2 in Appendix 2 on details of *t*-test results on daily returns.)

## **(2) Volatility of daily returns**

To perform *F*-test on the volatility of daily returns, the SD of daily returns during the entire study period were computed (1) for each of the ESG indices and their parent indices<sup>9</sup>; (2) separately for all ESG indices and for all parent indices in each of the three index categories; and (3) separately for all ESG indices and for all parent indices under study. *F*-test was then performed to see if there was statistically significant difference between the SD of ESG and parent indices. Figure 6 presents the difference in the average of the SDs of daily returns of indices and the test results.

The overall SDs of daily returns of all ESG indices was lower than that of all parent indices during the entire study period and the difference (-0.0214%) was statistically significant. In respect of index category, the SDs of ESG index returns in each category were lower than those of the parent index returns in each of the three categories, albeit only the difference in SD for the regional category was found to be statistically significant. In respect of individual index pairs, the SDs of ESG indices were lower than those of their parent indices, with statistical significance, for 6 out of 23 index pairs (1 global index pair, 3 regional index pairs and 2 home country index pairs), but higher for 2 index pairs (2 regional index pairs), with statistical significance.

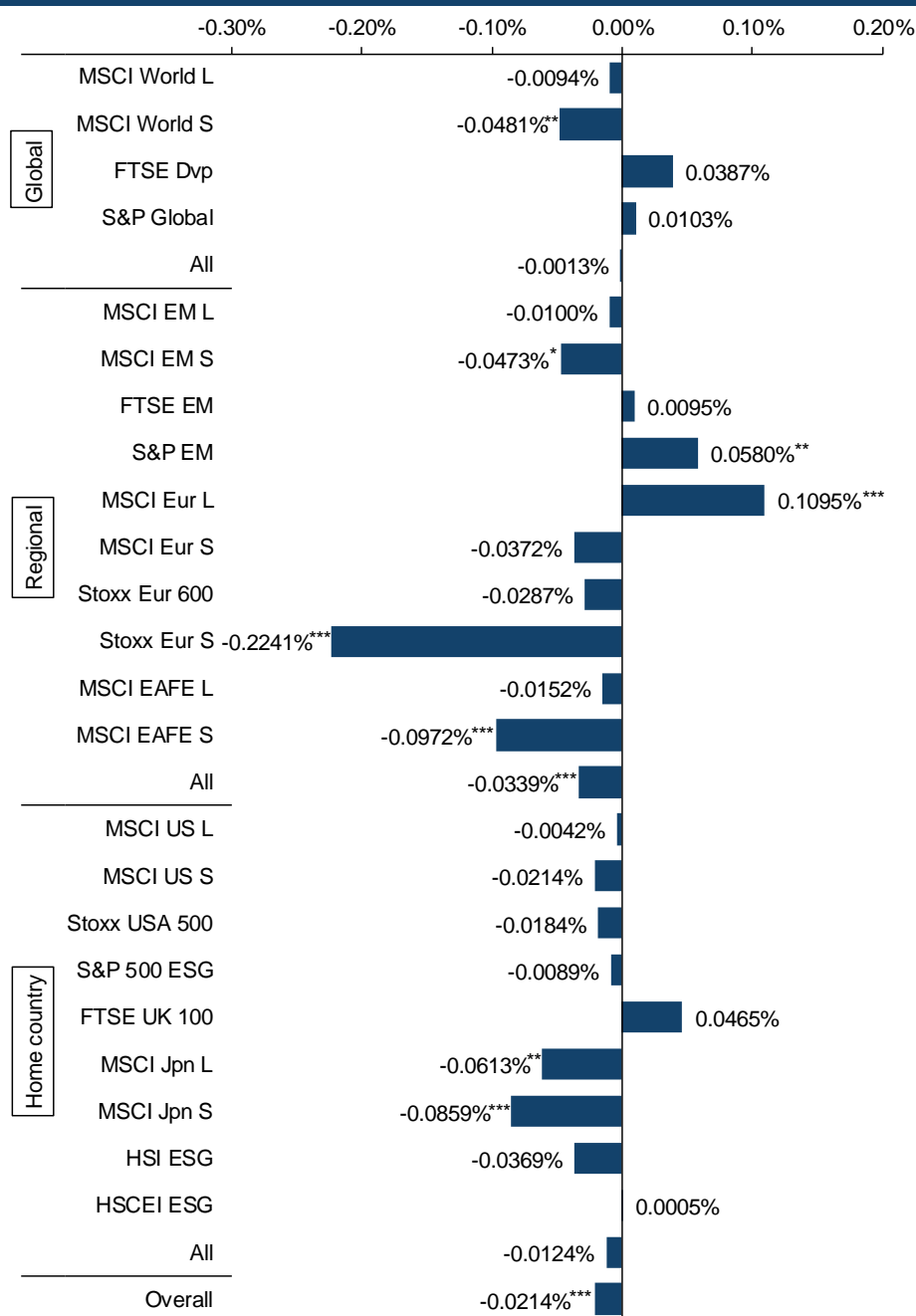
(See Table A3 in Appendix 2 on details of *F*-test results on SDs of daily returns.)

The above findings indicate that in many cases ESG indices tended to have similar, if not better, risk-return performances — higher return and/or lower risk (SDs of daily returns), compared to their parent indices.

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<sup>9</sup> Noting that the study period with data of each ESG-parent index pair available for the analysis may be different.

**Figure 6. Differences between the SDs of daily returns of ESG indices and their parent indices**



Note: Each ESG-parent index pair may have different length of study period ending 30 June 2020.

\*\*\* Statistically significant difference at 0.1% level.

\*\* Statistically significant difference at 1% level.

\* Statistically significant difference at 5% level.

Source: Computed from daily closings of indices obtained from Bloomberg.

### 3.2 Index performance over investment horizons up to 5 years

The risk-return performance of ESG indices compared to that of their parent indices may vary over different investment horizons. As all ESG indices under study have at least 5 years of available data, the risk-return performance for different investment horizons up to 5 years were

analysed for the entire sample. The period returns<sup>10</sup> and SDs of daily returns of the indices were computed for the investment horizons of 3 months, 6 months, 1 year, 3 years and 5 years from the base date of 30 June 2015. The differences in the two measures of return and risk between ESG indices and their parent indices were examined by applying *t*-test and *F*-test respectively as in Section 3.1 above.

### (1) Period returns

More than half of the ESG indices outperformed their parent indices in terms of period returns for the different short- and medium-term investment horizons under study (3-month, 6-month, 1-year, 3-year and 5-year holding periods). However, when looking into the performance of individual indices in each index category, more than half of the home country ESG indices (5 out of 9) underperformed their parent indices in 6-month and 3-year holding periods. Nevertheless, it was found that the differences between the period returns of the ESG indices and their corresponding parent indices for all holding periods, whether across all index pairs in each of the index categories or across all index pairs under study, were not statistically significant<sup>11</sup>.

(See Table A4 in Appendix 2 on details of *t*-test results on period returns.)

### (2) Volatility of daily returns

More than half of the ESG indices were less volatile (had a lower SD of daily returns) than their parent indices for different short- and medium-term investment horizons under study (3-month, 6-month, 1-year and 5-year but not 3-year holding periods). In respect of each index category, more than half of the regional ESG indices had lower volatilities for all investment horizons and more than half of the global and home country ESG indices had lower volatilities for short-term investment horizons of 3 months, 6 months and 1 year. Nevertheless, the differences between the volatilities of the ESG indices and their corresponding parent indices for all holding periods, whether for each index pair or for all ESG indices against all parent indices in each of the index categories or for all ESG indices against all parent indices under study, were not statistically significant except one regional index pair at 5-year holding period<sup>12</sup>.

(See Table A5 in Appendix 2 on details of *F*-test results on SD of daily returns.)

Figures 7 to 9 presents the risk-return pattern of ESG indices versus their parent indices for the respective index categories of global, regional and home country for 1-year, 3-year and 5-year holding periods. As an investment doctrine, one would expect a higher return for a higher risk level. An ESG index is considered having a better risk-return performance vis-à-vis its parent index if it has a higher return at the same risk level or a lower risk at the same return level or a higher return and lower risk at the same time. About half of the ESG indices under study, particularly regional index pairs, had better risk-return performance than their parent indices for 1-year and 5-year holding periods. In contrast, only a few ESG indices (less than three) had worse risk-return performance than their parent indices for each of the 1-year, 3-year and 5-year holding periods.<sup>13</sup>

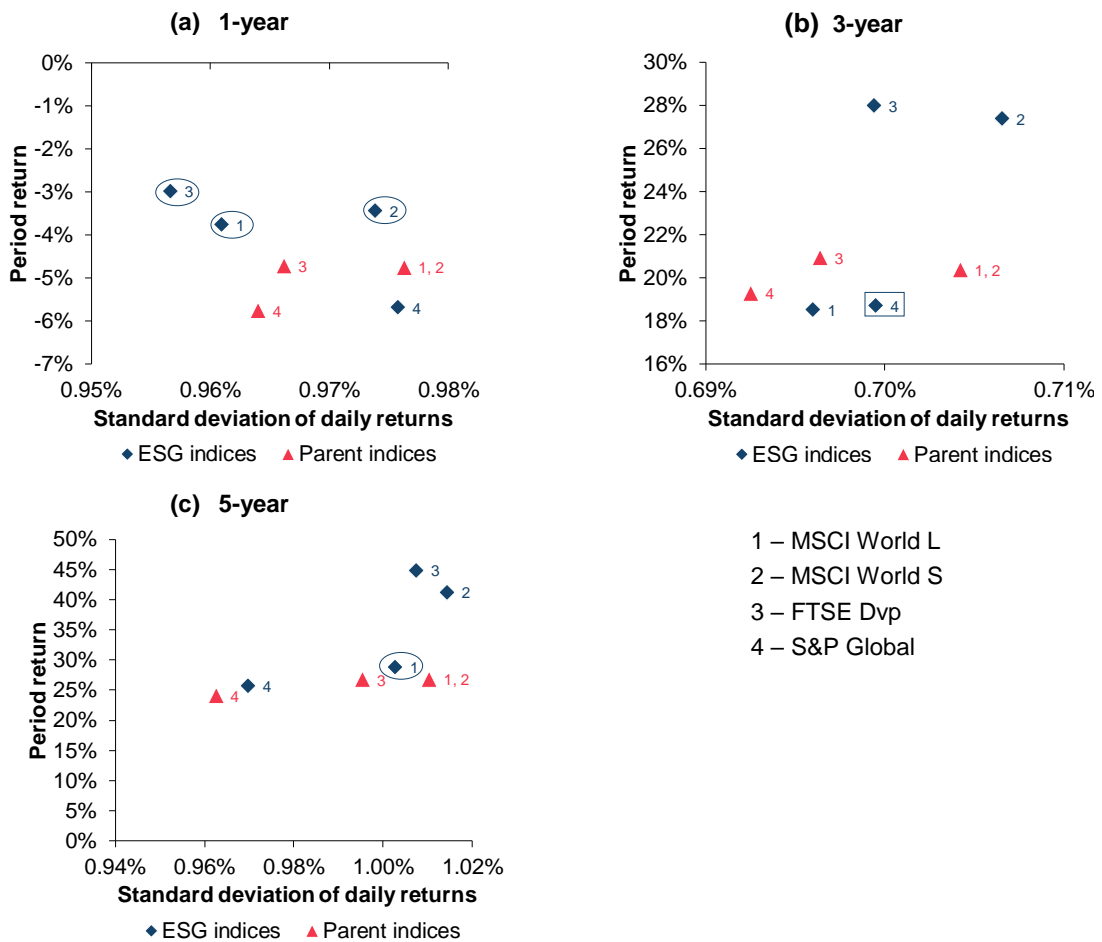
<sup>10</sup> "Period return" is defined as the percentage change of the index closing at the end of the period of a given investment horizon relative to the index closing on the base date.

<sup>11</sup> A limitation of *t*-test applied onto period returns is the small number of index pairs in the sample, which may contribute to a high standard error of the test. This limitation also applies to *t*-test results presented in Sections 3.3 and 3.4.

<sup>12</sup> This was Stoxx Europe ESG Leaders Select 30 index, which had a lower return volatility than its parent index (1.14% vs 1.29%), with statistical significance.

<sup>13</sup> It has to be noted that such observations of better/worse performances of the ESG indices relative to their parent indices are not supported by statistical tests for significant difference, which have been conducted separately for period returns and SD of daily returns with results presented above. The same applies to the observations from scatterplots in Sections 3.3 and 3.4.

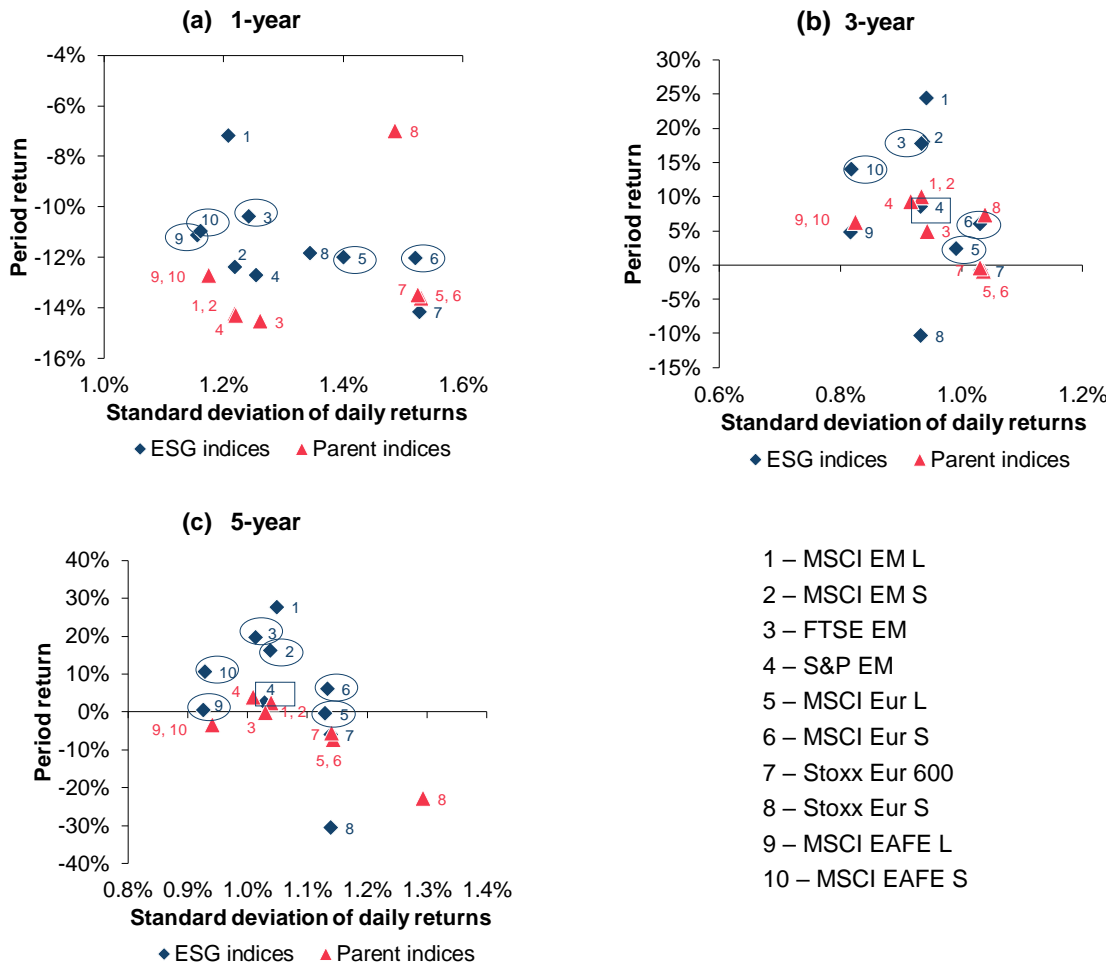
**Figure 7. Scatterplot risk-return profiles of ESG indices and parent indices — Global indices (base date: 30 Jun 2015)**



Note: A ESG index symbol in circle represents the ESG index appeared to have a better risk-return performance than its parent index (higher return and/or lower risk) and a ESG index symbol in rectangle represents the ESG index appeared to have a worse risk-return performance than its parent index (lower return and/or higher risk). ESG index symbols not in circle or rectangle appeared to follow the normal high-risk-high-return relationship with their parent indices (including those with return and risk very close to their parent indices). (See Appendix 2 for results on statistical test for significant difference in return and SD of daily returns.)

Source: Calculation based on daily index closings from Bloomberg.

**Figure 8. Scatterplot risk-return profiles of ESG indices and parent indices — Regional indices (base date: 30 Jun 2015)**

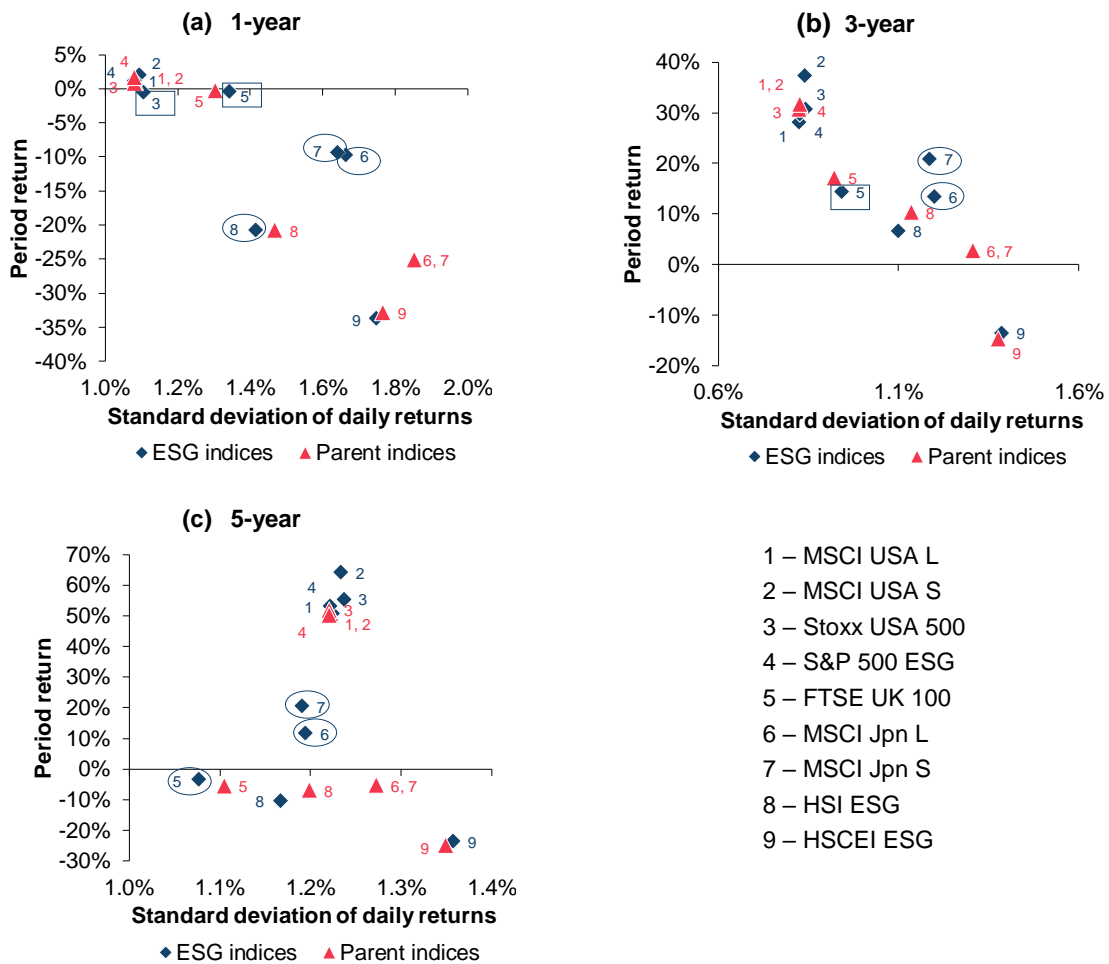


Note: A ESG index symbol in circle represents the ESG index appeared to have a better risk-return performance than its parent index (higher return and/or lower risk) and a ESG index symbol in rectangle represents the ESG index appeared to have a worse risk-return performance than its parent index (lower return and/or higher risk). ESG index symbols not in circle or rectangle appeared to follow the normal high-risk-high-return relationship with their parent indices (including those with return and risk very close to their parent indices). (See Appendix 2 for results on statistical test for significant difference in return and SD of daily returns.)

Source: Calculation based on daily index closings from Bloomberg.



**Figure 9. Scatterplot risk-return profiles of ESG indices and parent indices — Home country indices (base date: 30/6/2015)**



Note: A ESG index symbol in circle represents the ESG index appeared to have a better risk-return performance than its parent index (higher return and/or lower risk) and a ESG index symbol in rectangle represents the ESG index appeared to have a worse risk-return performance than its parent index (lower return and/or higher risk). ESG index symbols not in circle or rectangle appeared to follow the normal high-risk-high-return relationship with their parent indices (including those with return and risk very close to their parent indices). (See Appendix 2 for results on statistical test for significant difference in return and SD of daily returns.)

Source: Calculation based on daily index closings from Bloomberg.

The above findings indicate that in many cases ESG indices tended to have similar, if not better, risk-return performances for different investment horizons up to 5 years — higher return and/or lower risk (SDs of daily returns), compared to their parent indices. Certain regional and home country ESG indices<sup>14</sup> were found to consistently outperform their parent indices (though not necessarily with statistical significance).

### 3.3 Index performance over investment horizons up to 10 years

Analysis on index performance over different investment horizons up to 10 years, were performed on 12 index pairs with data available throughout the 10-year period (2 global index pairs, 5 regional index pairs and 5 home country index pairs). The period returns and SDs of daily returns of the indices were computed for the investment horizons of 3 months, 6 month, 1

<sup>14</sup> These include FTSE Emerging ESG Low Carbon Emission Select Index, MSCI Europe ESG Leaders Index, MSCI Europe ESG Screened Index, MSCI EAFE ESG Screened Index, MSCI Japan ESG Leaders Index and MSCI Japan ESG Screened Index.

year, 3 years, 5 years, 7 years and 10 years from the base date of 30 June 2010. Similar analyses and statistical tests were performed as in Section 3.2.

### **(1) Period returns**

About half of the ESG indices outperformed their parent indices in terms of period returns for a number of short-, medium- and long-term investment horizons under study (3-month, 3-year and 10-year holding periods), but less than a half did so for other investment horizons (6-month, 1-year, 5-year and 7-year holding periods). In respect of index category, two global ESG indices underperformed their parent indices for all holding periods while about a half of the regional and home country ESG indices outperformed their parent indices for all holding periods. Nevertheless, it was found that the differences between the period returns of the ESG indices and their corresponding parent indices across all index pairs under study for all holding periods were not statistically significant.

(See Table A6 in Appendix 2 on details of *t*-test results on period returns.)

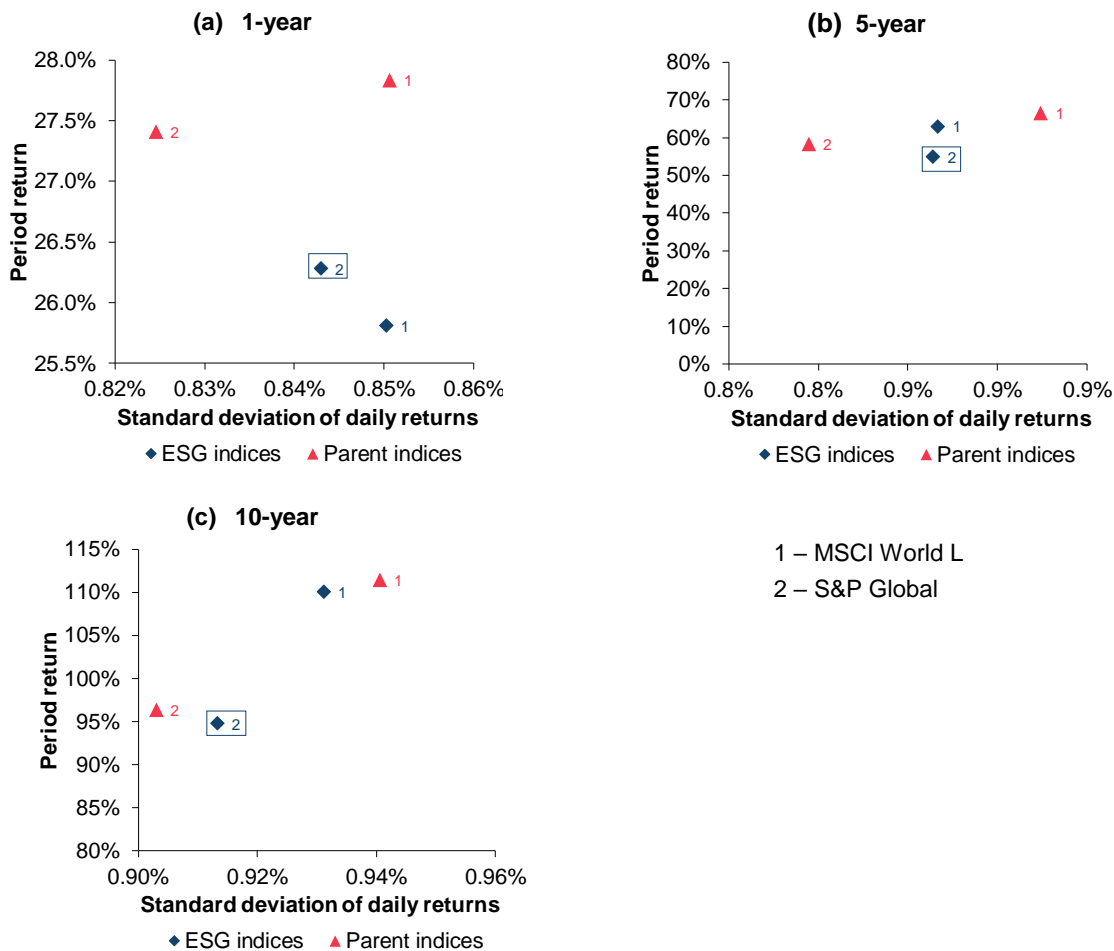
### **(2) Volatility of daily returns**

More than half of the ESG indices were less volatile than their parent indices for different short-, medium- and long-term investment horizons under study (except for 3-month holding period). In respect of index category, all home country ESG indices had lower volatilities than their parent indices for medium-term investment horizons (3-year, 5-year and 7-year holding periods). Nevertheless, it was found that the differences between the volatilities of the ESG indices and parent indices in each index category and those between all ESG indices and all parent indices under study for all holding periods were not statistically significant. For individual index pairs, only three regional index pairs were found to have statistically significant difference in volatilities (two for 6-month, 1-year, 3-year, 5-year, 7-year and 10-year holding periods; one for 5-year and 7-year holding periods).

(See Table A7 in Appendix 2 on details of *F*-test results on the volatility of daily returns.)

Figures 10 to 12 present the scatterplots of the risk-return pattern of ESG indices and their parent indices for 1-year, 5-year and 10-year holding periods. The risk-return performance of many ESG indices appeared to be similar to that of their parent indices for short-, medium- and long-term investment horizons. Less than a half of ESG indices were better but even less were worse (others follow the normal high-risk-high-return pattern).

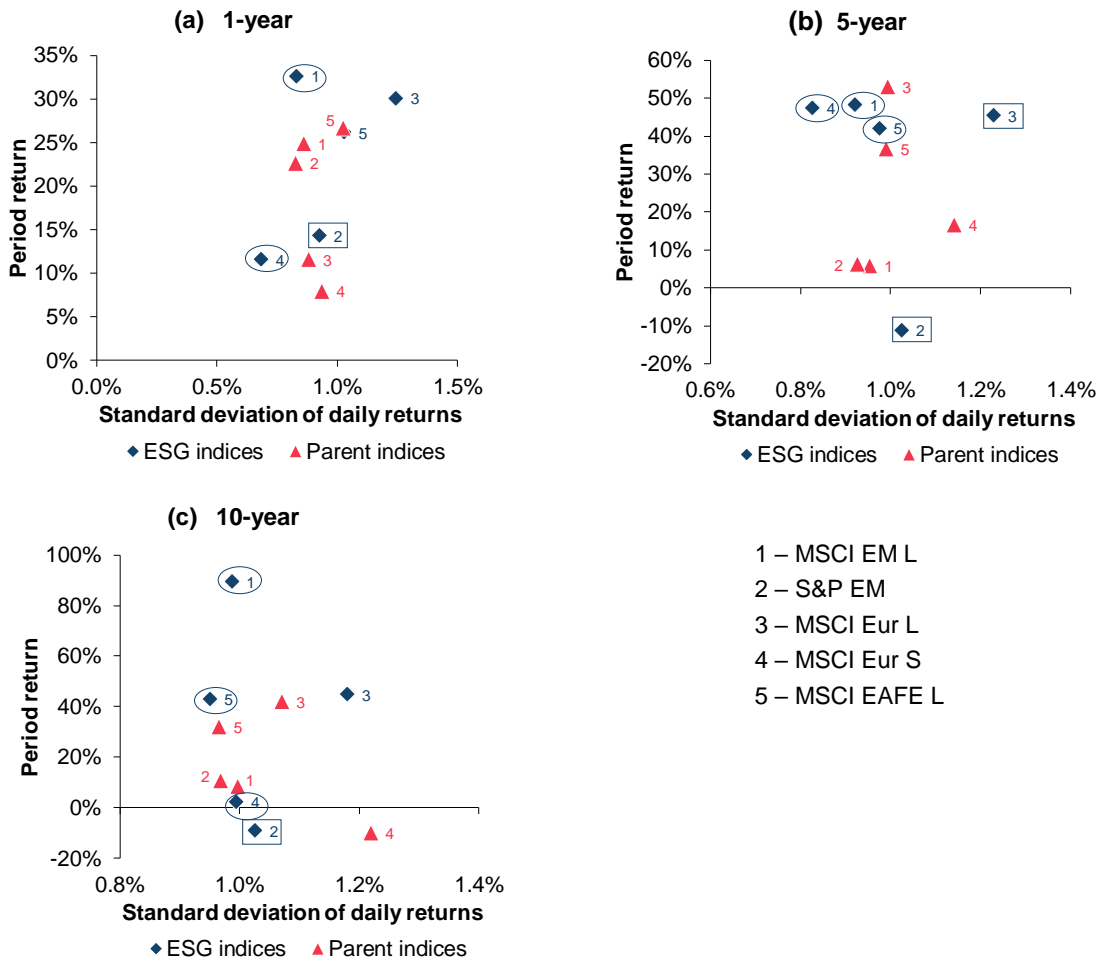
**Figure 10. Scatterplot risk-return profiles of ESG indices and parent indices — Global indices (base date: 30 Jun 2010)**



Note: A ESG index symbol in circle represents the ESG index appeared to have a better risk-return performance than its parent index (higher return and/or lower risk) and a ESG index symbol in rectangle represents the ESG index appeared to have a worse risk-return performance than its parent index (lower return and/or higher risk). ESG index symbols not in circle or rectangle appeared to follow the normal high-risk-high-return relationship with their parent indices (including those with return and risk very close to their parent indices). (See Appendix 2 for results on statistical test for significant difference in return and SD of daily returns.)

Source: Calculation based on daily index closings from Bloomberg.

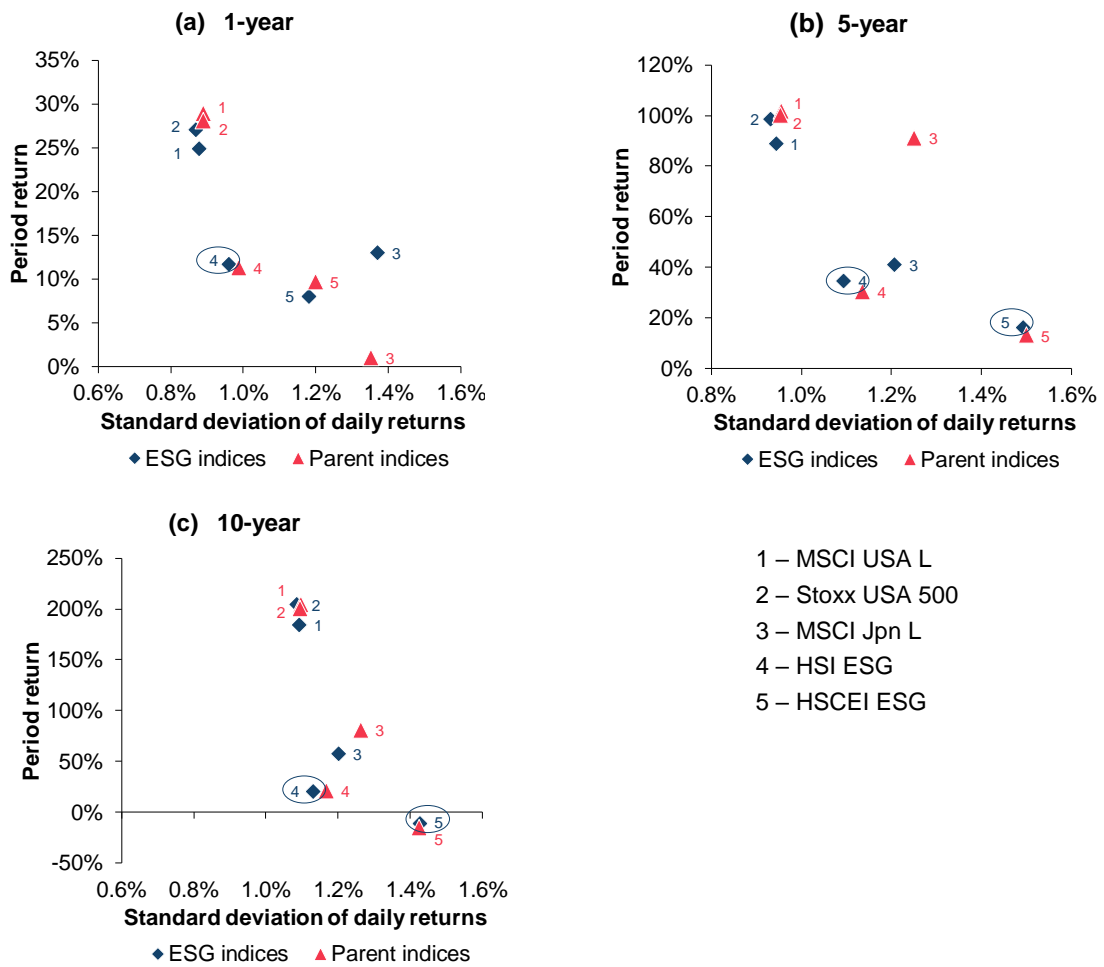
**Figure 11. Scatterplot risk-return profiles of ESG indices and parent indices — Regional indices (base date: 30 Jun 2010)**



Note: A ESG index symbol in circle represents the ESG index appeared to have a better risk-return performance than its parent index (higher return and/or lower risk) and a ESG index symbol in rectangle represents the ESG index appeared to have a worse risk-return performance than its parent index (lower return and/or higher risk). ESG index symbols not in circle or rectangle appeared to follow the normal high-risk-high-return relationship with their parent indices (including those with return and risk very close to their parent indices). (See Appendix 2 for results on statistical test for significant difference in return and SD of daily returns.)

Source: Calculation based on daily index closings from Bloomberg.

**Figure 12. Scatterplot risk-return profiles of ESG indices and parent indices — Home country indices (base date: 30 Jun 2010)**



Note: A ESG index symbol in circle represents the ESG index appeared to have a better risk-return performance than its parent index (higher return and/or lower risk) and a ESG index symbol in rectangle represents the ESG index appeared to have a worse risk-return performance than its parent index (lower return and/or higher risk). ESG index symbols not in circle or rectangle appeared to follow the normal high-risk-high-return relationship with their parent indices (including those with return and risk very close to their parent indices). (See Appendix 2 for results on statistical test for significant difference in return and SD of daily returns.)

Source: Calculation based on daily index closings from Bloomberg.

The above findings indicate that in many cases ESG indices tended to have similar, if not better, risk-return performances for different investment horizons up to 10 years, compared to their parent indices. Nevertheless, certain regional and home country ESG indices<sup>15</sup> were found to consistently outperform their parent indices (though not necessarily with statistical significance).

### 3.4 Index performance in selected bull and bear markets

To examine the risk-return patterns of ESG indices versus their parent indices under different market conditions, three bull market periods and three bear market periods were identified judgementally based on the peaks and troughs of global indices between 16 October 2014 and 23 March 2020 for analysis (see Figure 13).

<sup>15</sup> These include MSCI Emerging ESG Leaders Index, Stoxx Europe ESG Leaders Select 30 Index and Hang Seng ESG Index.

The three bull market periods are (period number in brackets for reference purpose):

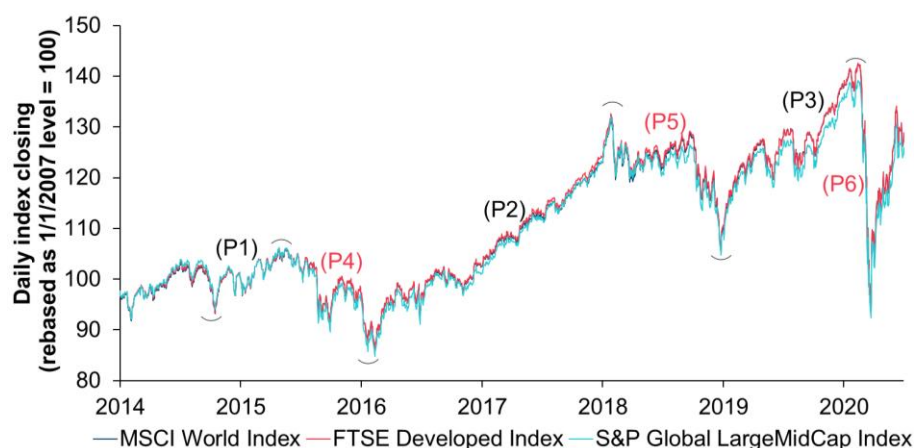
- 16 October 2014 — 21 May 2015 (P1);
- 11 February 2016 — 26 January 2018 (P2); and
- 25 December 2018 — 12 February 2020 (P3).

The three bear market periods are:

- 21 May 2015 — 11 February 2016 (P4);
- 26 January 2018 — 25 December 2018 (P5); and
- 12 February 2020 to 23 March 2020 (P6).

The period returns and standard deviations of daily returns of the indices during the respective bull/bear periods were calculated. The differences in these two variables between ESG indices and their parent indices were analysed with the same statistical tests as in the above sub-sections.

**Figure 13. The performance of major global equity indices (2014 – June 2020)**



Note: P1 to P3 are bull market periods; P4 to P6 are bear market periods.

Source: Bloomberg.

## (1) Period returns

More than half of the ESG indices outperformed their parent indices in terms of period returns for the different bull and bear market periods and the proportion of ESG indices with outperformance was higher in the most recent bull/bear periods (18 out of 23 ESG indices in bull market period P3 and in bear market period P6). However, when looking into the performance of indices in each index category, half of the global ESG indices (2 out of 4) underperformed their parent indices in the bull market periods of P1 and P2 and more than half of the home country ESG indices (5 out of 9) underperformed their parent indices in the bull and bear market periods of P1, P4 and P5. Nevertheless, it was found that the differences between the period returns of the ESG indices and their corresponding parent indices for all the bull/bear market periods under study, whether across all index pairs in each of the index categories or across all index pairs under study, were not statistically significant.

(See Table A8 in Appendix 2 on details of *t*-test results on period returns.)

## (2) Volatility of daily returns

More than half of the ESG indices were less volatile than their parent indices in the earlier bull market period of P1 and in all the bear market periods of P4, P5 and P6, but not for the more recent bull market periods of P2 and P3. However, when looking into the performance of indices in each index category, less than half of the global ESG indices (1 out of 4) had lower volatilities in the more recent bull market periods of P2 and P3 and the more recent bear market periods of P5 and P6; and less than half of the home country ESG indices had lower volatilities than their parent indices in the bull market periods of P1 and P2. Nevertheless, the differences between the volatilities of the ESG indices and their corresponding parent indices, whether for each index pair or for all ESG indices against all parent indices in each of the index categories or for all ESG indices against all parent indices under study, were not statistically significant for all bull/bear market periods.

(See Table A9 in Appendix 2 on details of *F*-test results on SD of daily returns.)

Figures 14 to 16 present the scatterplots of risk-return patterns of ESG indices versus their parent indices in each bull/bear market period. A number of ESG indices showed a risk-return performance dis-aligned with the high-risk-high return pattern relative to their parent indices in the bull and bear market periods — about a half of ESG indices were better than their parent indices in the bear market periods of P4 and P6 and only a few ESG indices were worse than their parent indices in the periods of P1, P2, P3 and P5.

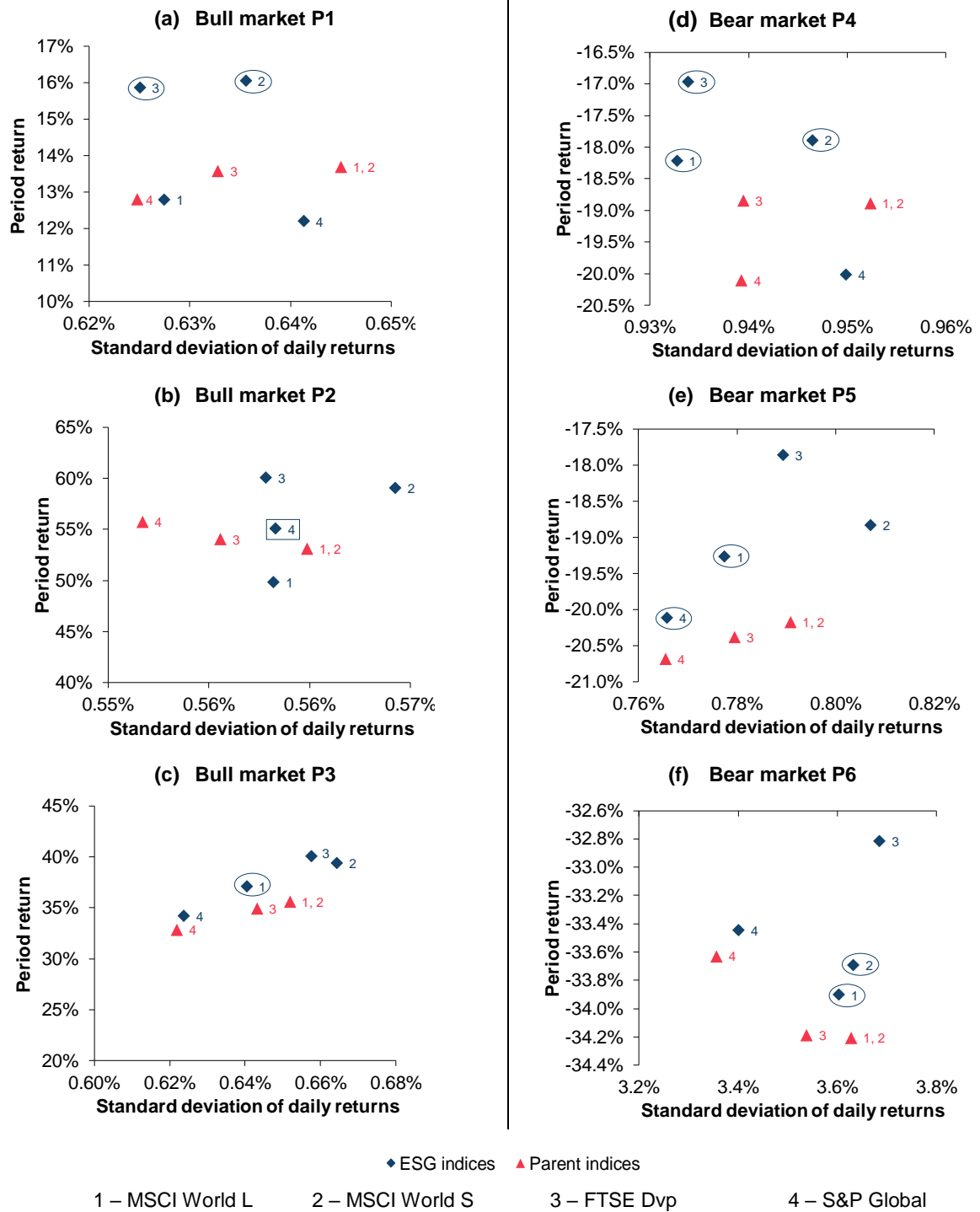
These results showed that in many cases the ESG indices under study tended to have similar, if not better, risk-return performances under different bull and bear market conditions, compared to their parent indices. One regional ESG index<sup>16</sup> was found to consistently outperform its parent index in the bull market and a few global and regional indices<sup>17</sup> did so in the bear market periods (though not necessarily with statistical significance).

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<sup>16</sup> This is MSCI EAFE ESG Screened Index.

<sup>17</sup> These include MSCI World ESG Leaders index, FTSE Emerging ESG Low Carbon Emission Select Index, MSCI Europe ESG Screened Index, MSCI EAFE ESG Leaders Index and MSCI EAFE ESG Screened Index.

**Figure 14. Scatterplot risk-return profiles of ESG indices and parent indices in bull/bear markets — Global indices**

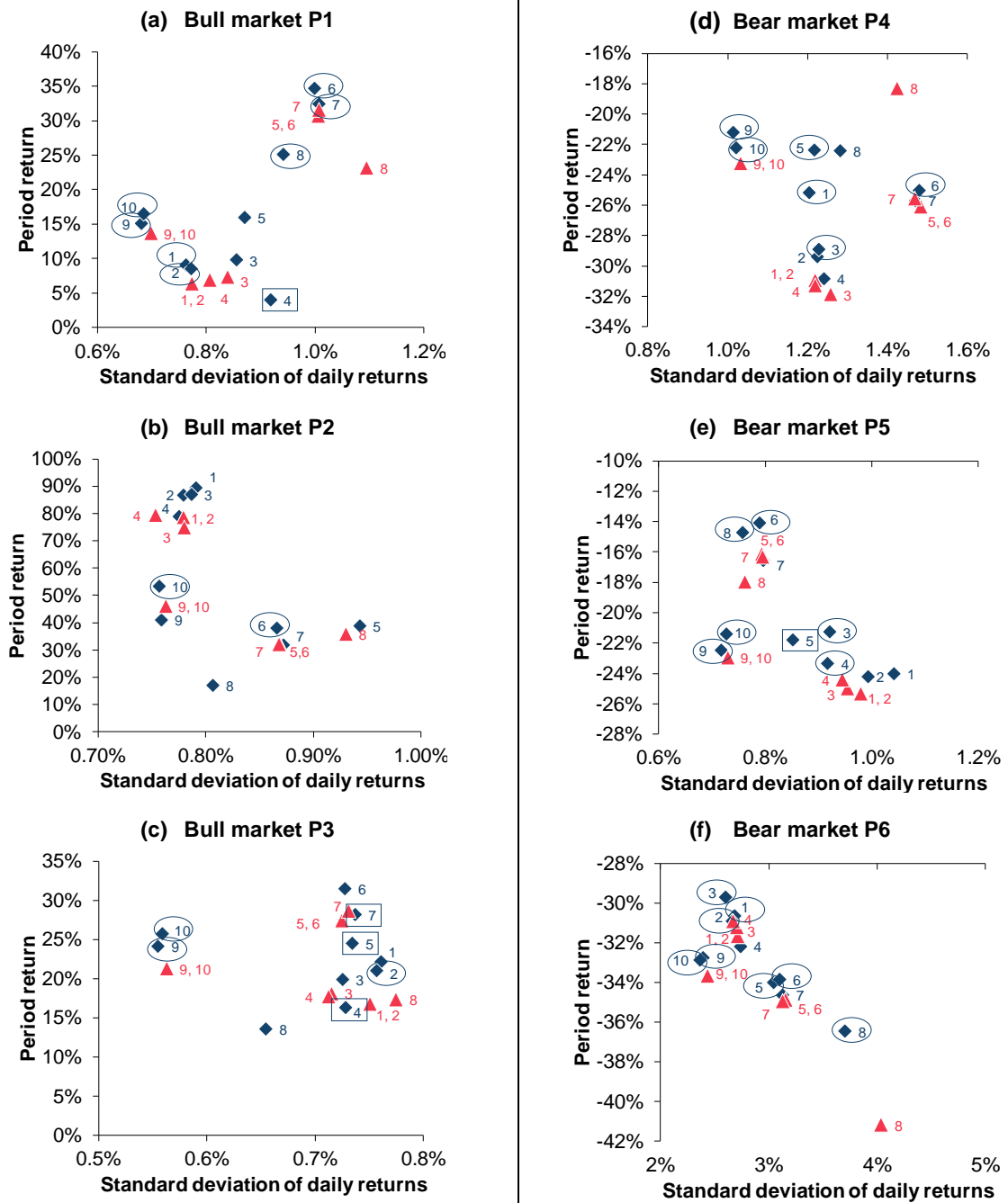


Note: A ESG index symbol in circle represents the ESG index appeared to have a better risk-return performance than its parent index (higher return and/or lower risk) and a ESG index symbol in rectangle represents the ESG index appeared to have a worse risk-return performance than its parent index (lower return and/or higher risk). ESG index symbols not in circle or rectangle appeared to follow the normal high-risk-high-return relationship with their parent indices (including those with return and risk very close to their parent indices). (See Appendix 2 for results on statistical test for significant difference in return and SD of daily returns.)

Source: Calculation based on daily index closings from Bloomberg.



**Figure 15. Scatterplot risk-return profiles of ESG indices and parent indices in bull/bear markets — Regional indices**



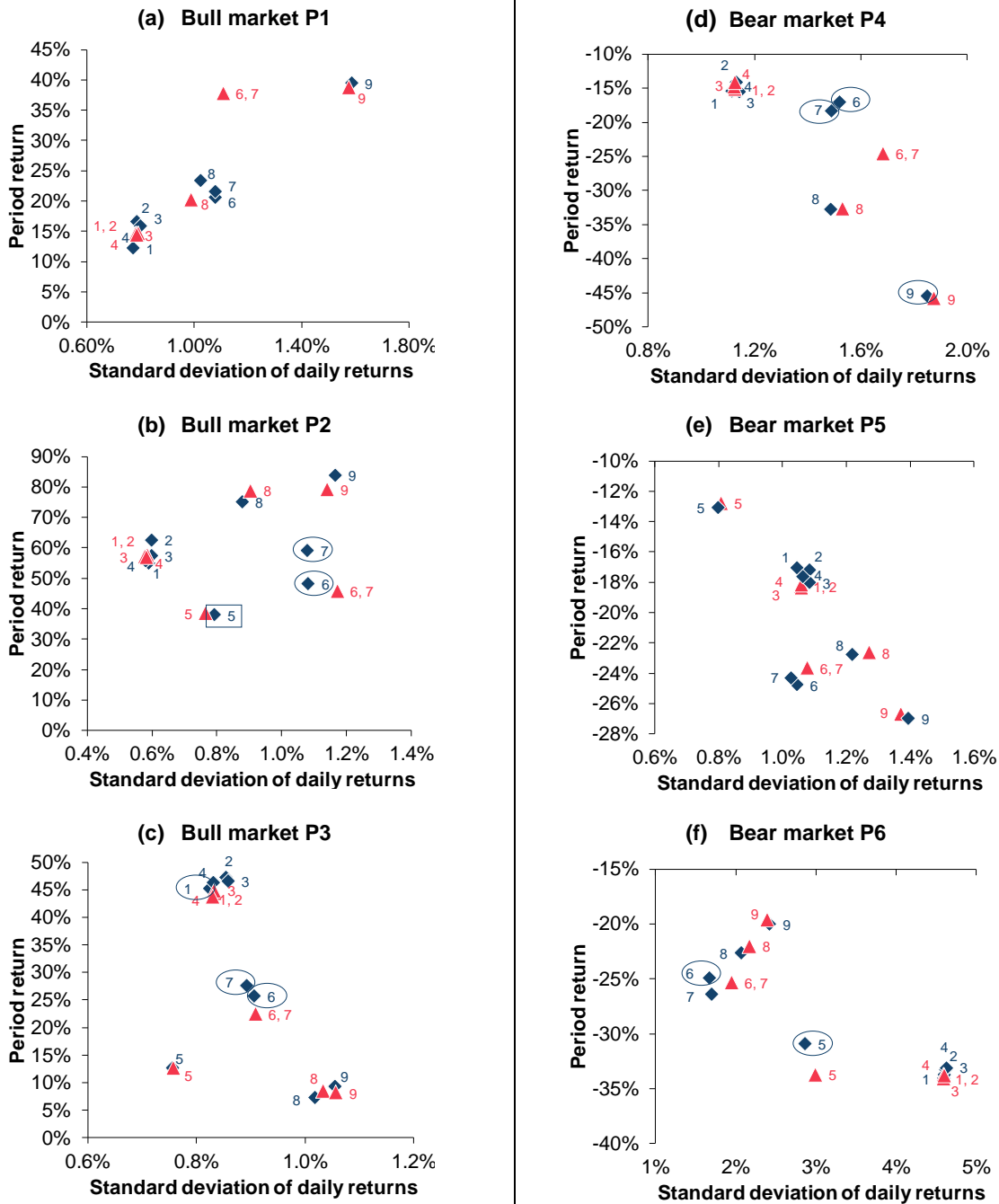
◆ ESG indices ▲ Parent indices

- |                |                   |                 |                 |                  |
|----------------|-------------------|-----------------|-----------------|------------------|
| 1 – MSCI EM L  | 2 – MSCI EM S     | 3 – FTSE EM     | 4 – S&P EM      | 5 – MSCI Eur L   |
| 6 – MSCI Eur S | 7 – Stoxx Eur 600 | 8 – Stoxx Eur S | 9 – MSCI EAFE L | 10 – MSCI EAFE S |

Note: A ESG index symbol in circle represents the ESG index appeared to have a better risk-return performance than its parent index (higher return and/or lower risk) and a ESG index symbol in rectangle represents the ESG index appeared to have a worse risk-return performance than its parent index (lower return and/or higher risk). ESG index symbols not in circle or rectangle appeared to follow the normal high-risk-high-return relationship with their parent indices (including those with return and risk very close to their parent indices). (See Appendix 2 for results on statistical test for significant difference in return and SD of daily returns.)

Source: Calculation based on daily index closings from Bloomberg.

**Figure 16. Scatterplot risk-return profiles of ESG indices and parent indices in bull/bear markets — Home country indices**



◆ ESG indices ▲ Parent indices

- 1 – MSCI USA L      2 – MSCI USA S      3 – Stoxx USA 500      4 – S&P 500 ESG      5 – FTSE UK 100
- 6 – MSCI Jpn L      7 – MSCI Jpn S      8 – HSI ESG      9 – HSCEI ESG

Note: A ESG index symbol in circle represents the ESG index appeared to have a better risk-return performance than its parent index (higher return and/or lower risk) and a ESG index symbol in rectangle represents the ESG index appeared to have a worse risk-return performance than its parent index (lower return and/or higher risk). ESG index symbols not in circle or rectangle appeared to follow the normal high-risk-high-return relationship with their parent indices (including those with return and risk very close to their parent indices). (See Appendix 2 for results on statistical test for significant difference in return and SD of daily returns.)

Source: Calculation based on daily index closings from Bloomberg.

### 3.5 Empirical findings in summary

Based on the above analysis results, the investment return and return volatility of ESG indices in many cases were found to be similar to that of their corresponding parent indices for different investment horizons and under different market conditions. Some ESG indices had shown better return and/or lower return volatility than their parent indices at times; these cases were often more in number than cases of ESG indices with worse return and/or higher return volatility than their parent indices at times<sup>18</sup>.

A number of ESG indices, mainly regional indices, were found to outperform their parent indices in terms of risk-return pattern consistently across different investment horizons.

The empirical findings may imply that individual ESG indices may have their own specific characteristics contributing to their outperformance relative to their parent indices, which would not be common across the whole spectrum of ESG indices. These are discussed in Section 4 below.

## 4. FACTORS CONTRIBUTING TO THE PERFORMANCE OF ESG INDICES

There are a large number of empirical studies on the performance of ESG investment. In line with the findings of our study presented in Section 3, although there was no evidence to support the *consistent* outperformance of ESG investments across markets and study periods<sup>19</sup>, individual ESG indices were found to outperform their parent indices at times. As constituents of ESG indices are companies recognised to have better ESG performance, the outperformance of ESG indices could be attributable to a positive relationship between corporate financial performance and ESG ratings of the constituent companies, a higher investor valuation of companies with better ESG performance and investor preferences of different ESG investment strategies. These factors are discussed below.

### (1) Corporate financial performance

A study on the MSCI index<sup>20</sup> (referred to as “MSCI ESG Study”) showed that the constituents of the MSCI World Index with the highest ESG ratings had better corporate financial performance during January 2007 to May 2017 through better cash flows generation and company-specific risk mitigation. The study argued that companies with better ESG ratings are usually more competitive than a comparable company in the same sector and can generate better financial returns, leading to higher business profitability and dividend payments. These companies are also better at managing company-specific risks and therefore have a lower probability of suffering from incidents that can impact their share prices. Consequently, their stock prices display lower company-specific tail risks.

The impact of ESG ratings may be different across different geographical markets. A research<sup>21</sup> reviewed 2,250 empirical studies on various markets between 1970 and 2014. From this review, the proportion of the number of empirical studies with findings supporting the positive relationship between corporate financial performance and ESG performance was the highest in emerging markets (65.4%) and the lowest in developed Europe (26.1%) (see Figure 17). In other words, corporate financial performance in emerging markets was

<sup>18</sup> Note that the difference in performance between the ESG indices and their parent indices may or may not be statistically significant.

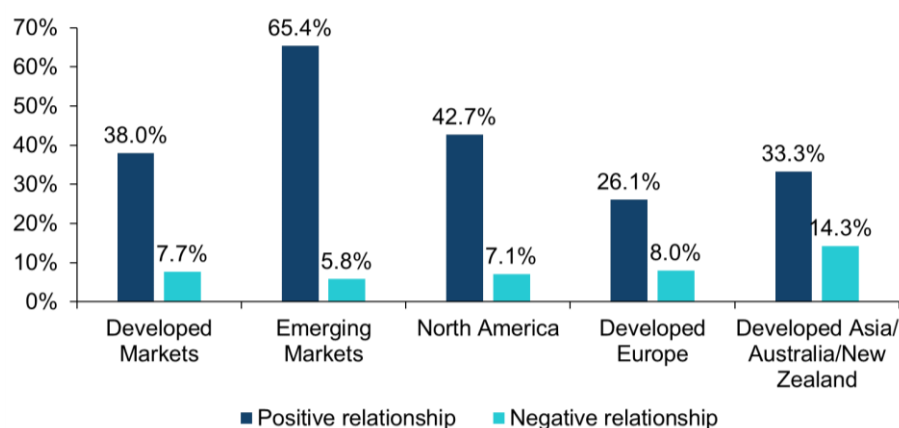
<sup>19</sup> See Henriksson, R., J. Livnat, P. Pfeifer, M. Stumpp and G. Zeng, “ESG literature review”, working paper published on the website of Quantitative Management Associates LLC (qma.com), June 2018.

<sup>20</sup> Giese, G. L. Lee, D. Melas, Z. Nagy and L. Nishikawa. (2019) “Foundations of ESG investing: How ESG affects equity valuation, risk, and performance”, *Journal of Portfolio Management*, Vol. 45, pp.69-83. The authors of the paper are all executives at MSCI, Inc.

<sup>21</sup> Friede, G., M. Lewis, A. Bassen and T. Busch. (2015) “ESG and Financial Performance: Aggregated Evidence from More than 2000 Empirical Studies”, *Journal of Sustainable Finance and Investment*, Vol. 5, pp.210-233.

likely to be better for companies with high ESG ratings. This could be a possible reason for better risk-return patterns of certain ESG indices on emerging markets. The research also found that the relationship between corporate financial performance and ESG performance was less ascertained in developed Asia, Australia and New Zealand. The research put forward a possible reason: the ESG reporting in Asia-Pacific markets was in the early stage of development during the study period of 1970 – 2014.

**Figure 17. Proportion of reviewed empirical studies finding positive and negative relationships between ESG performance and corporate financial performance**



Note: The number of reviewed empirical studies was 2,250 where were conducted between 1970 and 2014.

Source: Friede, G., M. Lewis, A. Bassen and T. Busch. (2015) "ESG and Financial Performance: Aggregated Evidence from More than 2000 Empirical Studies", *Journal of Sustainable Finance and Investment*, Vol. 5, pp.210-233.

## (2) Investor valuation of ESG performance

The MSCI ESG Study found that the constituents with the highest ESG rating had a higher valuation in terms of price-to-earnings (PE) ratio and price-to-book (PB) ratio during January 2007 to May 2017. The study interpreted that the higher valuation of high ESG-rated companies can be attributable to their lower volatility of earnings and systematic risks, which could lead to a lower cost of capital and hence support the stock's valuation.

Empirical evidence showed that investments in high ESG-rated companies can generate an alpha return (additional return on top of the return on low ESG-rated companies) among companies with similar corporate financial performance. ESG performance is usually assessed by comparing companies' disclosure (within the same industry sector) in accordance with ESG reporting standards<sup>22</sup>. An empirical study<sup>23</sup> looked into the returns of 2,307 US companies during 1992 to 2002 and identified the "material" and "immaterial" sustainability issues in companies' ESG disclosure based on international ESG reporting standards. This study found that there was a significant alpha return for companies with better ESG performance in "material" issues. This study finding highlights the relationship between stock valuation and ESG reporting quality. However, there are a wide range of international standards on ESG reporting and the adoption of these standards varies significantly across markets and companies<sup>24</sup>.

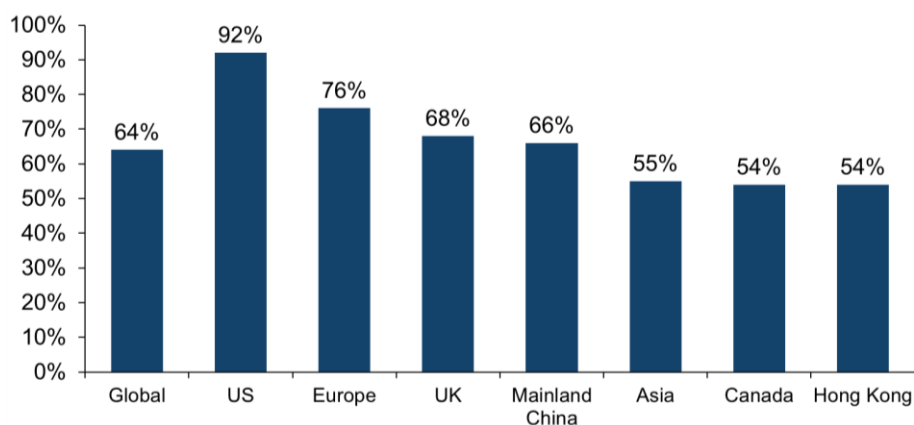
<sup>22</sup> In assessing the ESG rating of a company, the rater may evaluate the company's ESG performance against certain ESG reporting standards of their choice. These ESG reporting standards may be internally developed by the rater itself or with reference to those developed by international organisations such as Carbon Disclosure Project (CDP), Global Reporting Initiative (GRI), Sustainability Accounting Standards Board (SASB) or other market institutions. (See, for example, "Big four accounting firms reveal ESG reporting standards", published on the website of Business Green, 25 September 2020.)

<sup>23</sup> Khan, M., G. Serafeim and A. Yoon. (2015) "Corporate sustainability: First evidence on materiality", *Harvard Business School Working Paper*, No.15-073.

<sup>24</sup> Zembrowski, P., M. Leung and K. Schacht, "ESG disclosure in Asia Pacific: A review of ESG disclosure regimes for listed companies in selected markets", published on the website of CFA Institute, 21 July 2019.

Besides, as investors value more about ESG performance, they would be more willing to pay higher prices on high ESG-rated companies than on low ESG-rated but similar companies. This behaviour would further support the valuation of high ESG-rated companies. However, investors' valuation of ESG performance was found to vary across region — a survey found that institutional investors in the US and Europe see ESG of a higher value than those in Asia, Canada and Hong Kong (see Figure 18).

**Figure 18. Proportion of institutional investors in different markets viewing environmental and social issues as “very important” (2019)**



Source: “Sustainable Financing and Investing Survey 2019: Markets alert to the environment and society”, published on the website of HSBC Group, 24 September 2019.

In addition to varying investor demand, there is an uncertainty about the persistency of investor demand for high ESG-rated companies. A study<sup>25</sup> argued that the outperformance of high ESG-rated stocks may decay or vanish over time as investors may not react positively to simple ESG information (e.g. ESG ratings) in the long run. Investors may rush to buy high ESG-rated stocks and sell low ESG-rated stocks in the short and medium term but this may reverse in the long term. In contrast, the MSCI ESG Study found that the impact of ESG ratings was lower than certain traditional factors (e.g. price momentum) but the impact could last for a longer period up to several years (compared to a few months in respect of momentum factor).

### (3) Differences in ESG investment strategies

Investors may react differently to different ESG investment strategies because of different preferences in ESG issues<sup>26</sup>. To cater for different investment appetites, index providers adopt a wide range of methodologies to compile internal ESG ratings of index constituents such that the relative emphasis on the “E”, “S” and “G” components may be different. These would be one of the factors contributing to the differences in risk-return patterns across ESG indices even for those on the same underlying market. Take the US market as an example. A study<sup>27</sup> looked into five ESG equity indices on the US market and found that the returns of these ESG indices were similar to those of their parent indices, but the short-term volatilities of these ESG indices were higher than those of their parent indices because of the differences in index construction. These differences occurred in respect of constituent stocks and their number, and the relative sector weightings. Such differences may lead to a shift of investment style (e.g. value, growth, size) compared to their parent

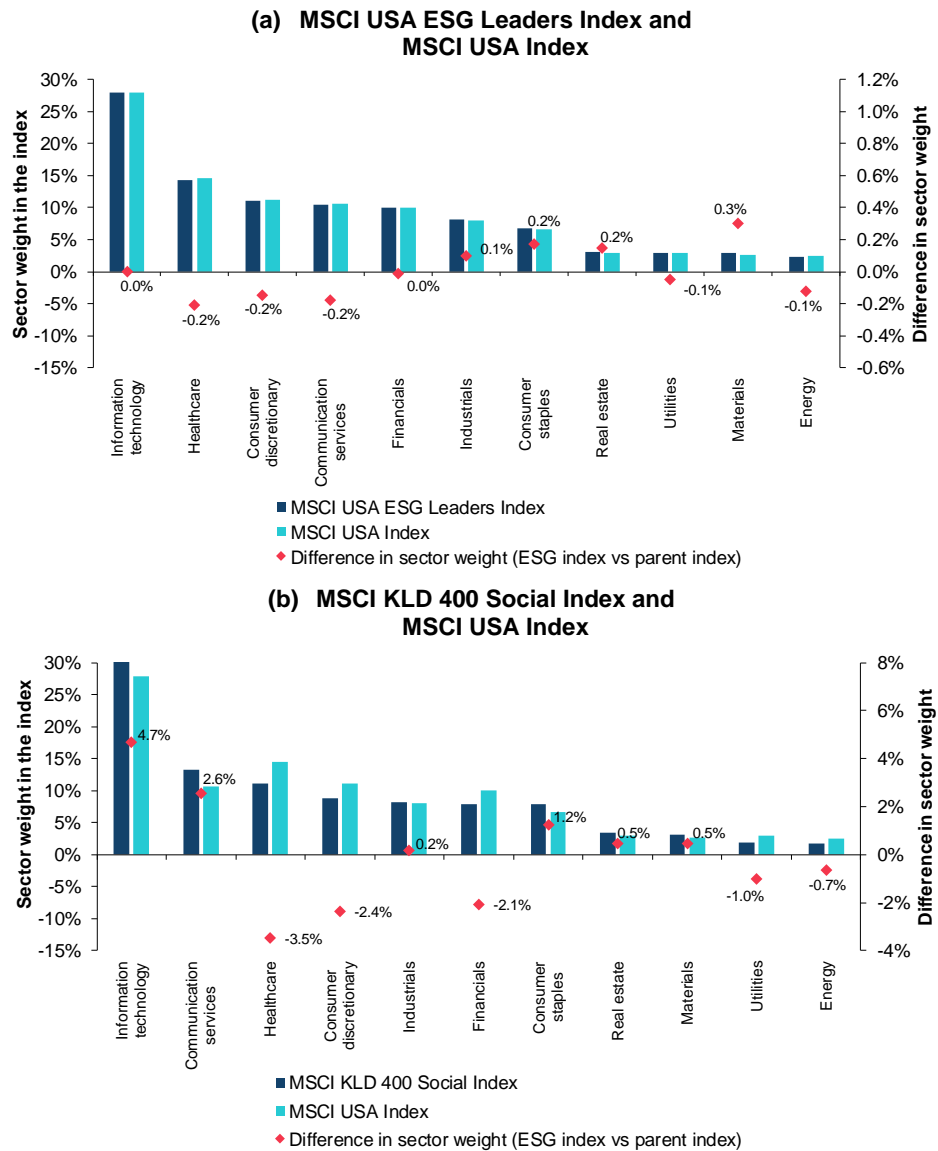
<sup>25</sup> Hvidkjær, S., “ESG investing: A literature review”, published on the website of Dansif (a forum to promote ESG investment in Denmark), September 2017.

<sup>26</sup> A survey found diverse views of consumers on climate change and consumption of tobacco and alcohol across different markets worldwide. See “Demystifying negative screens: The full implications of ESG exclusions”, published on the website of Schroders, December 2017.

<sup>27</sup> O'Brien, A., L. Liao and J. Campagna, “Responsible investing: delivering competitive performance”, published on the website of Nuveen, summer 2018.

indices. The degree of the shift in sector weights compared to the parent indices varied across ESG indices (see Figure 19) — ranging from -0.1% to 0.3% for MSCI USA ESG Leaders Index and from -3.7% to 5.8% for MSCI KLD 400 Social Index as of end-June 2020.

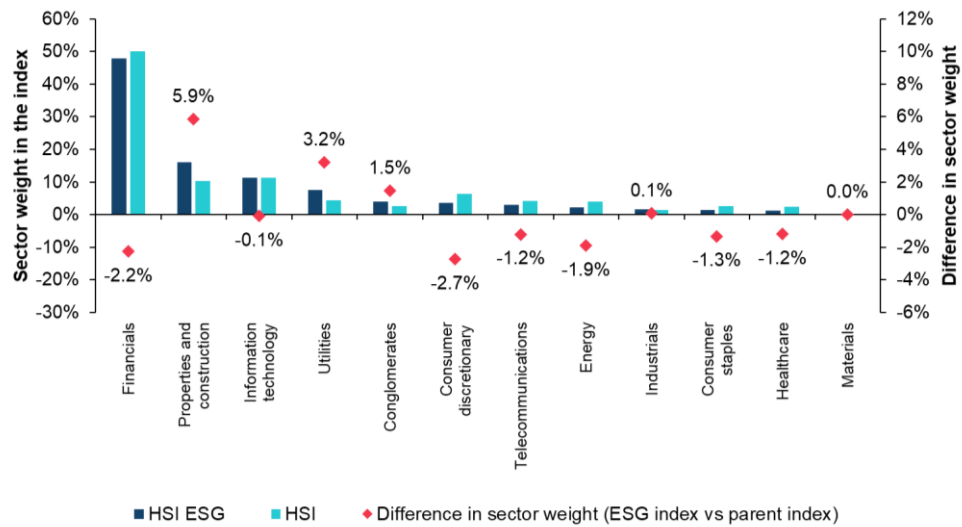
**Figure 19. Difference in sector weights for selected US ESG indices and their parent indices (June 2020)**



Source: Fact sheets of MSCI USA ESG Leaders Index, MSCI KLD 400 Social Index, MSCI USA Index and MSCI USA IMI (June 2020).

The ESG assessment may also be different between index providers across markets. This might affect the shift of sector weights in ESG indices relative to their parent indices across markets. In Hong Kong, the HSI ESG Index has a different sector composition compared to its parent index — the Hang Seng Index (HSI). The shift of sector weights ranged from -4.6% to 6.0% (see Figure 20). Compared to the ESG indices in the US which have the weights of the information technology sector higher than those in their parent indices, the HSI ESG Index has the weight of the information technology sector lower than its parent index; vice versa is true for the sector weights of utilities.

**Figure 20. Difference in sector weights between HSI ESG Index and HSI (June 2020)**



Source: Fact sheets of HSI ESG Index and HSI (June 2020).

## 5. CONCLUSION

Supported by international efforts, including the Paris Agreement to address climate change and UN SDGs, as well as the growing market demand for sustainable development, ESG investment is on the rise in the global market, particularly in equities and bonds. To meet market demand, ESG indices have been developed across world markets from their parent indices since 1990 with the incorporation of different ESG investment styles. These indices would be performance benchmarks for ESG investments and would form the underlying assets of passive investment tools like ETFs.

From the analysis results of 23 pairs of ESG equity indices and their parent indices covering global, regional and home country markets, the investment return and return volatility of ESG indices in many cases were found to be similar to those of their parent indices for different investment horizons and under different market conditions. Moreover, individual ESG indices were found to outperform their parent indices at times. Compared to their parent indices, the potentially better returns of ESG indices may owe to the better corporate financial performance and/or the higher investor valuation of constituents with better ESG performance, or investors' preferences for specific ESG investment strategies. ESG indices of different ESG investment strategies in different markets would therefore offer alternative investment choices with potentially better returns to global investors.

To conclude, empirical findings indicate that in many cases ESG indices tended to have similar, if not better, risk-return performances. This implies that investment through ESG indices does not necessarily sacrifice financial returns, and may even enjoy better returns, while pursuing ethical investment.

## APPENDIX 1. INVESTMENT STRATEGIES OF SELECTED ESG EQUITY INDICES

The two **MSCI ESG index series** under study in this paper are the ESG Screened Index series and ESG Leaders Index series. Compared to the parent indices, ESG Screened Index series exclude companies with negative environmental and social impacts (e.g. at least 5% revenue from thermal coal, oil sands, tobacco or weapons) and those which are not in compliance with the United Nations Global Compact Principles (UNGC Principles)<sup>28</sup>. ESG Leaders Index series adopt three filters to exclude companies with the lowest MSCI's internal ESG ratings (below "BB" rating in the range from AAA to CCC), a large negative ESG impact based on UN standards or a high involvement in controversial businesses. The ESG indices target 50% coverage of the free float-adjusted market capitalisation of each industry sector in the parent indices<sup>29</sup>.

The **FTSE ESG Low Carbon Emission Select Indices** for developed and emerging markets not only incorporate ESG factors by positive and negative screening, but also adopt a thematic factor (low carbon emission). Compared to parent indices, the index constituents will exclude those which are involved in controversial business activities and which are not in compliance with UNGC Principles. The weightings of constituents will be tilted based on FTSE's internal ESG scores and thematic exposure scores (e.g. carbon emission) such that the relative weightings of countries and industries will be similar to that in the parent indices<sup>30</sup>. For FTSE UK 100 Select Index, the top 100 UK-listed companies by market value with the highest FTSE's internal ESG scores will be included into the index with weightings according to their free float-adjusted market capitalisation<sup>31</sup>.

The **S&P's Global LargeMidCap ESG Index and Emerging LargeMidCap ESG Index** are constructed from the eligible constituents of LargeMidCap ESG indices for global and regional markets respectively<sup>32</sup>. These indices exclude stocks on assessment of their business activities and/or UNGC scores (compiled by a third party based on UNGC Principles) as well as the lowest quartile by S&P's internal ESG scores in each sector. The remaining stocks are selected in descending order of internal ESG score and weighted by free-float market capitalisation in order to achieve the target of 75% of eligible constituents' free float-market capitalisation in a sector. The S&P 500 ESG index is constructed in a similar way on the underlying universe of S&P 500 index constituents.

**Stoxx Europe 600 ESG-X Index** adopts negative screening on the constituents of Stoxx Europe 600 Index and excludes companies with negative environmental and social impacts (e.g. any involvement in tobacco production or at least 25% of revenue from thermal coal) and those which are not in compliance with the UNGC Principles<sup>33</sup>. **Stoxx USA 500 ESG-X Index** is constructed similarly on the constituents of Stoxx USA 500 Index. **Stoxx Europe ESG Leaders Select Index**, constituents from all Europe-listed constituents of Stoxx Global ESG Leaders Index. In selecting index constituents, stocks with the highest volatility (measured in terms of 3- or 12-month historical volatilities) are firstly excluded to retain a certain proportion of eligible stocks. From the retained pool, the 30 stocks with the highest 12-month historical dividend yields are selected to be the index constituents with weightings inversely proportional to their volatilities<sup>34</sup>.

<sup>28</sup> See "MSCI ESG Screened Indexes: An off-the-shelf approach to ESG screens", brochure published on the website of MSCI, viewed on 1 September 2020.

<sup>29</sup> See "MSCI ESG Leaders Indexes methodology", published on the website of MSCI, February 2019.

<sup>30</sup> See "Ground rules: FTSE ESG Index Series", published on the website of FTSE Russell, February 2020.

<sup>31</sup> See "Ground rules: FTSE UK 100 ESG Select Index", published on the website of FTSE Russell, February 2019.

<sup>32</sup> See "S&P ESG index series methodology", published on the website of S&P, July 2020.

<sup>33</sup> See "Stoxx Europe 600 ESG-X Index – Analysing ESG exclusions", published on the website of Stoxx, December 2018.

<sup>34</sup> See "Stoxx Europe ESG Leaders Select 30 EUR Index", webpage on the website of Stoxx, viewed on 1 September 2020.



The **HSI ESG Index** has the same list of constituents as its parent index, Hang Seng Index (HSI), but the weightings of constituents are adjusted according to the ESG scores compiled by Hong Kong Quality Assurance Authority (HKQAA) — titled upwards for constituents with relatively higher ESG scores and downwards for those with relatively lower ESG scores (capped at 10% for an index constituent)<sup>35</sup>. The HSCEI ESG Index is constructed in a similar way on the constituents of the Hang Seng Chinese Enterprises Index (HSCEI).

The construction methods of ESG equity indices under study are summarised in Table A1.

<b>Table A1. Construction methods of ESG equity indices under study</b>			
<b>ESG equity indices</b>	<b>Exclusions based on business activities or UNGC Principles</b>	<b>Inclusions based on ESG scores</b>	<b>Weight tilts based on ESG/thematic scores/volatility</b>
<b>Global</b>			
MSCI World ESG Leaders Index	✓	✓	
MSCI World ESG Screened Index	✓	✓	
FTSE Developed ESG Low Carbon Emission Select Index	✓		✓
S&P Global LargeMidCap ESG Index	✓	✓	
<b>Regional</b>			
MSCI EM ESG Leaders Index	✓	✓	
MSCI EM ESG Screened Index	✓	✓	
FTSE Emerging ESG Low Carbon Emission Select Index	✓		✓
S&P Emerging LargeMidCap ESG Index	✓	✓	
MSCI Europe ESG Leaders Index	✓	✓	
MSCI Europe ESG Screened Index	✓	✓	
Stoxx Europe 600 ESG-X Index	✓		
Stoxx Europe ESG Leaders Select 30 Index	✓		✓
MSCI EAFE ESG Leaders Index	✓	✓	
MSCI EAFE ESG Screened Index	✓	✓	
<b>Home country</b>			
MSCI USA ESG Leaders Index	✓	✓	
MSCI USA ESG Screened Index	✓	✓	
Stoxx USA 500 ESG-X Index	✓		
S&P 500 ESG Index	✓		
FTSE UK 100 ESG Select Index		✓	
MSCI Japan ESG Leaders Index	✓	✓	
MSCI Japan ESG Screened Index	✓	✓	
HSI ESG Index			✓
HSCEI ESG Index			✓

Source: Consolidated from the information available on the websites of index providers.

<sup>35</sup> See "Index methodology for managing the HSI ESG Index and HSCEI ESG Index", published on the website of Hang Seng Indexes Company Limited, September 2019.

## APPENDIX 2. ANALYSIS RESULTS ON THE PERFORMANCE OF ESG INDICES VERSUS THEIR PARENT INDICES

Table A2. <i>t</i> -test on daily returns of ESG indices and their parent indices									
Index		Average daily return of ESG index (A)	Average daily return of parent index (B)	Difference (A)-(B)	(1) <i>t</i> -stat on difference in average return	Average of daily return difference	(2) <i>t</i> -stat on daily return difference >0	No. of cases	Study period
Global	MSCI World ESG Leaders index	0.0329%	0.0332%	-0.0003%	-0.2430	-0.0003%	-0.0048	2,606	01/07/2010 - 30/06/2020
	MSCI World ESG Screened Index	0.0428%	0.0332%	0.0096%	12.6911***	0.0090%	0.2765	2,106	01/06/2012 - 30/06/2020
	FTSE Developed ESG Low Carbon Emission Select index	0.0311%	0.0329%	-0.0018%	-4.4183***	0.0110%	0.1140	1,501	22/09/2014 - 30/06/2020
	S&P Global LargeMidCap ESG index	0.0298%	0.0301%	-0.0003%	-0.3772	-0.0003%	-0.0074	2,596	01/07/2010 - 30/06/2020
	<b>All global indices</b>	<b>0.0340%</b>	<b>0.0321%</b>	<b>0.0020%</b>	<b>0.1362</b>	<b>0.0038%</b>	<b>0.0617</b>	—	—
Regional	MSCI EM ESG Leaders index	0.0294%	0.0081%	0.0213%	6.9005***	0.0213%	0.1352	2,605	01/07/2010 - 30/06/2020
	MSCI EM ESG Screened Index	0.0199%	0.0081%	0.0118%	11.6132***	0.0109%	0.2532	2,104	31/05/2012 - 30/06/2020
	FTSE Emerging ESG Low Carbon Emission Select index	0.0152%	0.0072%	0.0080%	4.8966***	0.0143%	0.1264	1,501	19/09/2014 - 30/06/2020
	S&P Emerging LargeMidCap ESG index	0.0021%	0.0086%	-0.0065%	-1.8980**	-0.0065%	-0.0372	2,603	01/07/2010 - 30/06/2020
	MSCI Europe ESG Leaders Index	0.0210%	0.0195%	0.0015%	0.1408	0.0015%	0.0028	2,568	01/07/2010 - 30/06/2020
	MSCI Europe ESG Screened Index	0.0351%	0.0195%	0.0156%	9.1653***	0.0117%	0.2014	2,071	31/05/2012 - 30/06/2020
	Stoxx Europe 600 ESG - X index	0.0195%	0.0211%	-0.0017%	-1.0101	0.0007%	0.0220	2,117	19/03/2012 - 30/06/2020
	Stoxx Europe ESG Leaders Select 30 index	0.0062%	0.0034%	0.0028%	0.2903	0.0028%	0.0057	2,560	01/07/2010 - 30/06/2020
	MSCI EAFE ESG Leaders Index	0.0183%	0.0154%	0.0029%	1.7549*	0.0029%	0.0344	2,608	01/07/2010 - 30/06/2020
	MSCI EAFE ESG Screened Index	0.0291%	0.0154%	0.0137%	11.0161***	0.0114%	0.2400	2,107	31/05/2012 - 30/06/2020
<b>All regional indices</b>	<b>0.0192%</b>	<b>0.0119%</b>	<b>0.0073%</b>	<b>0.7213</b>	<b>0.0066%</b>	<b>0.0254</b>	—	—	
Home country	MSCI US ESG Leaders Index	0.0476%	0.0503%	-0.0027%	-1.3376	-0.0027%	-0.0267	2,515	01/07/2010 - 30/06/2020
	MSCI US ESG Screened Index	0.0557%	0.0503%	0.0054%	8.7018***	0.0073%	0.1930	2,032	31/05/2012 - 30/06/2020
	Stoxx USA 500 ESG - X Index	0.0456%	0.0509%	-0.0052%	-1.1264	0.0012%	0.0248	2,064	19/03/2012 - 30/06/2020
	S&P 500 ESG index	0.0502%	0.0498%	0.0004%	0.3489	0.0004%	0.0070	2,516	01/07/2010 - 30/06/2020
	FTSE UK 100 ESG Select index	0.0012%	0.0143%	-0.0131%	-0.3782	0.0017%	0.0106	1,271	19/06/2015 - 30/06/2020
	MSCI Japan ESG Leaders Index	0.0233%	0.0323%	-0.0090%	-0.7627	-0.0090%	-0.0154	2,445	01/07/2010 - 30/06/2020
	MSCI Japan ESG Screened Index	0.0370%	0.0323%	0.0047%	0.7480	-0.0095%	-0.0168	1,974	31/05/2012 - 30/06/2020
	HSI ESG Index	0.0140%	0.0147%	-0.0006%	-0.2971	-0.0006%	-0.0060	2,464	01/07/2010 - 30/06/2020
	HSCEI ESG Index	0.0053%	0.0036%	0.0017%	0.9729	0.0017%	0.0196	2,464	01/07/2010 - 30/06/2020
	<b>All home country indices</b>	<b>0.0320%</b>	<b>0.0309%</b>	<b>0.0011%</b>	<b>0.0923</b>	<b>0.5058%</b>	<b>0.6608</b>	—	—
<b>Overall</b>	<b>0.0267%</b>	<b>0.0232%</b>	<b>0.0035%</b>	<b>0.5054</b>	<b>0.0031%</b>	<b>0.0126</b>	—	—	

Note: *t*-tests on (1) the difference between the average of daily returns of the ESG indices and that of the parent indices, and (2) the daily return difference between the ESG index and the parent index, are conducted for each ESG-parent index pair, for all ESG indices against all parent indices in each of the index categories of global, regional and home country, and for all ESG indices against all parent indices under study (overall). A *t*-statistic in blue cell means that the daily return of the ESG index(ices) is higher than that of the corresponding parent index(ices) with statistical significance. A *t*-statistic in red cell means that the daily return of the ESG index(ices) is lower than that of the corresponding parent index(ices) with statistical significance.

\*\*\* represents statistically significant difference at 0.1% level, \*\* represents statistically significant difference at 1% level; \* represents statistically significant difference at 5% level.

Source: Calculation is based on daily closings of indices obtained from Bloomberg.

Index		Standard deviation (SD) of daily returns				No. of cases	Study period
		ESG index	Parent index	Difference	F-stat		
Global	MSCI World ESG Leaders index	0.9312%	0.9406%	-0.0094%	1.0203	2,606	01/07/2010 - 30/06/2020
	MSCI World ESG Screened Index	0.8926%	0.9406%	-0.0481%	1.1106**	2,106	01/06/2012 - 30/06/2020
	FTSE Developed ESG Low Carbon Emission Select index	0.9687%	0.9300%	0.0387%	1.0849	1,501	22/09/2014 - 30/06/2020
	S&P Global LargeMidCap ESG index	0.9134%	0.9031%	0.0103%	1.0229	2,596	01/07/2010 - 30/06/2020
	<b>All global indices</b>	<b>0.9233%</b>	<b>0.9246%</b>	<b>-0.0013%</b>	<b>1.0029</b>	—	—
Regional	MSCI EM ESG Leaders index	0.9872%	0.9972%	-0.0100%	1.0204	2,605	01/07/2010 - 30/06/2020
	MSCI EM ESG Screened Index	0.9498%	0.9972%	-0.0473%	1.1021*	2,104	31/05/2012 - 30/06/2020
	FTSE Emerging ESG Low Carbon Emission Select index	0.9932%	0.9837%	0.0095%	1.0195	1,501	19/09/2014 - 30/06/2020
	S&P Emerging LargeMidCap ESG index	1.0262%	0.9682%	0.0580%	1.1234**	2,603	01/07/2010 - 30/06/2020
	MSCI Europe ESG Leaders Index	1.1805%	1.0710%	0.1095%	1.2149***	2,568	01/07/2010 - 30/06/2020
	MSCI Europe ESG Screened Index	1.0338%	1.0710%	-0.0372%	1.0733	2,071	31/05/2012 - 30/06/2020
	Stoxx Europe 600 ESG - X index	1.0435%	1.0722%	-0.0287%	1.0559	2,117	19/03/2012 - 30/06/2020
	Stoxx Europe ESG Leaders Select 30 index	0.9952%	1.2193%	-0.2241%	1.5011***	2,560	01/07/2010 - 30/06/2020
	MSCI EAFE ESG Leaders Index	0.9508%	0.9660%	-0.0152%	1.0322	2,608	01/07/2010 - 30/06/2020
	MSCI EAFE ESG Screened Index	0.8688%	0.9660%	-0.0972%	1.2363***	2,107	31/05/2012 - 30/06/2020
<b>All regional indices</b>	<b>1.0085%</b>	<b>1.0423%</b>	<b>-0.0339%</b>	<b>1.0683***</b>	—	—	
Home country	MSCI US ESG Leaders Index	1.0930%	1.0972%	-0.0042%	1.0076	2,515	01/07/2010 - 30/06/2020
	MSCI US ESG Screened Index	1.0758%	1.0972%	-0.0214%	1.0401	2,032	31/05/2012 - 30/06/2020
	Stoxx USA 500 ESG - X Index	1.0783%	1.0967%	-0.0184%	1.0344	2,064	19/03/2012 - 30/06/2020
	S&P 500 ESG index	1.0865%	1.0954%	-0.0089%	1.0165	2,516	01/07/2010 - 30/06/2020
	FTSE UK 100 ESG Select index	1.0772%	1.0307%	0.0465%	1.0922	1,271	19/06/2015 - 30/06/2020
	MSCI Japan ESG Leaders Index	1.2008%	1.2621%	-0.0613%	1.1047**	2,445	01/07/2010 - 30/06/2020
	MSCI Japan ESG Screened Index	1.1762%	1.2621%	-0.0859%	1.1514***	1,974	31/05/2012 - 30/06/2020
	HSI ESG Index	1.1310%	1.1678%	-0.0369%	1.0663	2,464	08/09/2014 - 30/06/2020
	HSCEI ESG Index	1.4262%	1.4256%	0.0005%	1.0007	2,464	08/09/2014 - 30/06/2020
	<b>All home country indices</b>	<b>1.1611%</b>	<b>1.1734%</b>	<b>-0.0124%</b>	<b>1.0214</b>	—	—
<b>Overall</b>	<b>1.0564%</b>	<b>1.0778%</b>	<b>-0.0214%</b>	<b>1.0409***</b>	—	—	

Note: The null hypothesis of the F-test is: the difference in the variance (squared SD) of daily returns is larger than zero. F-test is conducted for each ESG-parent index pair, for all ESG indices against all parent indices in each of the index(ices) categories of global, regional and home country, and for all ESG indices against all parent indices under study (overall). A F-statistic in blue cell means that the SD of the ESG index(ices) is higher than that of the corresponding parent index(ices), with statistical significance; a F-statistic in red cell means that the SD of the ESG index(ices) is lower than that of the corresponding parent index(ices) with statistical significance.

\*\*\* represents statistically significant difference at 0.1% level; \*\* represents statistically significant difference at 1% level; \* represents statistically significant difference at 5% level.

Source: Calculation is based on daily closings of indices obtained from Bloomberg.

Table A4. <i>t</i> -test on period returns of ESG indices and their parent indices for different investment horizons (base date: 30 Jun 2015)																
Index		3-month return			6-month return			1-year return			3-year return			5-year return		
		ESG index	Parent index	Diff.	ESG index	Parent index	Diff.	ESG index	Parent index	Diff.	ESG index	Parent index	Diff.	ESG index	Parent index	Diff.
Global	MSCI World ESG Leaders index	-8.40%	-8.86%	0.45%	-3.72%	-4.20%	0.47%	-3.76%	-4.75%	0.99%	18.53%	20.38%	-1.85%	28.84%	26.86%	1.98%
	MSCI World ESG Screened Index	-8.54%	-8.86%	0.31%	-3.34%	-4.20%	0.85%	-3.44%	-4.75%	1.31%	27.38%	20.38%	7.00%	41.28%	26.86%	14.42%
	FTSE Developed ESG Low Carbon Emission Select index	-8.16%	-8.86%	0.70%	-2.89%	-4.21%	1.32%	-2.98%	-4.72%	1.74%	27.99%	20.95%	7.04%	44.91%	26.77%	18.14%
	S&P Global LargeMidCap ESG index	-10.08%	-10.04%	-0.04%	-5.79%	-5.69%	-0.10%	-5.68%	-5.76%	0.07%	18.73%	19.29%	-0.57%	25.71%	24.06%	1.66%
	<b><i>t</i>-statistic for all global indices</b>			<b>1.15</b>			<b>1.06</b>			<b>1.45</b>			<b>0.61</b>			<b>1.07</b>
Regional	MSCI EM ESG Leaders index	-16.29%	-18.53%	2.25%	-15.01%	-18.32%	3.31%	-7.18%	-14.21%	7.03%	24.37%	10.00%	14.37%	27.73%	2.35%	25.38%
	MSCI EM ESG Screened Index	-17.90%	-18.53%	0.64%	-17.15%	-18.32%	1.17%	-12.38%	-14.21%	1.83%	17.99%	10.00%	7.99%	16.28%	2.35%	13.93%
	FTSE Emerging ESG Low Carbon Emission Select index	-17.96%	-19.53%	1.57%	-17.28%	-19.55%	2.26%	-10.37%	-14.53%	4.16%	17.77%	4.99%	12.79%	19.70%	-0.05%	19.75%
	S&P Emerging LargeMidCap ESG index	-19.06%	-19.64%	0.57%	-18.88%	-18.34%	-0.53%	-12.71%	-14.29%	1.58%	8.54%	9.35%	-0.81%	2.41%	3.97%	-1.57%
	MSCI Europe ESG Leaders Index	-7.94%	-9.24%	1.30%	-5.23%	-4.71%	-0.52%	-12.00%	-13.60%	1.60%	2.40%	-0.86%	3.26%	-0.40%	-7.16%	6.76%
	MSCI Europe ESG Screened Index	-8.90%	-9.24%	0.35%	-3.84%	-4.71%	0.87%	-12.01%	-13.60%	1.59%	6.05%	-0.86%	6.91%	6.07%	-7.16%	13.23%
	Stoxx Europe 600 ESG - X index	-8.70%	-8.80%	0.09%	-4.05%	-4.06%	0.02%	-14.15%	-13.49%	-0.66%	-0.77%	-0.36%	-0.41%	-6.02%	-5.50%	-0.52%
	Stoxx Europe ESG Leaders Select 30 index	-6.40%	-4.76%	-1.64%	-3.93%	0.77%	-4.70%	-11.83%	-6.99%	-4.84%	-10.30%	7.37%	-17.67%	-30.47%	-22.72%	-7.75%
	MSCI EAFE ESG Leaders Index	-10.15%	-10.75%	0.60%	-5.10%	-6.85%	1.75%	-11.12%	-12.70%	1.58%	4.83%	6.31%	-1.48%	0.59%	-3.36%	3.95%
	MSCI EAFE ESG Screened Index	-10.44%	-10.75%	0.31%	-5.91%	-6.85%	0.94%	-10.97%	-12.70%	1.73%	14.05%	6.31%	7.75%	10.69%	-3.36%	14.05%
<b><i>t</i>-statistic for all regional indices</b>			<b>0.59</b>			<b>0.21</b>			<b>0.51</b>			<b>0.36</b>			<b>0.84</b>	
Home country	MSCI US ESG Leaders Index	-6.99%	-7.21%	0.22%	-1.96%	-1.44%	-0.52%	1.12%	0.97%	0.15%	28.17%	31.13%	-2.95%	50.74%	50.69%	0.06%
	MSCI US ESG Screened Index	-6.89%	-7.21%	0.32%	-0.65%	-1.44%	0.79%	2.01%	0.97%	1.04%	37.38%	31.13%	6.25%	64.16%	50.69%	13.48%
	Stoxx USA 500 ESG - X Index	-7.49%	-7.12%	-0.37%	-1.67%	-1.33%	-0.34%	-0.44%	0.89%	-1.33%	30.76%	30.82%	-0.06%	55.42%	52.00%	3.42%
	S&P 500 ESG index	-7.68%	-6.94%	-0.75%	-2.08%	-0.93%	-1.15%	1.24%	1.73%	-0.49%	29.76%	31.76%	-2.00%	53.35%	50.27%	3.07%
	FTSE UK 100 ESG Select index	-7.12%	-7.04%	-0.07%	-5.08%	-4.27%	-0.81%	-0.36%	-0.26%	-0.11%	14.35%	17.11%	-2.77%	-3.33%	-5.39%	2.05%
	MSCI Japan ESG Leaders Index	-12.88%	-14.26%	1.38%	-3.29%	-5.98%	2.68%	-9.76%	-25.03%	15.27%	13.49%	2.72%	10.77%	11.71%	-5.27%	16.98%
	MSCI Japan ESG Screened Index	-12.26%	-14.26%	1.99%	-3.92%	-5.98%	2.06%	-9.29%	-25.03%	15.74%	20.87%	2.72%	18.14%	20.51%	-5.27%	25.78%
	HSI ESG Index	-20.21%	-20.59%	0.38%	-16.37%	-16.52%	0.15%	-20.75%	-20.78%	0.03%	6.64%	10.31%	-3.66%	-10.36%	-6.94%	-3.42%
	HSCEI ESG Index	-27.91%	-27.55%	-0.36%	-25.64%	-25.58%	-0.06%	-33.74%	-32.88%	-0.85%	-13.49%	-14.70%	1.21%	-23.51%	-24.83%	1.32%
	<b><i>t</i>-statistic for all home country indices</b>			<b>0.35</b>			<b>0.24</b>			<b>0.47</b>			<b>0.37</b>			<b>0.73</b>
<b><i>t</i>-statistic for all indices</b>			<b>0.51</b>			<b>0.27</b>			<b>0.45</b>			<b>0.39</b>			<b>0.86</b>	

Note: *t*-tests on the difference in period returns between ESG indices and their parent indices are conducted for the three index categories of global, regional and home country, and for all indices under study. None of them are found to be of statistical significance.

Source: Calculation is based on daily closings of indices obtained from Bloomberg.

Index		3-month SD			6-month SD			1-year SD			3-year SD			5-year SD		
		ESG index	Parent index	<i>F</i> -stat	ESG index	Parent index	<i>F</i> -stat	ESG index	Parent index	<i>F</i> -stat	ESG index	Parent index	<i>F</i> -stat	ESG index	Parent index	<i>F</i> -stat
Global	MSCI World ESG Leaders index	1.06%	1.09%	1.03	0.91%	0.93%	1.02	0.96%	0.98%	1.02	0.70%	0.70%	1.01	1.00%	1.01%	1.01
	MSCI World ESG Screened Index	1.08%	1.09%	1.00	0.93%	0.93%	1.01	0.97%	0.98%	1.00	0.71%	0.70%	1.00	1.01%	1.01%	1.00
	FTSE Developed ESG Low Carbon Emission Select index	1.07%	1.07%	1.00	0.92%	0.92%	1.00	0.96%	0.97%	1.01	0.70%	0.70%	1.00	1.01%	1.00%	1.01
	S&P Global LargeMidCap ESG index	1.08%	1.08%	1.01	0.93%	0.92%	1.01	0.98%	0.96%	1.01	0.70%	0.69%	1.01	0.97%	0.96%	1.01
	<b>All global indices</b>	<b>1.07%</b>	<b>1.08%</b>	<b>1.01</b>	<b>0.92%</b>	<b>0.93%</b>	<b>1.01</b>	<b>0.97%</b>	<b>0.97%</b>	<b>1.00</b>	<b>0.70%</b>	<b>0.70%</b>	<b>1.00</b>	<b>1.00%</b>	<b>0.99%</b>	<b>1.00</b>
Regional	MSCI EM ESG Leaders index	1.34%	1.36%	1.01	1.18%	1.20%	1.01	1.21%	1.22%	1.01	0.94%	0.93%	1.01	1.05%	1.04%	1.01
	MSCI EM ESG Screened Index	1.37%	1.36%	1.01	1.20%	1.20%	1.00	1.22%	1.22%	1.00	0.94%	0.93%	1.00	1.04%	1.04%	1.00
	FTSE Emerging ESG Low Carbon Emission Select index	1.38%	1.42%	1.03	1.21%	1.24%	1.02	1.24%	1.26%	1.02	0.93%	0.94%	1.01	1.01%	1.03%	1.02
	S&P Emerging LargeMidCap ESG index	1.38%	1.40%	1.01	1.23%	1.21%	1.01	1.26%	1.22%	1.03	0.93%	0.92%	1.02	1.03%	1.01%	1.02
	MSCI Europe ESG Leaders Index	1.32%	1.74%	1.31	1.12%	1.48%	1.32	1.40%	1.53%	1.09	0.99%	1.04%	1.04	1.13%	1.14%	1.01
	MSCI Europe ESG Screened Index	1.72%	1.74%	1.01	1.47%	1.48%	1.01	1.52%	1.53%	1.01	1.03%	1.04%	1.00	1.13%	1.14%	1.01
	Stoxx Europe 600 ESG - X index	1.70%	1.71%	1.00	1.45%	1.46%	1.00	1.53%	1.53%	1.00	1.03%	1.03%	1.00	1.14%	1.14%	1.00
	Stoxx Europe ESG Leaders Select 30 index	1.45%	1.65%	1.14	1.24%	1.39%	1.12	1.34%	1.49%	1.11	0.93%	1.04%	1.11	1.14%	1.29%	1.14*
	MSCI EAFE ESG Leaders Index	1.10%	1.12%	1.02	0.94%	0.97%	1.03	1.16%	1.17%	1.02	0.82%	0.82%	1.01	0.93%	0.94%	1.02
	MSCI EAFE ESG Screened Index	1.11%	1.12%	1.01	0.95%	0.97%	1.01	1.16%	1.17%	1.01	0.82%	0.82%	1.01	0.93%	0.94%	1.01
<b>All regional indices</b>	<b>1.39%</b>	<b>1.47%</b>	<b>1.06</b>	<b>1.21%</b>	<b>1.27%</b>	<b>1.05</b>	<b>1.31%</b>	<b>1.34%</b>	<b>1.03</b>	<b>0.94%</b>	<b>0.95%</b>	<b>1.02</b>	<b>1.05%</b>	<b>1.08%</b>	<b>1.02</b>	
Home country	MSCI US ESG Leaders Index	1.29%	1.31%	1.02	1.13%	1.14%	1.01	1.08%	1.08%	1.00	0.82%	0.83%	1.00	1.22%	1.22%	1.00
	MSCI US ESG Screened Index	1.32%	1.31%	1.01	1.14%	1.14%	1.00	1.09%	1.08%	1.01	0.84%	0.83%	1.02	1.23%	1.22%	1.01
	Stoxx USA 500 ESG - X Index	1.33%	1.31%	1.02	1.15%	1.14%	1.01	1.11%	1.08%	1.02	0.84%	0.82%	1.02	1.24%	1.22%	1.01
	S&P 500 ESG index	1.31%	1.31%	1.00	1.14%	1.14%	1.00	1.08%	1.08%	1.00	0.83%	0.83%	1.00	1.22%	1.22%	1.00
	FTSE UK 100 ESG Select index	1.52%	1.51%	1.01	1.29%	1.28%	1.01	1.34%	1.30%	1.03	0.94%	0.92%	1.02	1.08%	1.10%	1.03
	MSCI Japan ESG Leaders Index	1.68%	1.93%	1.14	1.46%	1.59%	1.09	1.66%	1.85%	1.11	1.20%	1.31%	1.09	1.19%	1.27%	1.07
	MSCI Japan ESG Screened Index	1.65%	1.93%	1.16	1.43%	1.59%	1.12	1.64%	1.85%	1.13	1.19%	1.31%	1.10	1.19%	1.27%	1.07
	HSI ESG Index	1.78%	1.79%	1.01	1.48%	1.51%	1.02	1.42%	1.47%	1.04	1.10%	1.13%	1.03	1.17%	1.20%	1.03
	HSCEI ESG Index	2.04%	2.09%	1.03	1.75%	1.78%	1.02	1.75%	1.77%	1.01	1.39%	1.38%	1.01	1.36%	1.35%	1.01
	<b>All home country indices</b>	<b>1.56%</b>	<b>1.63%</b>	<b>1.04</b>	<b>1.34%</b>	<b>1.38%</b>	<b>1.03</b>	<b>1.37%</b>	<b>1.43%</b>	<b>1.04</b>	<b>1.03%</b>	<b>1.06%</b>	<b>1.03</b>	<b>1.21%</b>	<b>1.23%</b>	<b>1.02</b>
<b>Overall</b>	<b>1.41%</b>	<b>1.47%</b>	<b>1.05</b>	<b>1.22%</b>	<b>1.26%</b>	<b>1.04</b>	<b>1.28%</b>	<b>1.32%</b>	<b>1.03</b>	<b>0.94%</b>	<b>0.96%</b>	<b>1.02</b>	<b>1.11%</b>	<b>1.12%</b>	<b>1.01</b>	

Note: The null hypothesis of the *F*-test is: the difference in the variance (squared SD) of daily returns is larger than zero. *F*-test is conducted for each ESG-parent index pair, for all ESG indices against all parent indices in each of the index(ices) categories of global, regional and home country, and for all ESG indices against all parent indices under study (overall). A *F*-statistic in red cell means that the SD of the ESG index is lower than that of the corresponding parent index with statistical significance.

\* represents statistically significant difference at 5% level.

Source: Calculation is based on daily closings of indices obtained from Bloomberg.

Table A6. <i>t</i> -test on period returns of ESG indices and their parent indices for different investment horizons (base date: 30 Jun 2010)																						
Index		3-month return			6-month return			1-year return			3-year return			5-year return			7-year return			10-year return		
		ESG index	Parent index	Diff.	ESG index	Parent index	Diff.	ESG index	Parent index	Diff.	ESG index	Parent index	Diff.	ESG index	Parent index	Diff.	ESG index	Parent index	Diff.	ESG index	Parent index	Diff.
Global	MSCI World ESG Leaders index	12.91%	13.24%	-0.33%	21.85%	22.93%	-1.07%	25.81%	27.84%	-2.03%	37.00%	37.67%	-0.66%	63.03%	66.67%	-3.65%	78.97%	84.04%	-5.07%	110.04%	111.44%	-1.40%
	S&P Global LargeMidCap ESG index	13.19%	13.75%	-0.57%	22.55%	23.37%	-0.82%	26.28%	27.41%	-1.13%	31.76%	32.88%	-1.12%	54.93%	58.32%	-3.39%	69.77%	73.96%	-4.19%	94.77%	96.40%	-1.64%
Regional	MSCI EM ESG Leaders index	19.76%	17.16%	2.60%	28.48%	25.42%	3.05%	32.64%	24.86%	7.77%	28.77%	2.43%	26.34%	48.32%	5.91%	-42.40%	69.44%	10.11%	59.33%	89.45%	8.40%	81.05%
	S&P Emerging LargeMidCap ESG index	13.65%	16.89%	-3.24%	20.73%	24.85%	-4.12%	14.32%	22.66%	-8.34%	-11.31%	0.43%	-11.74%	-11.08%	6.39%	-17.47%	-8.52%	9.21%	-17.73%	-8.94%	10.62%	-19.55%
	MSCI Europe ESG Leaders Index	18.42%	6.65%	11.77%	22.95%	13.01%	9.94%	30.10%	11.59%	18.51%	27.18%	15.75%	11.43%	45.41%	53.07%	-7.66%	47.23%	51.75%	-4.53%	44.82%	42.11%	2.71%
	Stoxx Europe ESG Leaders Select 30 index	5.31%	7.10%	-1.79%	7.97%	10.15%	-2.18%	11.61%	7.97%	3.64%	9.40%	-11.60%	21.00%	47.37%	16.57%	30.80%	37.48%	28.70%	8.78%	2.46%	-9.92%	12.38%
	MSCI EAFE ESG Leaders Index	15.89%	15.79%	0.10%	22.92%	23.01%	-0.09%	26.16%	26.70%	-0.54%	24.82%	21.57%	3.24%	42.16%	36.67%	5.49%	45.16%	39.69%	5.47%	42.99%	32.08%	10.91%
Home country	MSCI US ESG Leaders Index	9.71%	10.97%	-1.25%	20.23%	22.57%	-2.34%	24.90%	28.91%	-4.01%	52.05%	56.36%	-4.31%	88.73%	101.87%	-13.14%	117.14%	135.62%	-18.48%	184.51%	204.19%	-19.69%
	S&P 500 ESG index	10.82%	10.72%	0.10%	21.81%	22.02%	-0.21%	27.01%	28.13%	-1.12%	55.96%	55.84%	0.12%	98.63%	100.16%	-1.53%	129.67%	135.12%	-5.45%	204.60%	200.79%	3.80%
	MSCI Japan ESG Leaders Index	5.70%	-0.92%	6.62%	19.05%	7.75%	11.30%	12.99%	1.07%	11.91%	18.49%	34.96%	-16.47%	41.05%	91.26%	-50.21%	47.09%	83.71%	-36.62%	57.57%	81.18%	-23.61%
	HSI ESG Index	11.85%	11.07%	0.77%	15.92%	14.44%	1.48%	11.66%	11.27%	0.39%	3.66%	3.35%	0.31%	34.65%	30.41%	4.24%	30.83%	28.00%	2.83%	20.70%	21.35%	-0.65%
	HSCEI ESG Index	6.96%	8.20%	-1.24%	9.76%	10.69%	-0.94%	8.04%	9.68%	-1.64%	-17.56%	-18.79%	1.23%	16.02%	13.21%	2.81%	-6.55%	-9.60%	3.05%	-11.25%	-14.89%	3.64%
<b><i>t</i>-statistic for all indices</b>				<b>0.27</b>			<b>0.24</b>			<b>0.26</b>			<b>0.20</b>			<b>-0.04</b>			<b>-0.05</b>			<b>0.15</b>

Note: *t*-tests on the difference in period returns between ESG indices and their parent indices are conducted for all indices under study for each investment horizon. None of them are found to be of statistical significance.

Source: Calculation is based on daily closings of indices obtained from Bloomberg.

Index		3-month SD			6-month SD			1-year SD			3-year SD			5-year SD			7-year SD			10-year SD		
		ESG index	Parent index	<i>F</i> -stat	ESG index	Parent index	<i>F</i> -stat	ESG index	Parent index	<i>F</i> -stat	ESG index	Parent index	<i>F</i> -stat	ESG index	Parent index	<i>F</i> -stat	ESG index	Parent index	<i>F</i> -stat	ESG index	Parent index	<i>F</i> -stat
Global	MSCI World ESG Leaders index	1.01%	0.98%	1.03	0.90%	0.89%	1.01	0.85%	0.85%	1.00	1.00%	1.01%	1.01	0.85%	0.86%	1.01	0.83%	0.84%	1.01	0.93%	0.94%	1.01
	S&P Global LargeMidCap ESG index	0.96%	0.93%	1.04	0.89%	0.86%	1.03	0.84%	0.82%	1.02	1.00%	0.98%	1.02	0.85%	0.84%	1.02	0.83%	0.81%	1.02	0.91%	0.90%	1.01
	<b>All global indices</b>	<b>0.98%</b>	<b>0.95%</b>	<b>1.03</b>	<b>0.89%</b>	<b>0.87%</b>	<b>1.01</b>	<b>0.85%</b>	<b>0.84%</b>	<b>1.00</b>	<b>1.00%</b>	<b>0.99%</b>	<b>1.01</b>	<b>0.85%</b>	<b>0.85%</b>	<b>1.00</b>	<b>0.83%</b>	<b>0.83%</b>	<b>1.00</b>	<b>0.92%</b>	<b>0.92%</b>	<b>1.00</b>
Regional	MSCI EM ESG Leaders index	0.74%	0.78%	1.05	0.78%	0.82%	1.05	0.83%	0.86%	1.03	1.02%	1.07%	1.05	0.92%	0.95%	1.03	0.95%	0.97%	1.02	0.99%	1.00%	1.01
	S&P Emerging LargeMidCap ESG index	0.90%	0.76%	1.17	0.92%	0.80%	1.15	0.92%	0.83%	1.12	1.13%	1.02%	1.10	1.02%	0.93%	1.11*	1.02%	0.94%	1.08*	1.03%	0.97%	1.06
	MSCI Europe ESG Leaders Index	1.33%	1.06%	1.26	1.28%	0.92%	1.39*	1.24%	0.88%	1.41**	1.44%	1.09%	1.32***	1.23%	0.99%	1.24***	1.20%	1.05%	1.14**	1.18%	1.07%	1.10**
	Stoxx Europe ESG Leaders Select 30 index	0.74%	1.05%	1.41	0.68%	0.95%	1.40*	0.68%	0.94%	1.37**	0.87%	1.26%	1.44***	0.83%	1.14%	1.38***	0.90%	1.15%	1.29***	0.99%	1.22%	1.23***
	MSCI EAFE ESG Leaders Index	1.10%	1.05%	1.04	1.05%	1.03%	1.02	1.03%	1.02%	1.00	1.14%	1.15%	1.02	0.97%	0.99%	1.02	0.96%	0.97%	1.01	0.95%	0.97%	1.02
	<b>All regional indices</b>	<b>0.99%</b>	<b>0.95%</b>	<b>1.04</b>	<b>0.96%</b>	<b>0.91%</b>	<b>1.06</b>	<b>0.96%</b>	<b>0.91%</b>	<b>1.06</b>	<b>1.13%</b>	<b>1.12%</b>	<b>1.01</b>	<b>1.00%</b>	<b>1.00%</b>	<b>1.00</b>	<b>1.01%</b>	<b>1.02%</b>	<b>1.01</b>	<b>1.03%</b>	<b>1.05%</b>	<b>1.02</b>
Home country	MSCI US ESG Leaders Index	1.15%	1.14%	1.01	0.96%	0.96%	1.00	0.88%	0.89%	1.01	1.07%	1.09%	1.02	0.94%	0.96%	1.01	0.92%	0.93%	1.01	1.09%	1.10%	1.00
	S&P 500 ESG index	1.11%	1.14%	1.03	0.94%	0.96%	1.02	0.87%	0.89%	1.02	1.06%	1.09%	1.02	0.93%	0.95%	1.02	0.91%	0.92%	1.02	1.09%	1.10%	1.01
	MSCI Japan ESG Leaders Index	1.24%	1.20%	1.03	1.11%	1.06%	1.05	1.37%	1.35%	1.01	1.30%	1.33%	1.02	1.21%	1.25%	1.04	1.25%	1.32%	1.06	1.20%	1.26%	1.05
	HSI ESG Index	0.78%	0.81%	1.04	0.93%	0.96%	1.03	0.96%	0.99%	1.03	1.19%	1.25%	1.05	1.09%	1.14%	1.04	1.11%	1.15%	1.04	1.13%	1.17%	1.03
	HSCEI ESG Index	1.06%	1.09%	1.02	1.19%	1.22%	1.02	1.18%	1.20%	1.01	1.58%	1.59%	1.01	1.49%	1.50%	1.00	1.47%	1.48%	1.00	1.43%	1.43%	1.00
	<b>All home country indices</b>	<b>1.07%</b>	<b>1.08%</b>	<b>1.01</b>	<b>1.03%</b>	<b>1.03%</b>	<b>1.00</b>	<b>1.07%</b>	<b>1.08%</b>	<b>1.01</b>	<b>1.25%</b>	<b>1.28%</b>	<b>1.02</b>	<b>1.15%</b>	<b>1.18%</b>	<b>1.02</b>	<b>1.15%</b>	<b>1.18%</b>	<b>1.03</b>	<b>1.19%</b>	<b>1.21%</b>	<b>1.02</b>
<b>Overall average</b>		<b>1.02%</b>	<b>1.00%</b>	<b>1.02</b>	<b>0.98%</b>	<b>0.95%</b>	<b>1.03</b>	<b>0.99%</b>	<b>0.97%</b>	<b>1.02</b>	<b>1.16%</b>	<b>1.17%</b>	<b>1.01</b>	<b>1.04%</b>	<b>1.05%</b>	<b>1.01</b>	<b>1.04%</b>	<b>1.06%</b>	<b>1.02</b>	<b>1.08%</b>	<b>1.10%</b>	<b>1.02</b>

Note: The null hypothesis of the *F*-test is: the difference in the variance (squared SD) of daily returns is larger than zero. *F*-test is conducted for each ESG-parent index pair, for all ESG indices against all parent indices in each of the index(ices) categories of global, regional and home country, and for all ESG indices against all parent indices under study (overall). A *F*-statistic in blue cell means that the SD of the ESG index(ices) is higher than that of the corresponding parent index(ices), with statistical significance; a *F*-statistic in red cell means that the SD of the ESG index(ices) is lower than that of the corresponding parent index(ices) with statistical significance.

\*\*\* represents statistically significant difference at 0.1% level; \*\* represents statistically significant difference at 1% level; \* represents statistically significant difference at 5% level.

Source: Calculation is based on daily closings of indices obtained from Bloomberg.

Table A8. <i>t</i> -test on period returns of ESG indices and their parent indices during selected bull and bear market periods																			
Index		Period return in bull market periods									Period return in bear market periods								
		16/10/2014 - 21/05/2015 [P1: 156 days]			11/02/2016 - 26/01/2018 [P2: 512 days]			25/12/2018 - 12/02/2020 [P3: 297 days]			21/05/2015 - 11/02/2016 [P4: 191 days]			26/01/2018 - 25/12/2018 [P5: 238 days]			12/02/2020 - 23/03/2020 [P6: 29 days]		
		ESG index	Parent index	Diff.	ESG index	Parent index	Diff.	ESG index	Parent index	Diff.	ESG index	Parent index	Diff.	ESG index	Parent index	Diff.	ESG index	Parent index	Diff.
Global	MSCI World ESG Leaders index	12.79%	13.70%	-0.91%	49.83%	53.10%	-3.27%	37.08%	35.63%	1.45%	-18.21%	-18.88%	0.67%	-19.27%	-20.17%	0.90%	-33.90%	-34.20%	0.30%
	MSCI World ESG Screened Index	16.05%	13.70%	2.34%	59.06%	53.10%	5.95%	39.42%	35.63%	3.79%	-17.89%	-18.88%	1.00%	-18.83%	-20.17%	1.34%	-33.69%	-34.20%	0.51%
	FTSE Developed ESG Low Carbon Emission Select index	15.86%	13.58%	2.28%	60.08%	54.07%	6.01%	40.05%	34.98%	5.06%	-16.96%	-18.84%	1.87%	-17.87%	-20.37%	2.51%	-32.82%	-34.18%	1.37%
	S&P Global LargeMidCap ESG index	12.20%	12.80%	-0.61%	55.07%	55.76%	-0.70%	34.23%	32.85%	1.39%	-20.01%	-20.10%	0.09%	-20.11%	-20.68%	0.57%	-33.45%	-33.63%	0.18%
	<b><i>t</i>-statistic for all global indices</b>			<b>0.44</b>			<b>0.42</b>			<b>1.61</b>			<b>1.22</b>			<b>1.57</b>			<b>1.10</b>
Regional	MSCI EM ESG Leaders index	9.07%	6.39%	2.67%	89.45%	78.54%	10.91%	22.19%	16.78%	5.42%	-25.19%	-30.95%	5.77%	-24.01%	-25.36%	1.34%	-30.63%	-31.68%	1.04%
	MSCI EM ESG Screened Index	8.51%	6.39%	2.11%	86.69%	78.54%	8.15%	21.05%	16.78%	4.28%	-29.39%	-30.95%	1.56%	-24.23%	-25.36%	1.13%	-30.91%	-31.68%	0.77%
	FTSE Emerging ESG Low Carbon Emission Select index	9.76%	7.35%	2.42%	86.96%	74.81%	12.16%	19.88%	18.14%	1.74%	-28.88%	-31.88%	3.00%	-21.28%	-24.97%	3.69%	-29.69%	-31.21%	1.52%
	S&P Emerging LargeMidCap ESG Index	3.95%	6.87%	-2.92%	78.79%	79.42%	-0.63%	16.29%	17.70%	-1.41%	-30.83%	-31.28%	0.45%	-23.33%	-24.43%	1.10%	-32.19%	-30.93%	-1.26%
	MSCI Europe ESG Leaders Index	15.92%	30.73%	-14.81%	38.90%	32.12%	6.77%	24.53%	27.40%	-2.88%	-22.38%	-26.11%	3.72%	-21.79%	-16.11%	-5.68%	-33.99%	-34.88%	0.89%
	MSCI Europe ESG Screened Index	34.74%	30.73%	4.01%	37.97%	32.12%	5.84%	31.53%	27.40%	4.13%	-25.03%	-26.11%	1.07%	-14.11%	-16.11%	2.00%	-33.85%	-34.88%	1.03%
	Stoxx Europe 600 ESG - X index	32.46%	31.56%	0.90%	31.91%	31.95%	-0.04%	28.14%	28.61%	-0.47%	-25.69%	-25.57%	-0.12%	-16.53%	-16.31%	-0.23%	-34.64%	-34.96%	0.32%
	Stoxx Europe ESG Leaders Select 30 index	25.06%	23.14%	1.92%	17.01%	35.75%	-18.74%	13.56%	17.39%	-3.83%	-22.43%	-18.28%	-4.16%	-14.70%	-17.96%	3.25%	-36.47%	-41.18%	4.71%
	MSCI EAFE ESG Leaders Index	15.08%	13.63%	1.44%	41.03%	46.08%	-5.05%	24.17%	21.29%	2.88%	-21.20%	-23.25%	2.05%	-22.47%	-22.94%	0.47%	-32.74%	-33.67%	0.93%
	MSCI EAFE ESG Screened Index	16.51%	13.63%	2.87%	53.42%	46.08%	7.34%	25.78%	21.29%	4.49%	-22.22%	-23.25%	1.03%	-21.40%	-22.94%	1.54%	-32.89%	-33.67%	0.78%
<b><i>t</i>-statistic for all regional indices</b>			<b>0.01</b>			<b>0.29</b>			<b>0.43</b>			<b>0.55</b>			<b>0.33</b>			<b>0.73</b>	
Home country	MSCI US ESG Leaders Index	12.19%	14.72%	-2.52%	54.94%	57.68%	-2.74%	45.31%	44.38%	0.93%	-15.42%	-15.06%	-0.36%	-17.06%	-18.27%	1.21%	-34.08%	-34.05%	-0.03%
	MSCI US ESG Screened Index	16.63%	14.72%	1.92%	62.58%	57.68%	4.90%	47.32%	44.38%	2.94%	-14.12%	-15.06%	0.94%	-17.17%	-18.27%	1.10%	-33.70%	-34.05%	0.35%
	Stoxx USA 500 ESG - X Index	15.86%	14.67%	1.18%	57.45%	57.20%	0.25%	46.60%	44.90%	1.69%	-15.54%	-14.81%	-0.73%	-18.02%	-18.37%	0.35%	-33.28%	-33.73%	0.44%
	S&P 500 ESG index	14.16%	14.39%	-0.23%	55.86%	57.07%	-1.21%	46.35%	43.74%	2.61%	-14.83%	-14.16%	-0.67%	-17.63%	-18.16%	0.54%	-33.12%	-33.79%	0.67%
	FTSE UK 100 ESG Select index	—	—	—	38.04%	38.44%	-0.40%	12.72%	12.69%	0.03%	—	—	—	-13.05%	-12.78%	-0.28%	-30.94%	-33.72%	2.78%
	MSCI Japan ESG Leaders Index	20.62%	37.84%	-17.22%	48.21%	45.78%	2.44%	25.68%	22.50%	3.18%	-16.99%	-24.52%	7.53%	-24.76%	-23.65%	-1.11%	-24.93%	-25.31%	0.38%
	MSCI Japan ESG Screened Index	21.64%	37.84%	-16.20%	59.05%	45.78%	13.27%	27.54%	22.50%	5.04%	-18.28%	-24.52%	6.25%	-24.32%	-23.65%	-0.67%	-26.37%	-25.31%	-1.06%
	HSI ESG Index	23.37%	20.19%	3.18%	75.05%	78.77%	-3.72%	7.30%	8.47%	-1.17%	-32.71%	-32.62%	-0.09%	-22.78%	-22.63%	-0.15%	-22.64%	-22.02%	-0.62%
	HSCEI ESG Index	39.47%	38.75%	0.72%	83.88%	79.21%	4.66%	9.35%	8.17%	1.19%	-45.50%	-45.81%	0.31%	-26.97%	-26.68%	-0.30%	-20.03%	-19.60%	-0.43%
	<b><i>t</i>-statistic for all home country indices</b>			<b>-0.44</b>			<b>0.37</b>			<b>0.99</b>			<b>0.50</b>			<b>0.10</b>			<b>0.25</b>
<b><i>t</i>-statistic for all indices</b>			<b>-0.18</b>			<b>0.33</b>			<b>0.72</b>			<b>0.55</b>			<b>0.35</b>			<b>0.55</b>	

Note: *t*-tests on the difference in period returns between ESG indices and their parent indices are conducted for the three index categories of global, regional and home country, and for all indices under study. None of them are found to be of statistical significance.

Source: Calculation is based on daily closings of indices obtained from Bloomberg.



Index		SD of daily returns in bull market periods									SD of daily returns in bear market periods								
		16/10/2014 - 21/05/2015 [P1: 156 days]			11/02/2016 - 26/01/2018 [P2: 512 days]			25/12/2018 - 12/02/2020 [P3: 297 days]			21/05/2015 - 11/02/2016 [P4: 191 days]			26/01/2018 - 25/12/2018 [P5: 238 days]			12/02/2020 - 23/03/2020 [P6: 29 days]		
		ESG index	Parent index	<i>F</i> -stat	ESG index	Parent index	<i>F</i> -stat	ESG index	Parent index	<i>F</i> -stat	ESG index	Parent index	<i>F</i> -stat	ESG index	Parent index	<i>F</i> -stat	ESG index	Parent index	<i>F</i> -stat
Global	MSCI World ESG Leaders index	0.63%	0.65%	1.03	0.56%	0.56%	1.00	0.64%	0.65%	1.02	0.93%	0.95%	1.02	0.78%	0.79%	1.02	3.60%	3.63%	1.01
	MSCI World ESG Screened Index	0.64%	0.65%	1.01	0.56%	0.56%	1.01	0.66%	0.65%	1.02	0.95%	0.95%	1.01	0.81%	0.79%	1.02	3.63%	3.63%	1.00
	FTSE Developed ESG Low Carbon Emission Select index	0.63%	0.63%	1.01	0.56%	0.56%	1.00	0.66%	0.64%	1.02	0.93%	0.94%	1.01	0.79%	0.78%	1.01	3.69%	3.54%	1.04
	S&P Global LargeMidCap ESG index	0.64%	0.62%	1.03	0.56%	0.55%	1.01	0.62%	0.62%	1.00	0.95%	0.94%	1.01	0.77%	0.77%	1.00	3.40%	3.36%	1.01
	<b>All global indices</b>	<b>0.63%</b>	<b>0.64%</b>	<b>1.01</b>	<b>0.56%</b>	<b>0.56%</b>	<b>1.01</b>	<b>0.65%</b>	<b>0.64%</b>	<b>1.01</b>	<b>0.94%</b>	<b>0.94%</b>	<b>1.01</b>	<b>0.78%</b>	<b>0.78%</b>	<b>1.00</b>	<b>3.53%</b>	<b>3.49%</b>	<b>1.01</b>
Regional	MSCI EM ESG Leaders index	0.76%	0.77%	1.01	0.79%	0.78%	1.02	0.76%	0.75%	1.01	1.20%	1.22%	1.01	1.04%	0.98%	1.06	2.69%	2.71%	1.01
	MSCI EM ESG Screened Index	0.77%	0.77%	1.00	0.78%	0.78%	1.00	0.76%	0.75%	1.01	1.22%	1.22%	1.00	0.99%	0.98%	1.01	2.67%	2.71%	1.02
	FTSE Emerging ESG Low Carbon Emission Select index	0.86%	0.84%	1.02	0.79%	0.78%	1.01	0.73%	0.72%	1.01	1.23%	1.26%	1.02	0.92%	0.95%	1.04	2.60%	2.71%	1.04
	S&P Emerging LargeMidCap ESG Index	0.92%	0.81%	1.14	0.78%	0.75%	1.03	0.73%	0.71%	1.02	1.24%	1.22%	1.02	0.92%	0.94%	1.03	2.74%	2.67%	1.03
	MSCI Europe ESG Leaders Index	0.87%	1.01%	1.16	0.94%	0.87%	1.09	0.73%	0.72%	1.01	1.22%	1.48%	1.22	0.85%	0.79%	1.07	3.05%	3.15%	1.03
	MSCI Europe ESG Screened Index	1.00%	1.01%	1.01	0.87%	0.87%	1.00	0.73%	0.72%	1.00	1.48%	1.48%	1.00	0.79%	0.79%	1.01	3.10%	3.15%	1.02
	Stoxx Europe 600 ESG - X index	1.01%	1.01%	1.00	0.87%	0.87%	1.00	0.74%	0.73%	1.01	1.47%	1.47%	1.00	0.80%	0.79%	1.00	3.13%	3.13%	1.00
	Stoxx Europe ESG Leaders Select 30 index	0.94%	1.10%	1.16	0.81%	0.93%	1.15	0.65%	0.77%	1.18	1.28%	1.42%	1.11	0.76%	0.76%	1.01	3.70%	4.04%	1.09
	MSCI EAFE ESG Leaders Index	0.68%	0.70%	1.03	0.76%	0.76%	1.00	0.56%	0.56%	1.01	1.01%	1.03%	1.02	0.72%	0.73%	1.02	2.40%	2.44%	1.02
	MSCI EAFE ESG Screened Index	0.69%	0.70%	1.02	0.76%	0.76%	1.01	0.56%	0.56%	1.01	1.02%	1.03%	1.01	0.73%	0.73%	1.00	2.36%	2.44%	1.03
	<b>All regional indices</b>	<b>0.86%</b>	<b>0.88%</b>	<b>1.03</b>	<b>0.82%</b>	<b>0.82%</b>	<b>1.00</b>	<b>0.70%</b>	<b>0.70%</b>	<b>1.01</b>	<b>1.24%</b>	<b>1.29%</b>	<b>1.04</b>	<b>0.86%</b>	<b>0.85%</b>	<b>1.01</b>	<b>2.83%</b>	<b>2.91%</b>	<b>1.03</b>
Home country	MSCI US ESG Leaders Index	0.77%	0.78%	1.01	0.59%	0.58%	1.01	0.82%	0.83%	1.01	1.12%	1.13%	1.01	1.05%	1.06%	1.01	4.59%	4.59%	1.00
	MSCI US ESG Screened Index	0.79%	0.78%	1.00	0.60%	0.58%	1.03	0.85%	0.83%	1.02	1.13%	1.13%	1.00	1.08%	1.06%	1.02	4.60%	4.59%	1.00
	Stoxx USA 500 ESG - X Index	0.80%	0.79%	1.01	0.60%	0.58%	1.04	0.86%	0.83%	1.03	1.14%	1.12%	1.02	1.08%	1.06%	1.02	4.62%	4.60%	1.00
	S&P 500 ESG index	0.79%	0.79%	1.00	0.58%	0.58%	1.00	0.83%	0.83%	1.00	1.13%	1.13%	1.00	1.06%	1.06%	1.01	4.63%	4.60%	1.01
	FTSE UK 100 ESG Select index	—	—	—	0.79%	0.77%	1.03	0.76%	0.76%	1.00	—	—	—	0.80%	0.81%	1.01	2.86%	2.99%	1.04
	MSCI Japan ESG Leaders Index	1.08%	1.11%	1.03	1.08%	1.17%	1.08	0.91%	0.91%	1.00	1.52%	1.68%	1.11	1.05%	1.08%	1.03	1.67%	1.95%	1.17
	MSCI Japan ESG Screened Index	1.08%	1.11%	1.03	1.08%	1.17%	1.08	0.89%	0.91%	1.02	1.49%	1.68%	1.13	1.03%	1.08%	1.05	1.70%	1.95%	1.15
	HSI ESG Index	1.02%	0.99%	1.04	0.88%	0.90%	1.03	1.02%	1.03%	1.02	1.49%	1.53%	1.03	1.22%	1.27%	1.04	2.07%	2.17%	1.05
	HSCEI ESG Index	1.59%	1.57%	1.01	1.16%	1.14%	1.02	1.06%	1.06%	1.00	1.85%	1.88%	1.01	1.39%	1.37%	1.02	2.42%	2.39%	1.01
	<b>All home country indices</b>	<b>1.02%</b>	<b>1.01%</b>	<b>1.01</b>	<b>0.85%</b>	<b>0.87%</b>	<b>1.02</b>	<b>0.89%</b>	<b>0.89%</b>	<b>1.00</b>	<b>1.38%</b>	<b>1.42%</b>	<b>1.03</b>	<b>1.09%</b>	<b>1.10%</b>	<b>1.01</b>	<b>3.43%</b>	<b>3.47%</b>	<b>1.01</b>
<b>Overall</b>	<b>0.88%</b>	<b>0.89%</b>	<b>1.01</b>	<b>0.79%</b>	<b>0.80%</b>	<b>1.01</b>	<b>0.77%</b>	<b>0.77%</b>	<b>1.00</b>	<b>1.25%</b>	<b>1.29%</b>	<b>1.03</b>	<b>0.94%</b>	<b>0.94%</b>	<b>1.00</b>	<b>3.20%</b>	<b>3.24%</b>	<b>1.01</b>	

Note: The null hypothesis of the *F*-test is: the difference in the variance (squared SD) of daily returns is larger than zero. *F*-test is conducted for each ESG-parent index pair, for all ESG indices against all parent indices in each of the index(ices) categories of global, regional and home country, and for all ESG indices against all parent indices under study (overall). None of them are found to be of statistical significance.

Source: Calculation is based on daily closings of indices obtained from Bloomberg.

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