

## ESG - Environmental, Social & Governance Investing

### A Quantitative Perspective of how ESG can Enhance your Portfolio

In this note, we take a look at the merits of ESG Investing. We have divided the note into three sections discussing the big picture trends in SRI, ESG ratings and scores, and ESG integration to existing factors. Our key takeaway is that ESG can enhance your portfolio by reducing volatility, increasing Sharpe ratios and limiting drawdowns. These points suggest both quant and discretionary managers should take a closer look.

- **ESG – a measurement system of potential inequalities**

Environmental, Social and Governance (ESG) investing has gained popularity over recent years, partly as a growing number of investors have focused on the ethical impact behind their investment decisions. We believe that the evolution within ESG today means it offers a measurement system to capture potential inequalities and, equally, manage reputational and operational risk that may impact long-term corporate profitability. The growth in ESG investing is being fuelled by the sharp rise in AuM, robust performance, new sources of information, availability of investment product and the growing research that emphasises enhanced risk adjusted returns. Globally, there are believed to be about 350 equity funds classified as ESG with a combined AuM of US\$111bn. The bulk of these funds are domiciled in the USA or Europe.

- **ESG – Environmental is strongest in USA & Japan, Governance in Europe**

The return profile for MSCI ESG indices appears no worse than investing in MSCI regional benchmarks. Yet, the use of ESG ratings and scores suggests high scores and ratings offer better risk-adjusted returns, often with lower volatility, and muted drawdowns. Breaking down the components of ESG suggests Environmental factors are the strongest performers in the USA and Japan, while, in Europe, Governance factors provide much better risk/reward. Although the evidence is not conclusive across the regions, we see some merit in combining high and low ESG scores with the Momentum of the Score. High and rising ESG factors have an increasing probability of outperforming Low and falling ESG factors. This method of ESG 'integration' is shown to be more relevant than the use of ESG 'exclusions'. For ESG stock screens see Pages 23-25.

- **Size, Value and Quality help to explain much of what is ESG**

There appears to be growing evidence that E, S and G factors may have some merit as standalone alpha sources, particularly from the point of view of portfolio construction. However, it is noteworthy that traditional quantitative styles like Size, Value and Quality go a long way to explain high factor loading or factor contributions to ESG.

- **ESG can enhance your portfolio returns**

It may still take much convincing before ESG factors are considered as standalone alpha sources. However, our research highlights that the key attributes of ESG Investing lie within portfolio construction. While the return profile may not be the selling point, not having ESG factors in your portfolio significantly increases volatility, lowers potential Sharpe ratios and leads to a higher probability of suffering larger drawdowns during times of market stress. For example, the table on the front page shows that ESG can enhance a traditional Quality, high Dividend Yield, price Momentum or low Volatility strategy. For stocks screens that we believe can enhance traditional factor portfolios see Page 39.

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#### European Equity Quantitative Strategy

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**Table 1: ESG Combinations (ACWI)**

Factor	Returns	Sharpe
Quality	1.4%	0.20
ESG + Quality	2.3%	0.53
Div. Yield	0.7%	0.04
ESG + Div. Yield	2.5%	0.27
PMOM	(2.3%)	(0.16)
ESG + PMOM	1.7%	0.31
Low Vol	0.8%	0.07
ESG + Low Vol	3.4%	0.68

Source: J.P. Morgan QDS

\* Ann. Excess return between 2007-2016

**See page 47 for analyst certification and important disclosures, including non-US analyst disclosures.**

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## Introduction

In this research note, we take a look at the merits of ESG (Environmental, Social and Governance) investing through a quantitative lens to gain a better perspective of how ESG investing may potentially enhance equity portfolios.

Our note is divided into three sections: 1) aims to address the *'big picture'* trends in ESG investing; including what is ESG? Why is it growing in importance?, and, How are investors using ESG?. We then discuss 2) *ESG ratings and scores* from third party data providers and discuss how they compare, what are the definitions used, and how do the components of ESG interplay with one another. Finally, 3) we use the approach of *ESG integration* to better understand how traditional quant factors respond and are impacted by ESG factors in an equity portfolio.

ESG, which is a branch of Socially Responsible Investing (SRI) has become a major topic of discussion in recent years as market participants look towards more long-term, sustainable and socially responsible approaches to investing. There is a growing understanding that all investments have an impact. For example, capital investment can finance either socially desirable or socially destructive businesses or outcomes. The ways we spend and invest can dramatically influence the consciousness of society.

- ***“Conscience is a man’s compass”*** – Vincent Van Gogh – Artist/ Painter

Since the turn of the millennium and more recently, the world appears to have increased its commitment to ensuring environmental sustainability; curbing ‘climate change’ risks is now firmly on the political agenda, and recent socio-economic trends are becoming increasingly focused on economic growth that benefits all in society. We are starting to see exponential growth in Impact investing, which is defined as “direct investments made into companies, organisations and funds with the intention to generate social and environment impact alongside a financial return”<sup>1</sup>. This definition highlights the key aspirations of ESG integration: generating both financial and measurable societal benefits. How does ESG aim to achieve this? The driving principle is to minimise company specific exposure associated with ESG issues. The challenge is thus to integrate a more wholesome set of ideals into the investment process without giving up returns.

There have been several studies on ESG/SRI based investing over the years. Initial ideas focused on the concept of *negative screening* whereby perceived *sinful* stocks/industries etc. would be excluded in stock screening. Found to be detracting from risk-adjusted performance<sup>2</sup> these efforts quickly led to more holistic measures along ESG lines. Simultaneously, the availability and quality of ESG metrics and reporting have increased, enabling institutional investors to overlay discretionary and more systematic ESG views on their holdings. Equipped with a potential new *toolkit* many investors are now focused on the impact of ESG factors on risk-adjusted performance. In this note, we look at the origins of ESG strategies, the current landscape, their overlap with traditional risk premia, inclusion within a multi-factor framework and essentially investigate whether ESG can add alpha?

In this research note –

- 1) Big Picture – ESG,
- 2) ESG Ratings & Scores
- 3) ESG Integration

We look at the

- ESG strategies, (focusing on the MSCI ESG dataset),
- their overlap with traditional risk premia,
- inclusion within a multi-factor framework
- and essentially investigate whether ESG can add alpha?

<sup>1</sup> This is the Global Impact Investing Network’s (a non-profit organisation aiming to increase the scale and effectiveness of impact investing) definition of impact investing. Can be found at <https://thegiin.org/impact-investing>

<sup>2</sup> See e.g. [Hong and Kacperczyk \(2008\)](#) who found US sin stocks gained on average 26bps a month overall a traditional 4-factor model, and more recently [Adamsson and Hoepner \(2015\)](#) who though finding the *sin stock premium* found it can be explained by a small cap bias.

## The Big Picture – What is ESG?

### More than just an Ethical way of Investing

Environmental, Social and Governance (ESG) investing has gained popularity in recent years partly as a growing number of investors have focused on the ethical impact behind their investment decisions. Moreover, the performance of ESG factors has been robust since the global financial crisis, at least matching the broader equity market and, in many cases, delivering positive excess returns.

Yet, our discussions with a broad spectrum of global equity investors suggest there remains a high level of skepticism. Many report there is limited alpha, others believe it looks like another proxy for high quality stocks, and some highlight the significant risk associated with excluding ‘sinful’ stocks or sectors.

ESG offers a measurement system to capture potential inequalities

We will discuss these points as we journey through this research report, but we believe it is important to highlight early on, that ESG may have its roots in ethical investing, but the evolution within this space, means that today **ESG offers a measurement system to capture potential inequalities**. Historically, these inequalities have developed as a result of the misallocation of economic resources within an economy, and therefore the distribution and benefits to the environment and society at large have often been uneven and inequitable. ESG investing appears to be evolving in a way that investors can more readily capture the impact of such changes on long-term corporate profitability.

The changing tide in the economic and political landscape (quantitative easing, polarisation of political views, growing income inequality etc) suggests investors are more likely to care about the potential impact and want to measure/ govern the social and environmental changes than any time in the recent past. In essence, ESG is being branded as a concept that can help investors and corporates to minimise reputational and operational risk.

- *“The only stable state is the one in which all men are equal before the law”* – Aristotle – Greek Philosopher.

### A Branch of Sustainable and Responsible Investment

There seems to be much debate even among the experts about what is the difference between Socially Responsible Investing (SRI), Sustainable and Responsible Investment (SRI), Corporate Social Responsibility (CSR) and ESG? In simple terms, we believe ESG is a branch of Sustainable and Responsible Investment, although many commentators use the acronyms interchangeably.

ESG and SRI are often used interchangeably...

SRI often takes a more ‘top down’ approach, which is long term and often excludes selected criteria in the overall decision making of responsible investment decisions and is frequently qualitative in its approach. ESG aims to include all criteria but weights those factors positively/negatively to determine attractive and unattractive scores. This approach can be qualitative or quantitative in nature.

**Environmental:** aims to measure the direct or indirect impact of a company's activity on the environment (waste management, level of carbon dioxide emissions, responsible consumption of water, development of renewable energies, degree of energy efficiency are examples).

**Social:** aims to measure the direct or indirect impact of a company's activity on 1) customers, 2) employees, 3) stockholders, 4) local communities, and 5) on society in general, focusing on respect for human rights, international labour standards, anti corruption etc.

**Governance:** aims to measure processes, regulations, laws and institutions influenced by the way in which the company is managed, controlled and conducts day to day business. This includes, in particular, the relationships between the company's stockholders, management and board of directors. Examples are: the balance of powers, business ethics, fraud and anti-competitive practices etc.

### 'Values-based' investing isn't a new concept

SRI/ESG is not a new concept...

Through our study of ESG, we learn that it is not a new investment philosophy. For example, in the USA during the 1970s several socio-political movements led to the growth in socially responsible investments. In Europe, the first SRI fund is cited as being launched in Sweden (Aktie Ansvar Myrberg) during the mid 1960s. Moreover, ESG investing has gained popularity since the Global Financial Crisis given the perceived lack of governance issues faced by the global financial industry. Yet, the roots of ESG investing appear to go back much, much further. Some accounts suggest maybe to biblical times. Jewish, Christian and Islamic scriptures suggest avoiding investing in enterprises that profit from products designed to enslave or harm fellow human beings.

- ***“What is morally wrong can never be advantageous, even when it enables you to make some gain that you believe to be to your advantage.”*** –  
Macrus Tullius Cicero – Roman Statesman
- ***“If a business is not ethical, it will fail, perhaps not right away but eventually”*** – Sir John Templeton – Philanthropist and Investor
- ***“Quality means doing it right when no one is looking”*** –  
Henry Ford – Founder of the Ford Motor Company
- ***“Capital will go where it is wanted, and it will stay where it is well treated”***  
– Walter Wriston – Former Chairman of Citibank

### Seven SRI Investment Strategies

...but the SRI investment strategies that are growing AuM are in their infancy and are evolving rapidly.

Eurosif defines 7 clear SRI investment strategies.

ESG as a concept may not be new, but we believe how investors (and the SRI industry) are starting to consider various sustainable and responsible investment strategies is new, is changing and is evolving rapidly.

A clear consensus of how to invest responsibly is yet to emerge, however *Eurosif*, the European Sustainable and Responsible Investment Forum, does suggest that there are seven sustainable and responsible investment strategies: 1) sustainability themed investments, 2) best in class investment selection, 3) norms-based screening, 4) exclusion of holdings from investment universe, 5) engagement and voting on sustainability matters, 6) integration of ESG factors in financial analysis, and 7) impact investing.

All seven investment strategies have grown faster than the broader European asset management market, since the Global Financial Crisis. The chart below illustrates the growth in European Sustainable Investment Strategies from 2013-2015 and is sourced from the latest Eurosif *European SRI Study 2016*. These results are the outcome of a survey/ questionnaire carried out during H1-2016 and cover SRI investments across all asset classes, including institutional and retail assets.

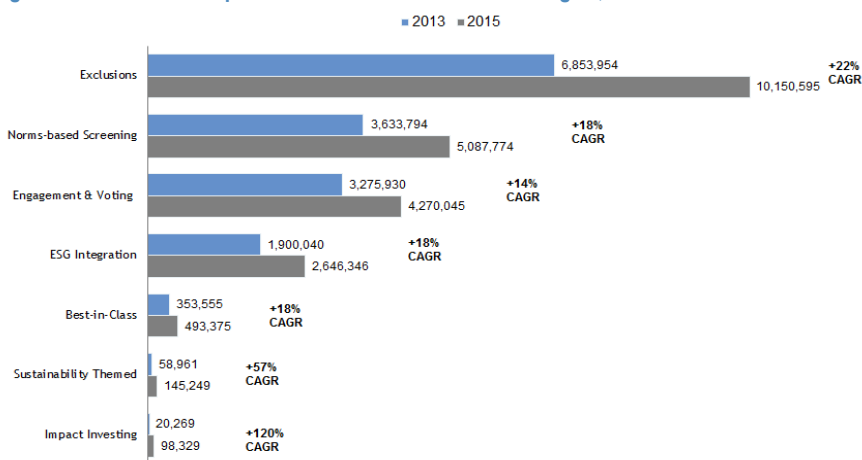
The survey results indicate that 30% of European SRI AuM is equity focused and 65% is bond focused (driven by the recent growth in issuance of Green bonds).

Among the SRI strategies followed by investors, Exclusions is now considered to have gone ‘mainstream’ as more assets follow this process than other SRI strategies.

One reason seems to be, because it is regarded as the easiest and most convenient to implement to an existing investment framework. Exclusions is regarded as being an ‘overlay’ strategy and involves a negative screening policy (excluding problem countries, sectors of stocks).

- Exclusions strategies cover about 44% of the estimated €23trn of total professionally managed assets.
- Norms-based screening and Engagement & Voting criteria are the 2<sup>nd</sup> and 3<sup>rd</sup> largest segments covering about 20% each of total managed assets.
- 12% is captured by ESG integration, which represents about €12trn of AuM. This strategy represents a systematic and more formalised process to construct stock portfolios, and is where most quantitative ESG investments are positioned.
- The remaining 3% of SRI assets are categorised as ‘Best in Class’, ‘Sustainability themed’, or ‘Impact Investing’.

Figure 1: Growth of European Sustainable Investment Strategies, 2013-2015 € millions



Exclusions strategies cover about 44% of the estimated €23trn of total professionally managed assets (Includes equities, bonds, institutional and retail).

Source: J.P. Morgan Quantitative and Derivatives Strategy; Eurosif – European SRI Study 2016

### 1) Sustainability themed investments

Investment in issues or in assets linked to the development of sustainability. Themed funds centre on specific or multiple issues relating to environmental, social and corporate governance criteria. Examples would include COP21, low-carbon economy, renewable energy, waste management etc.

### 2) Best in class investment selection

An approach in which the investments with the best outputs within a field, category or class, based on the ESG criteria are selected or weighted. Best in class positively screens for the stocks and is regarded as being an investment process based on selecting perceived 'good values'.



### 3) Norms-based screening

Selecting investments based on their compliance with international standards and rules based on criteria such as environmental protection, human rights, labour standards and anti corruption. These norms are those developed by the OECD, the UN and the UN's agencies.

### 4) Exclusion of holdings from investment universe

This approach excludes specific investments or classes of investment from the field being invested in, such as companies, sectors or countries based on limiting reputational or operational risk. Exclusions can be based on a Norms-based approach or ESG criteria. This strategy has shown rapid and consistent growth over the years.

### 5) Engagement and Voting on sustainability matters

This is the 3<sup>rd</sup> most popular strategy based on AuM. Stockholder activism and active implication through engagement with companies on SRI/ESG matters, and includes voting in shareholders meetings. This method is often a long-term process that seeks to influence behaviour or to increase the transparency on particular topics.

### 6) Integration of ESG factors in financial analysis

This strategy explicitly includes ESG risks and couples them with potential opportunities by asset managers in traditional financial analysis/factor research. Investment decisions are often based on a systematic process, this method is the most suited to a quantitative approach to ESG investing.

### 7) Impact Investing

Direct investments made within companies, organisations and/or funds with the intention of generating a social and environment impact together with a financial return.

ESG integration is the strategy that is most suited to a quantitative framework.

## What is Fuelling the growth in ESG?

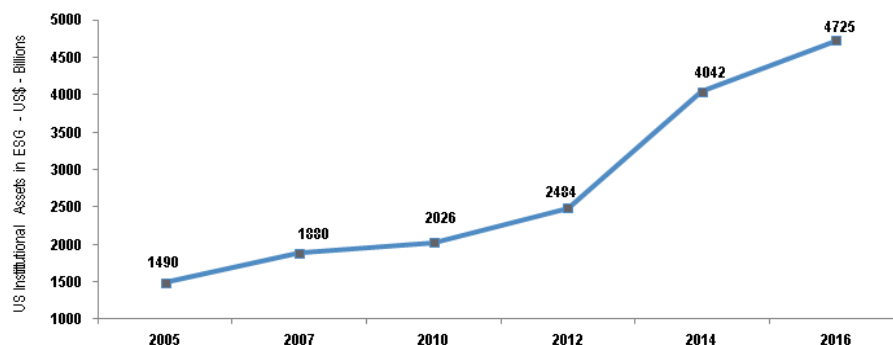
For many discretionary and quantitative investors, ESG investing presents more questions than answers. In particular, it may seem like the 'right thing to do', but investors typically believe there is a cost/compromise or they must forgo investment returns. Below we have compiled a selection of thoughts from the SRI industry experts behind what appears to be fueling the growth in ESG.

### Growth in ESG AUM (across all assets)

Earlier we showed that the Eurosif – 2016 SRI study showed meaningful growth in SRI assets managed in Europe. The chart below shows aggregated data from the US SIF foundation 2016 report. The data illustrates the growth in US institutional investors ESG assets from 2005 to 2016. It is estimated that current AuM is \$4.7trn and this has grown by 217% over the past decade.

It is estimated that current AuM is \$4.7trn and this has grown by 217% over the past decade.

Figure 2: Growth of US Institutional Investors ESG Asset, US\$ billions



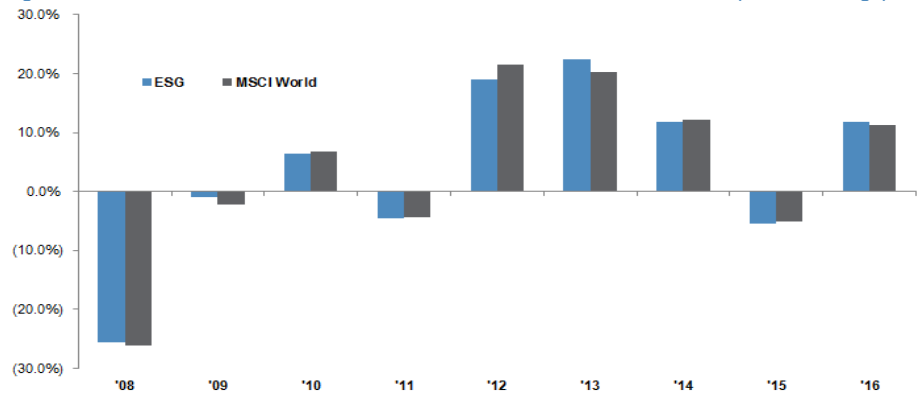
Source: J.P. Morgan Quantitative and Derivatives Strategy; US SIF – 2016

**Performance has been robust since the GFC**

There is a perception that investing more responsibly must mean a compromise on investment returns. Yet, a growing body of academic research suggests this is not necessarily the case. The chart below shows the year-on-year returns from MSCI World and MSCI World ESG indices since the global financial crisis. ESG returns do not appear to be significantly better or worse than the more established benchmark returns.

The return profile suggests investors have been no worse off investing in MSCI ESG World benchmarks compared to MSCI World.

**Figure 3: Performance of MSCI World & MSCI World ESG Total Return Indices (YoY % Change)**



Source: J.P. Morgan Quantitative and Derivatives Strategy; MSCI

**Information and availability**

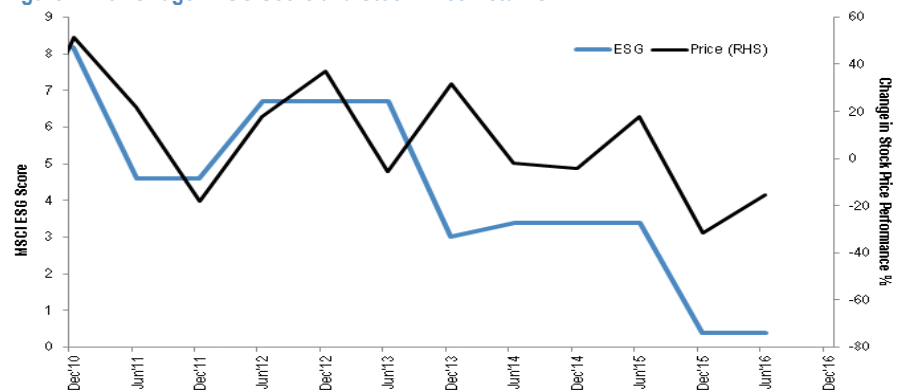
Investors are more informed and educated today on ESG matters. Research companies provide higher quality information than ever before, and better informed investors are deemed to be more aware and responsible. Similarly, SRI investment products are increasingly available, and a socially conscious investor can now choose from among many funds. Eurosif suggests 22% of SRI assets are owned by the retail investor, up from 3% in 2013.

**A filter to screen troubled companies**

Various instances of accounting fraud and other corporate scandals have challenged the trust in company leadership (BP, VW, Deutsche Bank, Enron, Worldcom etc). Many investors are attracted to an investment process based on research that delves deeper into the behaviour and impact of companies and their management.

The ESG scores for VW started to dip ahead of the stock price moves following the newsflow on car emissions levels.

**Figure 4: Volkswagen ESG Score and Stock Price Returns**



Source: J.P. Morgan Quantitative and Derivatives Strategy; MSCI



### Feel good factor of doing the right thing

While this may be difficult to measure, it is believed that we live in an increasingly interconnected and interdependent world. Our lives and happiness are increasingly joined to well-being of others. As our communities prosper, so do we.

It is thought that as more and more women enter the workforce and climb the corporate ladder many have brought a more caring approach to investing with them. Separately, the ‘Millennials’ a generation that seeks to make a difference in society through the jobs they hold, products they purchase and the investments they make. Millennials are beginning to inherit trillions of dollars from Baby Boomers and their influence as impact-oriented investors is likely to be felt.

### Enhance risk/returns in your portfolio

We will discuss this topic in more detail later in this research note. However, the table below provides a brief snapshot of the returns, volatility and Sharpe ratio (risk adjusted returns) of ESG benchmarks compared to their regional benchmarks.

The table illustrates that between 2007 and 2016, risk adjusted returns for ESG indices are in many instances higher than regional MSCI benchmarks.

**Table 2: Comparing Regional Benchmarks with their ESG Indices**

	Returns	Volatility	Sharpe	Hit Rate	Drawdowns
MSCI World	3.0%	17.1%	0.18	56.4%	-54.0%
World ESG	2.6%	17.2%	0.15	55.0%	-54.2%
MSCI EM	0.4%	24.2%	0.02	50.9%	-61.6%
EM ESG	3.6%	22.8%	0.16	54.1%	-58.9%
MSCI USA	11.8%	11.5%	1.03	63.5%	-15.9%
USA ESG	12.9%	11.6%	1.11	67.6%	-16.6%
MSCI Australia	1.7%	25.8%	0.07	54.5%	-63.3%
Australia ESG	2.0%	25.6%	0.08	55.0%	-62.0%
MSCI Canada	0.4%	22.3%	0.02	50.9%	-56.2%
Canada ESG	2.0%	22.5%	0.09	52.3%	-54.8%
MSCI UK	(0.9%)	19.2%	(0.05)	52.7%	-59.0%
UK ESG	(1.4%)	18.7%	(0.07)	52.3%	-57.1%
MSCI Japan	0.8%	16.3%	0.05	54.5%	-45.7%
Japan ESG	1.0%	16.7%	0.06	55.0%	-46.4%
MSCI AC Europe	(1.1%)	21.4%	(0.05)	50.0%	-60.1%
Europe ESG	0.2%	21.1%	0.01	53.2%	-58.6%

Source: MSCI, J.P. Morgan Quantitative and Derivatives Strategy (Performance between September 2007 and November 2016)

### Demographics of AuM of ESG Equity Funds

Interestingly, of the listed equity funds that are currently classified under ESG (specifically) or SRI (generally), we found a couple with an inception date back in the 1950s and 1960s and a fair few that have been around 1970s and 1980s. While this does not definitely mean these may have been conceptualised as ESG/SRI funds when they were launched, it does highlight that, as a theme, these strategies have been around for long, even if they may not have been as commonplace.

Currently, about 350 equity funds globally are categorised as offering ESG compliant investments. Their combined AuM is around \$111bn. If we include SRI within this club, the number of funds goes above 850 with AUM rising to \$189bn.

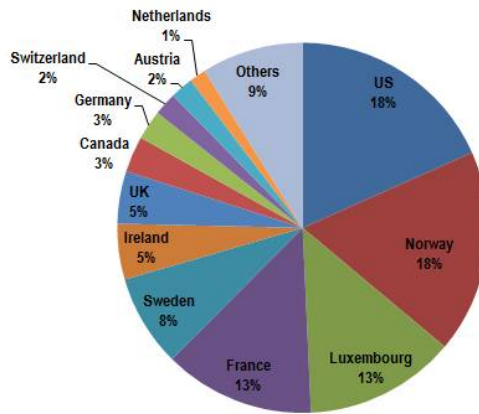
In many instances, risk adjusted returns for ESG indices are higher than regional MSCI benchmarks

There are 350 equity funds globally that offer ESG investments, their combined AuM is \$111bn; adding SRI, the number of funds increases to 850 with AuM of \$189bn.

Of the funds categorised under ESG, we find 64 (18.2%) are domiciled in the US followed by 62 (17.7%) in Norway. In fact, more than 90 (25.7%) ESG funds are domiciled in Norway, Sweden, and Denmark, with combined AUM of over \$32bn (28.8%). The AUM for the US-domiciled funds is over \$37bn (33.3%).

18% of ESG equity funds globally is domiciled in the USA, and 26% in the Nordic region

Figure 5: Distribution of number of ESG equity funds by domicile<sup>3</sup>

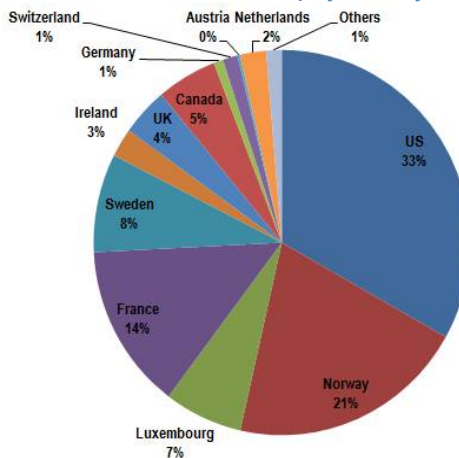


Source: J.P. Morgan Quantitative and Derivatives Strategy, Bloomberg.

Globally, the US, Norway, France, Sweden, Canada, Ireland, UK and Luxembourg dominate the ESG investment fund landscape, with the largest number of funds and AUM. These countries collectively account for 290 funds with a combined AUM of over \$100bn (94% of the total AUM of ESG funds).

33% of global AuM for Equity ESG funds are domiciled in the USA

Figure 6: Distribution of AUM of ESG Equity funds by domicile



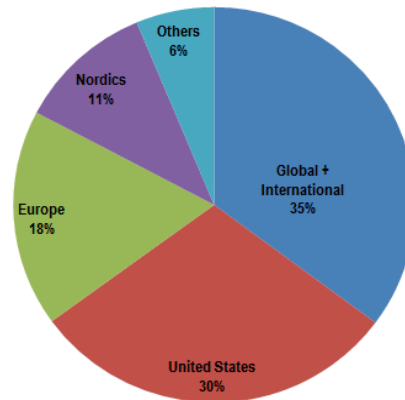
Source: J.P. Morgan Quantitative and Derivatives Strategy, Bloomberg.

<sup>3</sup> The region “Others” includes Belgium and Brazil (5 funds each), Denmark (4), Japan and China (3 each) and Taiwan among others.

In terms of investment mandates, about 39% of the ESG funds have a global or international mandate. Some 43 funds globally have a US-only focus. There are about twice as many ESG funds (81) with a European/Eurozone focus. 42 ESG funds have a Nordic focus.

Most ESG equity funds have a Global or international mandate.

Figure 7: Distribution of AUM of ESG Equity funds by Investment focus



Source: J.P. Morgan Quantitative and Derivatives Strategy, Bloomberg.

Global and International mandates have combined AUM of over \$39bn (~35% of total ESG AUM), while the US-only mandates currently cover \$33bn of AUM (~30% of total ESG AUM). AUM under European mandate covers about \$19bn (18%). ESG funds with a mandate in the Nordics region have over \$12bn (11%).

## ESG Ratings & Scores

### 3<sup>rd</sup> Party Providers Benchmark data

We have focused on the MSCI ESG dataset.

In this section, we look at the detail behind ESG ratings and scores. We have tested many 3<sup>rd</sup> party providers' ESG data and conclude that while the methods and scores may differ, there is a high degree of overlap when considering the impact on price returns. The ESG ratings we analyse in this research note are based on the MSCI ESG dataset that ranks stocks globally on their proprietary criteria. Our access to this dataset covers stock ratings going back to 2007.

MSCI defines Environmental, Social and Governance issues based on the following criteria.

Table 3: MSCI ESG Key Issue Hierarchy

These are the ESG issues for which MSCI provide an ESG rating.

3 Pillars	10 Themes	37 ESG Key Issues	
Environment	Climate Change	Carbon Emissions* Energy Efficiency Product Carbon Footprint	Financing Environmental Impact Climate Change Vulnerability
	Natural Resources	Water Stress* Biodiversity & Land Use	Raw Material Sourcing
	Pollution & Waste	Toxic Emissions & Waste* Packaging Material & Waste	Electronic Waste
	Environmental Opportunities	Opportunities in Clean Tech Opportunities in Green Building	Opp's in Renewable Energy
Social	Human Capital	Labor Management* Health & Safety*	Human Capital Development Supply Chain Labor Standards
	Product Liability	Product Safety & Quality Chemical Safety Financial Product Safety	Privacy & Data Security Responsible Investment Health & Demographic Risk
	Stakeholder Opposition	Controversial Sourcing	
	Social Opportunities	Access to Communications Access to Finance	Access to Health Care Opp's in Nutrition & Health
Governance	Corporate Governance*	Board** Pay**	Ownership** Accounting**
	Corporate Behaviour	Business Ethics* Anti-Competitive Practices*	Corruption & Instability Financial System Instability

Source: MSCI ESG - \* indicates "universal" issues assessed for all companies in MSCI World \*\* Board, Pay, Ownership, and Accounting carry weight in the ESG Rating model for all companies. Currently, they contribute to the Corporate Governance score directly and 0-10 sub-scores are not available.

The MSCI ESG indices use the standard (large and mid cap) MSCI benchmark indices as the parent index. For example, the MSCI World ESG index uses the MSCI World (standard) benchmark as its parent index and includes companies with the highest ESG ratings<sup>4</sup>.

<sup>4</sup> See the MSCI ESG research factsheet from their website [here](#). For a specific ESG index like MSCI World ESG index, download the factsheet [here](#).

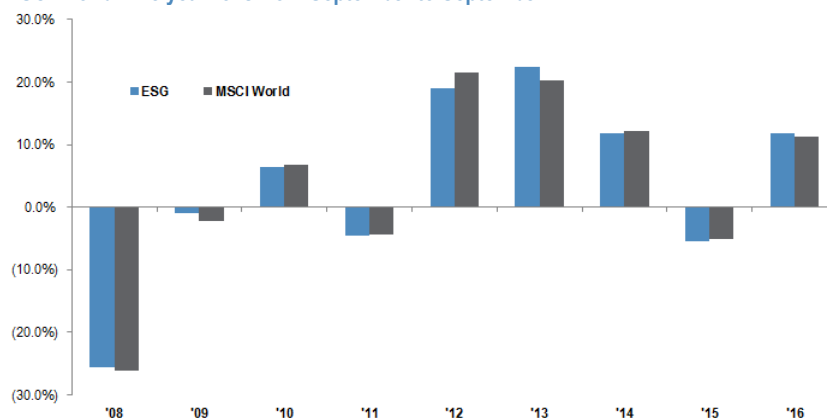
We first compared MSCI regional indices with the returns from the regional ESG indices

The return profile suggests investors have been no worse off investing in MSCI ESG World benchmarks compared to MSCI World.

The first step before we even begin to look at the dataset would therefore be to compare performance of an MSCI ESG benchmark index with its parent index. An investor should find the ESG offering acceptable as long as it does not lead to underperformance vis-à-vis the parent index.

The figure below shows yearly returns of the MSCI World benchmark index compared to the MSCI ESG World index. We consider the net total returns for both these indices and find that for most periods, the performance is very much inline with each other for the two.

Figure 8: Rolling 1-year performance for (Net Total Returns) benchmarks of MSCI World ESG and MSCI World. The year rolls from September to September



Source: MSCI, J.P. Morgan Quantitative and Derivatives Strategy

We do, however, find some differences in performance, when we look at other regions. Interestingly, the performance difference is largely seen with the outperformance observed for the ESG benchmark indices over their respective parent benchmark index.

For example, in the more commodity driven markets like Global Emerging Markets, Australia, and Canada, we find the ESG benchmark indices outperform the parent benchmark index.

Perhaps a case could be made for ESG outperformance being observed in markets that have been under pressure for any one of the various reasons (co-incidentally the GFC and the post-GFC environment including the sovereign debt crisis, growth cyclicality in Emerging Markets, central bank intervention etc.), though, as we observed in the broader market (developed market), the performance was pretty much similar. At the very least, the ESG benchmark indices in these markets and environment have acted as a form of “Quality-proxy” offering some protection from downside.

In many instances risk adjusted returns for ESG indices are higher than regional MSCI benchmarks.

Table 4: Comparing Regional Benchmarks with their ESG Indices

	Returns	Volatility	Sharpe	Hit Rate	Drawdown	t-Stat	Skew	Kurtosis
MSCI World	3.0%	17.1%	0.18	56.4%	-54.0%	0.79	-0.67	4.46
World ESG	2.6%	17.2%	0.15	55.0%	-54.2%	0.71	-0.62	4.49
MSCI EM	0.4%	24.2%	0.02	50.9%	-61.6%	0.42	-0.38	4.66
MSCI EM ESG	3.6%	22.8%	0.16	54.1%	-58.9%	0.82	-0.35	4.47
MSCI Australia	1.7%	25.8%	0.07	54.5%	-63.3%	0.60	-0.40	3.78
Australia ESG	2.0%	25.6%	0.08	55.0%	-62.0%	0.63	-0.41	3.78
MSCI Canada	0.4%	22.3%	0.02	50.9%	-56.2%	0.40	-0.40	5.56
Canada ESG	2.0%	22.5%	0.09	52.3%	-54.8%	0.61	-0.42	5.50
MSCI UK	(0.9%)	19.2%	(0.05)	52.7%	-59.0%	0.15	-0.25	3.85
UK ESG	(1.4%)	18.7%	(0.07)	52.3%	-57.1%	0.06	-0.39	4.71
MSCI Japan	0.8%	16.3%	0.05	54.5%	-45.7%	0.39	-0.44	3.60
Japan ESG	1.0%	16.7%	0.06	55.0%	-46.4%	0.43	-0.48	3.70
MSCI Europe	(1.1%)	21.4%	(0.05)	50.0%	-60.1%	0.17	-0.45	3.83
MSCI Europe ESG	0.2%	21.1%	0.01	53.2%	-58.6%	0.34	-0.48	4.22
MSCI USA	11.8%	11.5%	1.03	63.5%	-15.9%	2.56	0.09	3.61
MSCI USA ESG	12.9%	11.6%	1.11	67.6%	-16.6%	2.74	-0.04	3.50

Source: MSCI, J.P. Morgan Quantitative and Derivatives Strategy (Performance between September 2007 and November 2016)

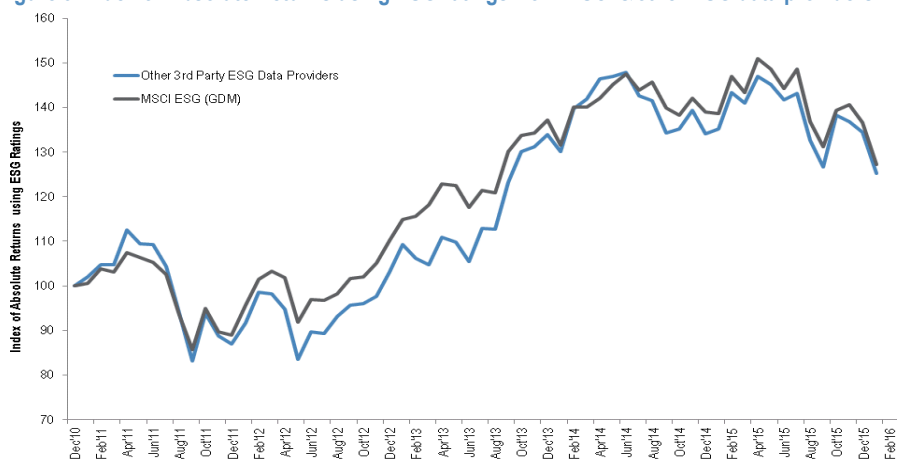
### Comparing 3<sup>rd</sup> Party Vendors

In the initial stages of our research, we tested ESG ratings/score from a selection of data providers. Our analysis suggested that while the scores, ratings and stocks ranking differ, ultimately there is very little difference when we compare the impact on price returns.

The chart below highlights the return profile for stocks within the global developed markets index using MSCI ESG ratings and other ESG data providers.

Although score and ratings can differ across ESG data providers the return outcomes looks very similar.

Figure 9: Index of Absolute Returns using ESG ratings from MSCI & other ESG data providers



Source: MSCI, J.P. Morgan Quantitative and Derivatives Strategy, MSCI



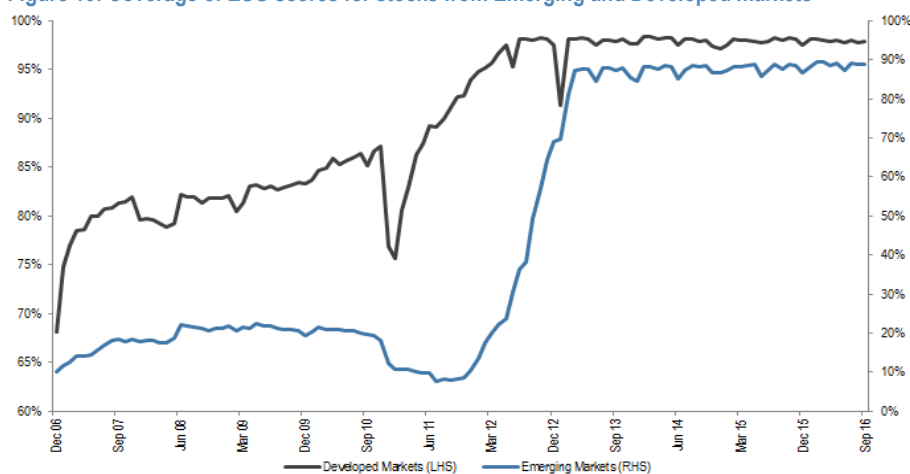
## Global Coverage of Stocks

>90% of stock coverage for GDM since 2011 For EM stocks coverage is >85% since 2013.

We find a good overlap for ESG scores on MSCI benchmark coverage particularly for the developed markets. Nearly 70% of the stocks from the developed markets have ESG scores earlier on in the history of the dataset. This coverage has been above 90% since late 2011.

Emerging markets, however, had much poorer coverage earlier on (~10% of the stocks). The coverage also falls into single digits in 2011, though it started to improve after that period and has been above 85% since early 2013. Currently, about 88% of the MSCI Emerging markets stocks are covered and carry ESG ratings.

Figure 10: Coverage of ESG scores for stocks from Emerging and Developed markets



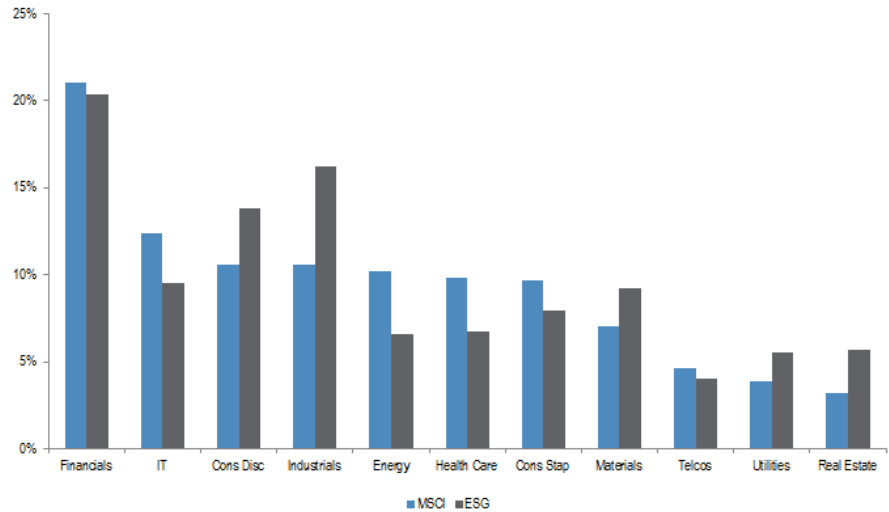
Source: J.P. Morgan Quantitative and Derivatives Strategy

Europe and USA both have had consistent and improving coverage. Both regions currently have ESG scores and ratings for over 90% of the stocks from MSCI and the coverage has been above 75% for its history. Interestingly, in percentage terms, Japan has better coverage on ESG scores (~100%) than both USA and Europe.

## Country and Sector Characteristics of ESG data

Below we show the regional, country and sector characteristics of the global ESG dataset. We calculate the aggregate benchmark weights for GICS Level 1 Sector definitions for the MSCI standard universe as well as computing the aggregate weights using the same stocks based on their ESG scores. We attempt to assess if there is a significant difference between the benchmark weights and weights computed for the same universe based on ESG scores.

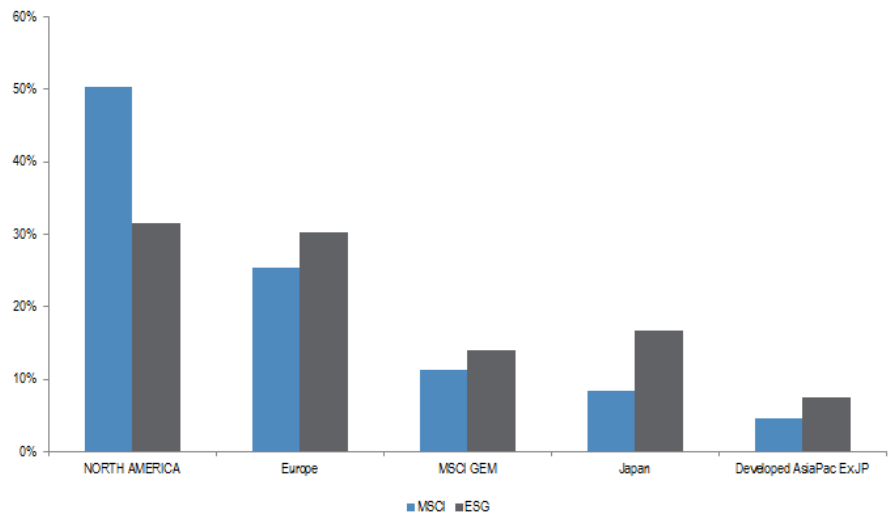
Figure 11: Average Sector Weights based on MSCI Benchmark weights and ESG Score weights



Source: J.P. Morgan Quantitative and Derivatives Strategy, MSCI. (Data between January 2007 and November 2016)

We do the same exercise at the regional level to see if the ESG weighted universe is significantly different from the standard benchmark weights. The ESG weighted benchmark seems to be more OW Japan, EM and Europe, and UW the US.

Figure 12: Comparing average regional weights: MSCI benchmark and ESG score weights



Source: J.P. Morgan Quantitative and Derivatives Strategy, MSCI. (Data between January 2007 and November 2016)

## How many stocks is too many for an active ESG portfolio?

In this section, we try to work out what is the optimal size of an ESG portfolio and does it differ across the regions.

We extended the analysis of 50-stock ESG portfolios by varying the number of stocks to hold in the portfolio. We iterated with a list of 30, 40, 50, 75, and 100-stock portfolios. We find inconclusive results in terms of what is an ideal threshold in terms of number of stocks to hold.

For instance, in Europe, we find best risk-reward payoff for a 50-stock portfolio whereas in the US, a 30-stock portfolio yields a similar Sharpe ratio to a 100-stock portfolio. In Japan, the optimal number of stocks seems to be between 50 and 100, whereas GEM has better statistics for 50-75 stock portfolios. Interestingly, for the All World market (ACWI<sup>5</sup>), we found general improvements in performance as the number of stocks in the portfolio is increased.

Table 5: Annualized Returns and Sharpe Ratios for Portfolios of Varying Stock Counts

The 'sweet spot' for optimal ESG portfolio size is between 50 and 100 names across most regions

ESG IAS	Annualized Returns %					Sharpe Ratios				
	Top 30	40	50	75	100	Top 30	40	50	75	100
ACWI	(0.4%)	0.8%	0.5%	0.9%	1.8%	(0.07)	0.15	0.10	0.21	0.45
GEM	4.2%	4.2%	4.2%	4.2%	3.1%	0.65	0.75	0.78	0.86	0.69
GDM	(0.6%)	0.8%	(0.1%)	0.8%	1.6%	(0.09)	0.15	(0.02)	0.17	0.35
US	3.8%	2.5%	2.5%	2.4%	2.6%	0.53	0.44	0.49	0.49	0.53
Europe	2.2%	3.7%	4.0%	3.9%	3.5%	0.42	0.80	0.95	0.98	0.86
Japan	2.2%	2.9%	3.7%	3.8%	3.3%	0.45	0.64	0.75	0.82	0.80
UK	1.9%	1.3%	0.5%	0.2%	0.1%	0.28	0.19	0.07	0.03	0.02

Source: J.P. Morgan Quantitative and Derivatives Strategy, MSCI

While the results are inconclusive on the ideal threshold for number of stocks, we do find a bit of sweet spot at 50 and 100 name portfolios across most regions. Of course, this also means certain regions may need further adjustments – for example, the UK has around 100 stocks in the official benchmark and selecting the top 100 is similar to taking an equal-weighted position in the entire market. We do, however, notice that most regions have positive returns for most of these portfolios.

On this evidence alone, it may be suggested there is indeed some degree of outperformance (over the relative benchmark) to be had following an ESG portfolio construction. However, these returns do not rank among the best for each of these regions that could be attained via more conventional factors (such as Value, Momentum, and Quality). Further, there may also be an overlap for ESG scores with some of fundamental factors in that an ESG score for a stock may be picking up some characteristics such as Momentum, Value, and Quality etc.

In a later section, we look at identifying these characteristics with the aim of seeing what exactly an ESG score might depict.

<sup>5</sup> ACWI stands for MSCI All Country World Index – a combination of Emerging and Developed markets.

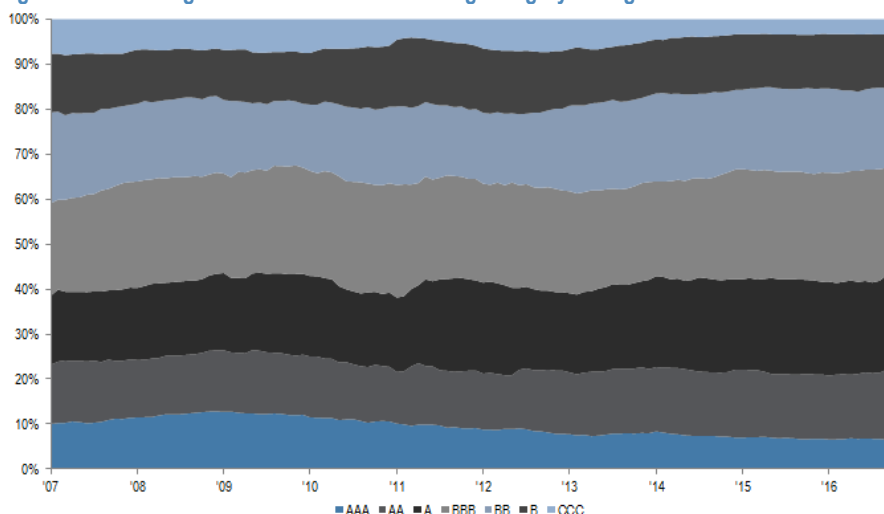
Separate from ESG scores MSCI also includes ratings from AAA to CCC. In this section, we highlight our observations on how best to use these bond-like ratings.

### How helpful are the bond-style ratings?

Besides having a score and weight for the Environmental, Social, and Governance pillars for every stock under their coverage, MSCI ESG also provides a rating for the stock. These may be likened to ratings from bond rating agencies (AAA, BB etc.). We looked at these ratings, with an aim to understanding whether we could use them to segregate portfolios and whether such segregation can help highlight any performance differential.

The first thing we observe in the chart below (for MSCI GDM) is that the number of stocks under each rating category is not uniform. For example, in the most recent data, less than 4% of stocks have a “CCC” rating. In fact, stocks rated “BB” or higher make up about 85% of the coverage. Currently, the most common ratings for stocks are “A” or “BBB”, with about 45% given one of those.

Figure 13: Percentage of Stocks under each Rating Category through Time in MSCI GDM



Source: J.P. Morgan Quantitative and Derivatives Strategy

There is a low proportion of stocks in Europe and the USA with CCC ratings. There are very few ratings in GEM for AAA.

Similarly, “CCC” has a very low representation in MSCI Europe and the most common ratings are “AA” or “A”, which cover more than 50% of MSCI Europe stocks. We find a many more examples of stocks rated “CCC” in the US on the other hand. About 7% of the current stocks in MSCI US are rated “CCC”. Stocks rated “BBB” or “BB” make up just under half of all stocks in the US.

In GEM, we find very few instances of stocks rated “AAA” (just under 1%) while “BB” and “B” combined represent half of the stocks from the region. Japan, like GEM, has very few stocks rated “AAA”, but stocks rated “A”, “BBB”, or “BB” make up ~75% of the market.

We now look at creating portfolios for each rating group. Every month, we buy and hold stocks within each rating portfolio corresponding to the ESG ratings. As we did in the earlier sections, we track the portfolio performance as excess returns (over the underlying benchmark).

Table 6: Equal-Weighted ESG Portfolios Created based on Rating Segregation (Excess Returns)

Region	Portfolio	Ann. Ret	Ann. Vol.	Sharpe	Hit-Rate	Max DD	t-Stat	% of ESG coverage
ACWI	AAA	1.8%	4.2%	0.43	58.1%	(9.5%)	1.4	8%
ACWI	AA	1.0%	3.8%	0.26	57.3%	(9.2%)	0.9	12%
ACWI	A	0.7%	4.0%	0.18	49.6%	(12.0%)	0.6	17%
ACWI	BBB	1.0%	3.8%	0.27	48.7%	(9.4%)	0.9	23%
ACWI	BB	0.4%	4.1%	0.10	46.2%	(14.8%)	0.4	18%
ACWI	B	0.2%	4.9%	0.04	50.4%	(18.0%)	0.2	14%
ACWI	CCC	0.6%	5.4%	0.10	49.6%	(19.7%)	0.4	7%
GDM	AAA	1.5%	4.6%	0.32	51.3%	(10.3%)	1.1	9%
GDM	AA	1.1%	4.1%	0.27	53.8%	(9.7%)	0.9	14%
GDM	A	1.2%	4.2%	0.29	49.6%	(9.9%)	1.0	18%
GDM	BBB	1.3%	4.0%	0.34	53.0%	(10.3%)	1.1	23%
GDM	BB	1.0%	4.0%	0.27	51.3%	(9.7%)	0.9	17%
GDM	B	1.4%	4.6%	0.29	52.1%	(14.2%)	1.0	13%
GDM	CCC	2.0%	5.0%	0.40	58.1%	(10.0%)	1.3	6%
GEM	AAA	9.1%	13.9%	0.66	60.9%	(28.4%)	2.2	2%
GEM	AA	2.6%	9.4%	0.28	56.4%	(20.2%)	1.0	6%
GEM	A	(1.2%)	7.0%	(0.18)	42.7%	(17.6%)	(0.5)	13%
GEM	BBB	5.2%	6.0%	0.86	55.6%	(5.4%)	2.7	20%
GEM	BB	2.5%	5.4%	0.47	56.4%	(8.0%)	1.5	23%
GEM	B	4.7%	6.3%	0.76	57.3%	(8.5%)	2.4	21%
GEM	CCC	0.7%	7.8%	0.08	53.0%	(12.9%)	0.4	16%
Europe	AAA	4.3%	4.1%	1.05	61.5%	(9.8%)	3.3	18%
Europe	AA	2.2%	4.2%	0.53	60.7%	(10.9%)	1.7	21%
Europe	A	0.8%	5.3%	0.15	47.9%	(13.9%)	0.5	23%
Europe	BBB	(0.1%)	6.6%	(0.01)	52.1%	(21.4%)	0.1	21%
Europe	BB	(3.5%)	7.1%	(0.50)	45.3%	(31.2%)	(1.5)	10%
Europe	B	2.0%	8.6%	0.23	55.6%	(23.0%)	0.8	6%
Europe	CCC	(8.3%)	12.3%	(0.67)	42.7%	(65.6%)	(2.0)	2%
US	AAA	4.1%	8.0%	0.52	53.8%	(10.2%)	1.7	4%
US	AA	2.2%	4.8%	0.45	59.0%	(7.7%)	1.5	8%
US	A	3.3%	5.4%	0.62	58.1%	(8.0%)	2.0	15%
US	BBB	1.6%	5.6%	0.28	57.3%	(21.1%)	1.0	23%
US	BB	2.2%	5.9%	0.38	53.0%	(10.0%)	1.3	22%
US	B	0.9%	6.6%	0.14	52.1%	(18.1%)	0.5	18%
US	CCC	2.5%	6.7%	0.37	56.4%	(20.1%)	1.3	10%
Japan	AAA	2.4%	4.9%	0.49	62.4%	(8.6%)	1.6	8%
Japan	AA	4.0%	6.2%	0.65	59.0%	(7.7%)	2.1	13%
Japan	A	2.8%	4.4%	0.64	56.4%	(11.1%)	2.0	19%
Japan	BBB	2.9%	4.4%	0.65	55.6%	(6.8%)	2.1	25%
Japan	BB	2.8%	5.5%	0.50	49.6%	(12.4%)	1.6	20%
Japan	B	1.9%	6.9%	0.28	50.4%	(10.0%)	1.0	12%
Japan	CCC	4.1%	12.3%	0.34	49.6%	(18.5%)	1.2	3%

Source: J.P. Morgan Quantitative and Derivatives Strategy. Performance between Jan 2007 and Sep 2016

We do find a portfolio of “AAA” rated stocks not only outperforms the underlying benchmark but is also among the best performing portfolios for each region.

A portfolio of “CCC” rated stocks does not provide as clear a picture. We find outperformance for US and Japan, while we see severe underperformance in Europe. We could perhaps make an exception for Europe and Japan as we mentioned earlier there are not many “CCC” rated stocks in these regions. Performance for this rating then becomes a case of specific risk since the portfolio is very low on representation in terms of number of stocks. Likewise an exception could be made for the strong performance of “AAA” rated stocks in GEM as that portfolio too is sparsely populated.

To get around the problem of limited coverage in certain rating categories, we follow a more broad-brush approach and segregate the rating categories into two: “BBB” or better (containing all stocks rated “AAA”, “AA”, “A” and “BBB”) and “BB” or worse (containing all stocks rated “BB”, “B”, and “CCC”).

Across most regions, we do find some performance differential with the higher rated ESG portfolios outperforming the lower rated ESG portfolios. The largest spread is observed in Europe, where less than 20% of the ESG covered stocks are rated “BB” or lower. This portfolio underperformed the MSCI Europe benchmark index by 2.4% (annualised) returns while the “BBB” or better rated stocks in Europe had an annual outperformance over the benchmark of 1.7%. The Sharpe ratios too indicate a difference in risk-reward, not just for Europe but for most other regions.

Table 7: Equal-Weighted ESG Portfolios created on Grouping Ratings (Excess Returns)

Region	Portfolio	Ann. Ret	Ann. Vol.	Sharpe	Hit-Rate	Max DD	t-Stat	% of ESG coverage
ACWI	> BB	1.0%	3.5%	0.28	53.0%	(8.2%)	0.9	60%
ACWI	< BBB	0.4%	4.2%	0.10	46.2%	(15.8%)	0.4	40%
GDM	> BB	1.3%	3.8%	0.34	54.7%	(8.9%)	1.1	64%
GDM	< BBB	1.4%	3.9%	0.38	52.1%	(9.8%)	1.2	36%
GEM	> BB	3.1%	4.8%	0.65	58.1%	(7.8%)	2.1	41%
GEM	< BBB	2.8%	4.3%	0.63	52.1%	(6.4%)	2.0	59%
Europe	> BB	1.7%	4.2%	0.41	62.4%	(12.2%)	1.3	82%
Europe	< BBB	(2.4%)	6.6%	(0.36)	47.9%	(24.9%)	(1.0)	18%
US	> BB	2.4%	4.8%	0.51	53.8%	(11.9%)	1.6	51%
US	< BBB	1.9%	5.6%	0.34	53.8%	(13.4%)	1.1	49%
Japan	> BB	3.1%	3.4%	0.90	63.2%	(3.7%)	2.8	65%
Japan	< BBB	2.7%	5.0%	0.55	55.6%	(8.5%)	1.8	35%

Source: J.P. Morgan Quantitative and Derivatives Strategy. Performance between Jan 2007 and Sep 2016

It may be therefore concluded that the across most regions a higher ESG rating is indeed more desirable for portfolio selection.

Across most regions >BB ratings have higher returns, higher Sharpe ratios and lower drawdowns.



## E, S or G?

Up to now, we have focussed on the composites of ESG, but are there preferences when it comes to return data for Environmental vs. Social, or Environmental vs. Governance? If so, do the results differ across the regions?

Environmental factors appear to offer the best risk/return profile across world when compared to Social or Governance factors.

**Table 8: Excess Returns of ESG, E, S, & G for MSCI Developed and Emerging Markets**

Excess Returns over respective benchmarks	MSCI Developed Markets			MSCI Emerging Markets		
	Returns	Sharpe	Max DD	Returns	Sharpe	Max DD
<b>Industry Adjusted Score (ESG)</b>	<b>-0.10%</b>	<b>-0.02</b>	<b>-13.10%</b>	<b>4.20%</b>	<b>0.78</b>	<b>-7.00%</b>
Environmental Score	2.10%	0.39	-10.20%	3.80%	0.70	-9.30%
Social Score	-2.10%	-0.30	-30.00%	0.70%	0.12	-19.50%
Governance Score	1.90%	0.30	-15.50%	0.00%	0.00	-14.00%

Source: J.P. Morgan Quantitative and Derivatives Strategy.

The table above suggests returns for both global developed markets and emerging markets are highest for Environmental scores, with high Sharpe ratios too and lower drawdowns. Governance issues return higher performance in developed market compared to emerging markets, but Social issues performance better in emerging markets than developed markets.

In the USA, Environmental factors show the best returns, in Europe Governance factors show the best returns (but ESG is preferred), and in Japan – while Environmental factors dominate, the return profile is strong across all ESG components.

**Table 9: Excess Returns of ESG, E, S, & G for USA, Europe and Japan**

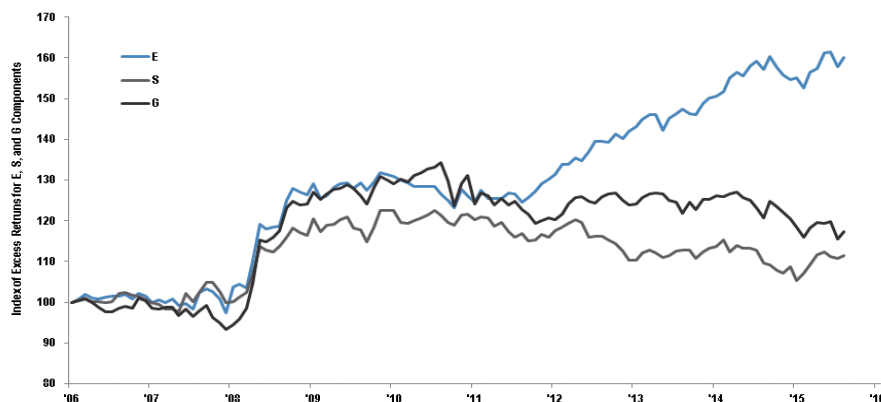
Excess Returns over respective benchmarks	Sharpe Ratios			Annualized Returns		
	USA	Europe	Japan	USA	Europe	Japan
<b>Industry Adjusted Score (ESG)</b>	<b>0.49</b>	<b>0.95</b>	<b>0.75</b>	<b>2.50%</b>	<b>4.00%</b>	<b>3.70%</b>
Environmental Score	0.77	0.15	0.86	4.60%	0.90%	4.10%
Social Score	0.25	0.42	0.70	1.40%	2.30%	3.40%
Governance Score	0.19	0.59	0.67	1.30%	3.00%	3.40%

Source: J.P. Morgan Quantitative and Derivatives Strategy.

Assessing the data across the largest regions/countries (USA, Japan and Europe) suggests returns are highest for Environmental factors in the USA and Japan and also greater than the composite of ESG.

In contrast, in Europe, Governance and Social factors appear to deliver the highest returns, but the ESG composite is preferred to its components. Japanese data is strong across the separate E, S and G components and also for the ESG composite.

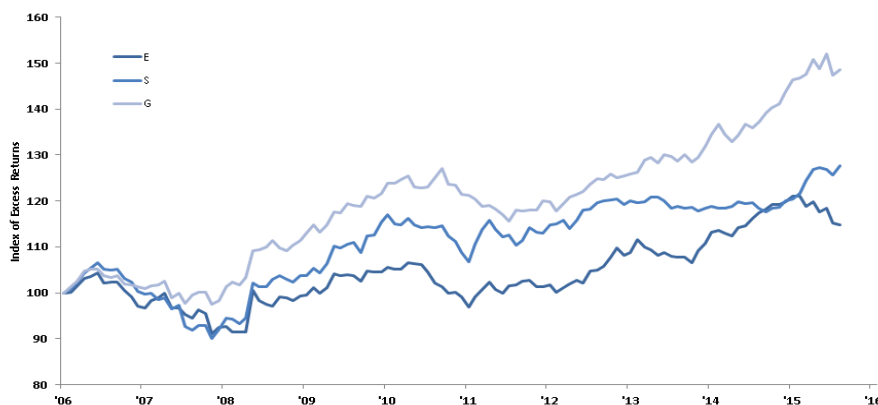
**Figure 14: Environmental Factors yield the Highest Returns in the USA**



Source: J.P. Morgan Quantitative and Derivatives Strategy

In Europe, Governance appears to offer more consistent returns relative to Environmental factors

Figure 15: Governance Factors Yield the Highest Returns in Europe



Source: J.P. Morgan Quantitative and Derivatives Strategy

The tables below show the cross sectional rank correlation for ESG factors highlighting the co-movement between each factor.

Table 10: Cross Sectional Rank Correlation for USA ESG Factors

USA Environmental and Governance share the lowest LT correlations, and Governance is the least positively correlated to overall ESG factors.

	ESG_IAS	ESG_WAS	ESG_EQW_	Environmental	Social	Governance
<b>ESG_Industry Adjusted</b>		87%	77%	58%	68%	44%
<b>ESG_Weighted</b>			87%	69%	75%	48%
<b>ESG_Equal Weight</b>				71%	69%	67%
<b>Environmental</b>					32%	24%
<b>Social</b>						28%
<b>Governance</b>						

Source: J.P. Morgan Quantitative and Derivatives Strategy

Table 11: Cross Sectional Rank Correlation for Japan ESG Factors

Japanese Governance and Environmental share the least positive correlation and Environmental has the highest correlation to overall ESG factors

	ESG_IAS	ESG_WAS	ESG_EQW_	Environmental	Social	Governance
<b>ESG_Industry Adjusted</b>		86%	78%	65%	64%	43%
<b>ESG_Weighted</b>			91%	75%	71%	49%
<b>ESG_Equal Weight</b>				75%	68%	64%
<b>Environmental</b>					31%	28%
<b>Social</b>						29%
<b>Governance</b>						

Source: J.P. Morgan Quantitative and Derivatives Strategy

Table 12: Cross Sectional Rank Correlation for Europe ESG Factors

European Governance and Environmental share the least positive correlation but all ESG factors show high positive correlation to the composite ESG scores.

	ESG_IAS	ESG_WAS	ESG_EQW_	Environmental	Social	Governance
<b>ESG_Industry Adjusted</b>		89%	81%	61%	69%	54%
<b>ESG_Weighted</b>			90%	71%	74%	57%
<b>ESG_Equal Weight</b>				72%	70%	71%
<b>Environmental</b>					34%	30%
<b>Social</b>						33%
<b>Governance</b>						

Source: J.P. Morgan Quantitative and Derivatives Strategy

Figure 16: European Stocks: ESG, Environmental, Social and Governance (November 30, 2016)

ESG				Environmental				Social				Governance			
Name	Ticker	Sector	Rank	Name	Ticker	Sector	Rank	Name	Ticker	Sector	Rank	Name	Ticker	Sector	Rank
Diageo PLC	DGE LN	Consumer Staples	1	Aberdeen Asset Manag	ADN LN	Financials	1	Neste Oyj	NESTE FH	Energy	1	Adecco Group AG	ADEN VX	Industrials	1
Schroders PLC	SDR LN	Financials	1	Sky PLC	SKY LN	Consumer Discretionary	1	ASML Holding NV	ASML NA	Information Technology	1	Swiss Re AG	SREN VX	Financials	1
Marks & Spencer Group	MKS LN	Consumer Discretionary	1	Aviva PLC	AV/ LN	Financials	1	CNH Industrial NV	CNHI IM	Industrials	1	Admiral Group PLC	ADM LN	Financials	1
L'Oreal SA	OR FP	Consumer Staples	1	Schroders PLC	SDR LN	Financials	1	Koninklijke Vopak NV	VPK NA	Energy	1	Provident Financial PL	PFG LN	Financials	1
Intesa Sanpaolo SpA	ISP IM	Financials	2	Legal & General Group	LGEN LN	Financials	2	Wolseley PLC	WOS LN	Industrials	2	United Utilities Group	FUU/ LN	Utilities	2
Intesa Sanpaolo SpA	ISPR IM	Financials	2	Babcock International	BAB LN	Industrials	2	Air Liquide SA	AI FP	Materials	2	RELX PLC	REL LN	Industrials	2
CRH PLC	CRH ID	Materials	2	Smith & Nephew PLC	SN/ LN	Health Care	2	Boliden AB	BOL SS	Materials	2	NN Group NV	NN NA	Financials	2
KBC Group NV	KBC BB	Financials	2	BT Group PLC	BT/A LN	Telecommunication Services	2	WPP PLC	WPP LN	Consumer Discretionary	2	Swiss Life Holding AG	SLHN VX	Financials	2
Wartsila OYJ Abp	WRT1V FH	Industrials	3	ITV PLC	ITV LN	Consumer Discretionary	3	Ashtead Group PLC	AHT LN	Industrials	3	National Grid PLC	NG/ LN	Utilities	3
Deutsche Post AG	DPW GR	Industrials	3	RELX NV	REN NA	Industrials	3	Skanska AB	SKAB SS	Industrials	3	Whitbread PLC	WTB LN	Consumer Discretionary	3
Merck KGaA	MRK GR	Health Care	3	Telenor ASA	TEL NO	Telecommunication Services	3	Abertis Infraestructuras	ABE SM	Industrials	3	Wolseley PLC	WOS LN	Industrials	3
Schneider Electric SE	SU FP	Industrials	3	SGS SA	SGSN VX	Industrials	3	Pernod Ricard SA	RI FP	Consumer Staples	3	Auto Trader Group PLC	AUTO LN	Information Technology	3
SAP SE	SAP GR	Information Technology	4	Vivendi SA	VIV FP	Consumer Discretionary	4	InterContinental Hotels	IHG LN	Consumer Discretionary	4	Worldpay Group PLC	WPG LN	Information Technology	4
Banco Bilbao Vizcaya	BBVA SM	Financials	4	Randstad Holding NV	RAND NA	Industrials	4	Diageo PLC	DGE LN	Consumer Staples	4	Schneider Electric SE	SU FP	Industrials	4
Siemens AG	SIE GR	Industrials	4	Swisscom AG	SCMN VX	Telecommunication Services	4	Barratt Developments	IBDEV LN	Consumer Discretionary	4	Next PLC	NXT LN	Consumer Discretionary	4
Koninklijke Vopak NV	VPK NA	Energy	4	TDC A/S	TDC DC	Telecommunication Services	4	Ferrovial SA	FER SM	Industrials	4	Unilever NV	UNA NA	Consumer Staples	4
Skanska AB	SKAB SS	Industrials	5	Elisa OYJ	ELISA FH	Telecommunication Services	5	ITV PLC	ITV LN	Consumer Discretionary	5	Zurich Insurance Group	ZURN VX	Financials	5
Essilor International S/	EI FP	Health Care	5	Telefonica SA	TEF SM	Telecommunication Services	5	Novozymes A/S	NZYMB DC	Materials	5	Umicore SA	UMI BB	Materials	5
J Sainsbury PLC	SBRY LN	Consumer Staples	5	Koninklijke KPN NV	KPN NA	Telecommunication Services	5	Kuehne + Nagel Intern	KNIN VX	Industrials	5	SSE PLC	SSE LN	Utilities	5
Neste Oyj	NESTE FH	Energy	5	Telia Co AB	TELIA SS	Telecommunication Services	5	Lundin Petroleum AB	LUPE SS	Energy	5	Wartsila OYJ Abp	WRT1V FH	Industrials	5
Kuehne + Nagel Intern	KNIN VX	Industrials	6	Adecco Group AG	ADEN VX	Industrials	6	Enagas SA	ENG SM	Utilities	6	Sampo Oyj	SAMPO FH	Financials	6
Investec PLC	INVP LN	Financials	6	Sonova Holding AG	SOON VX	Health Care	6	Gas Natural SDG SA	GAS SM	Utilities	6	Koninklijke Ahold Delh	AD NA	Consumer Staples	6
Natixis SA	KN FP	Financials	6	Essilor International S/	EI FP	Health Care	6	Linde AG	LIN GR	Materials	6	HUGO BOSS AG	BOSS GR	Consumer Discretionary	6
Orkla ASA	ORK NO	Consumer Staples	6	Lonza Group AG	LONN VX	Health Care	6	Natixis SA	KN FP	Financials	6	Segro PLC	SGRO LN	Real Estate	6
Boliden AB	BOL SS	Materials	7	Telecom Italia SpA/Mil	TIT IM	Telecommunication Services	7	CRH PLC	CRH ID	Materials	7	Direct Line Insurance	DLG LN	Financials	7
Danone SA	BN FP	Consumer Staples	7	Telecom Italia SpA/Mil	TITR IM	Telecommunication Services	7	Rexel SA	RXL FP	Industrials	7	Imperial Brands PLC	IMB LN	Consumer Staples	7
Novozymes A/S	NZYMB DC	Materials	7	Getinge AB	GETIB SS	Health Care	7	Norsk Hydro ASA	NHY NO	Materials	7	Baloise Holding AG	BALN VX	Financials	7
easyJet PLC	EZJ LN	Industrials	7	Proximus SADP	PROX BB	Telecommunication Services	7	Snam SpA	SRG IM	Energy	7	Nokia OYJ	NOKIA FH	Information Technology	7
WPP PLC	WPP LN	Consumer Discretionary	8	Experian PLC	EXPN LN	Industrials	8	Galp Energia SGPS S/	GALP PL	Energy	8	Koninklijke DSM NV	DSM NA	Materials	8
ASML Holding NV	ASML NA	Information Technology	8	3i Group PLC	III LN	Financials	8	Berkeley Group Holdin	BKG LN	Consumer Discretionary	8	HeidelbergCement AG	HEI GR	Materials	8
Coca-Cola HBC AG	CCH LN	Consumer Staples	8	Capita PLC	CPI LN	Industrials	8	Cie de Saint-Gobain	SGO FP	Industrials	8	UPM-Kymmene OYJ	UPM1V FH	Materials	8
CNH Industrial NV	CNHI IM	Industrials	8	RELX PLC	REL LN	Industrials	8	Allianz SE	ALV GR	Financials	8	Amadeus IT Group SA	AMS SM	Information Technology	8
Red Electrica Corp SA	REE SM	Utilities	9	Amadeus IT Group SA	AMS SM	Information Technology	9	Carlsberg A/S	CARLB DC	Consumer Staples	9	ASML Holding NV	ASML NA	Information Technology	9
Croda International PL	CRDA LN	Materials	9	Julius Baer Group Ltd	BAER VX	Financials	9	Taylor Wimpey PLC	TW/ LN	Consumer Discretionary	9	Standard Life PLC	SL/ LN	Financials	9
Segro PLC	SGRO LN	Real Estate	9	Old Mutual PLC	OML LN	Financials	9	Red Electrica Corp	SAREE SM	Utilities	9	Croda International PL	CRDA LN	Materials	9
Unibail-Rodamco SE	UL NA	Real Estate	9	Mediclinic International	MDC LN	Health Care	9	Boskalis Westminster	BOKA NA	Industrials	9	CRH PLC	CRH ID	Materials	9
AXA SA	CS FP	Financials	10	WPP PLC	WPP LN	Consumer Discretionary	10	Aena SA	AENA SM	Industrials	10	Swiss Prime Site AG	SPSN SW	Real Estate	10
ITV PLC	ITV LN	Consumer Discretionary	10	AXA SA	CS FP	Financials	10	Essilor International S/	EI FP	Health Care	10	Neste Oyj	NESTE FH	Energy	10
BT Group PLC	BT/A LN	Telecommunication Services	10	G4S PLC	GFS LN	Industrials	10	Statoil ASA	STL NO	Energy	10	Bunzl PLC	BNZL LN	Industrials	10
Deutsche Boerse AG	DB11 GR	Financials	10	Publicis Groupe SA	PUB FP	Consumer Discretionary	10	Volvo AB	VOLVB SS	Industrials	10	RELX NV	REN NA	Industrials	10

Source: J.P. Morgan Quantitative and Derivatives Strategy

Figure 17: US Stocks: ESG, Environmental, Social and Governance (November 30, 2016)

ESG				Environmental				Social				Governance			
Name	Ticker	Sector	Rank	Name	Ticker	Sector	Rank	Name	Ticker	Sector	Rank	Name	Ticker	Sector	Rank
Ecolab Inc	ECL US	Materials	1	American Express Co	AXP US	Financials	1	Spectra Energy Corp	SE US	Energy	1	Delphi Automotive PLC	DLPH US	Consumer Discretionary	1
Henry Schein Inc	HSIC US	Health Care	1	Automatic Data Process	ADP US	Information Technology	1	Patterson Cos Inc	PDCO US	Health Care	1	Ashland LLC	ASH US	Materials	1
3M Co	MMM US	Industrials	1	Baxter International Inc	BAX US	Health Care	1	Cummins Inc	CMI US	Industrials	1	ManpowerGroup Inc	MAN US	Industrials	1
Patterson Cos Inc	PDCO US	Health Care	1	Becton Dickinson and Co	BDX US	Health Care	1	FMC Technologies Inc	FTI US	Energy	1	Accenture PLC	ACN US	Information Technology	1
Rockwell Collins Inc	COL US	Industrials	1	Verizon Communications	VZ US	Telecommunication Services	1	Praxair Inc	PX US	Materials	1	Bunge Ltd	BG US	Consumer Staples	1
Bunge Ltd	BG US	Consumer Staples	1	Boston Scientific Corp	BSX US	Health Care	1	WW Grainger Inc	GWV US	Industrials	1	Nordstrom Inc	JWN US	Consumer Discretionary	1
Tiffany & Co	TIF US	Consumer Discretionary	1	Mettler-Toledo International	MTD US	Health Care	1	Air Products & Chemicals	APD US	Materials	1	F5 Networks Inc	FFIV US	Information Technology	1
Accenture PLC	ACN US	Information Technology	2	Cardinal Health Inc	CAH US	Health Care	2	Discovery Communications	DISCA US	Consumer Discretionary	2	Unum Group	UNM US	Financials	2
Microsoft Corp	MSFT US	Information Technology	2	Cigna Corp	CI US	Health Care	2	Discovery Communications	DISCK US	Consumer Discretionary	2	NRG Energy Inc	NRG US	Utilities	2
Kellogg Co	K US	Consumer Staples	2	Walt Disney Co/The	DIS US	Consumer Discretionary	2	Scripps Networks Interactive	SNI US	Consumer Discretionary	2	CDK Global Inc	CDK US	Information Technology	2
Cummins Inc	CMI US	Industrials	2	Humana Inc	HUM US	Health Care	2	Phillips 66	PSX US	Energy	2	Mid-America Apartment Communities	MAA US	Real Estate	2
Cardinal Health Inc	CAH US	Health Care	2	Agilent Technologies Inc	A US	Health Care	2	Rockwell Collins Inc	COL US	Industrials	2	Lam Research Corp	LRCX US	Information Technology	2
Tesla Motors Inc	TSLA US	Consumer Discretionary	2	ManpowerGroup Inc	MAN US	Industrials	2	Caterpillar Inc	CAT US	Industrials	2	XL Group Ltd	XL US	Financials	2
Agilent Technologies Inc	A US	Health Care	2	Edwards Lifesciences	EW US	Health Care	2	Deere & Co	DE US	Industrials	2	KeyCorp	KEY US	Financials	2
NextEra Energy Inc	NEE US	Utilities	3	Marsh & McLennan Companies	MMC US	Financials	3	Baker Hughes Inc	BHI US	Energy	3	Microsoft Corp	MSFT US	Information Technology	3
General Electric Co	GE US	Industrials	3	Northern Trust Corp	NTRS US	Financials	3	CBRE Group Inc	CBG US	Real Estate	3	American Capital Agency	AGNC US	Financials	3
International Flavors & Fragrances	IFF US	Materials	3	Capital One Financial Corp	COF US	Financials	3	United Rentals Inc	URI US	Industrials	3	Amazon.com Inc	AMZN US	Consumer Discretionary	3
Clorox Co/The	CLX US	Consumer Staples	3	AT&T Int'l	T US	Telecommunication Services	3	Intel Corp	INTC US	Information Technology	3	Tractor Supply Co	TSCO US	Consumer Discretionary	3
Zoetis Inc	ZTS US	Health Care	3	Stryker Corp	SYK US	Health Care	3	Molson Coors Brewing	TAP US	Consumer Staples	3	Union Pacific Corp	UNP US	Industrials	3
Exelon Corp	EXC US	Utilities	3	State Street Corp	STT US	Financials	3	Marathon Petroleum Corp	MPC US	Energy	3	OGE Energy Corp	OGE US	Utilities	3
General Mills Inc	GIS US	Consumer Staples	3	UnitedHealth Group Inc	UNH US	Health Care	3	Realty Group Holdings	RLGY US	Real Estate	3	Cognizant Technology	CTSH US	Information Technology	3
ManpowerGroup Inc	MAN US	Industrials	4	Varian Medical Systems	VAR US	Health Care	4	Lam Research Corp	LRCX US	Information Technology	4	Expeditors International	EXPD US	Industrials	4
Eversource Energy	ES US	Utilities	4	Invesco Ltd	IVZ US	Financials	4	ONEOK Inc	OKE US	Energy	4	Waste Connections Inc	WCN US	Industrials	4
Hewlett Packard Enterprise	HPE US	Information Technology	4	Level 3 Communications	LVT US	Telecommunication Services	4	Applied Materials Inc	AMAT US	Information Technology	4	Fortive Corp	FTV US	Industrials	4
Intel Corp	INTC US	Information Technology	4	Quintiles Transnational	Q US	Health Care	4	Brown-Forman Corp	BF/B US	Consumer Staples	4	Citizens Financial Group	CFG US	Financials	4
WhiteWave Foods Co	WWAV US	Consumer Staples	4	Liberty Global PLC	LBTYA US	Consumer Discretionary	4	PG&E Corp	PCG US	Utilities	4	Darden Restaurants Inc	DRI US	Consumer Discretionary	4
Campbell Soup Co	CPB US	Consumer Staples	4	Liberty Global PLC	LBTYK US	Consumer Discretionary	4	Valero Energy Corp	VLO US	Energy	4	Brixmor Property Group	BRX US	Real Estate	4
Honeywell International Inc	HON US	Industrials	4	Twenty-First Century	FFOX US	Consumer Discretionary	4	Agilent Technologies Inc	A US	Health Care	4	Parker-Hannifin Corp	PH US	Industrials	4
Best Buy Co Inc	BBY US	Consumer Discretionary	5	Twenty-First Century	FFOX US	Consumer Discretionary	5	IDEXX Laboratories Inc	IDXX US	Health Care	5	Electronic Arts Inc	EA US	Information Technology	5
HP Inc	HPQ US	Information Technology	5	Sprint Corp	S US	Telecommunication Services	5	Cooper Cos Inc/The	COO US	Health Care	5	Cardinal Health Inc	CAH US	Health Care	5
WW Grainger Inc	GWV US	Industrials	5	Willis Towers Watson	IWLTV US	Financials	5	Exelon Corp	EXC US	Utilities	5	Mattel Inc	MAT US	Consumer Discretionary	5
Prologis Inc	PLD US	Real Estate	5	Voya Financial Inc	VOYA US	Financials	5	WABCO Holdings Inc	WBC US	Industrials	5	CMS Energy Corp	CMS US	Utilities	5
PepsiCo Inc	PEP US	Consumer Staples	5	Anthem Inc	ANTM US	Health Care	5	Fastenal Co	FAST US	Industrials	5	Rockwell Automation Inc	ROK US	Industrials	5
FMC Technologies Inc	FTI US	Energy	5	Liberty Global PLC	LILAK US	Consumer Discretionary	5	Henry Schein Inc	HSIC US	Health Care	5	Xylem Inc/NY	XYL US	Industrials	5
Xylem Inc/NY	XYL US	Industrials	5	Medtronic PLC	MDT US	Health Care	5	Jones Lang LaSalle Inc	JLL US	Real Estate	5	CarMax Inc	KMX US	Consumer Discretionary	5
Baker Hughes Inc	BHI US	Energy	6	Nielsen Holdings PLC	NLSN US	Industrials	6	Workday Inc	WDAY US	Information Technology	6	CF Industries Holdings	CF US	Materials	6
Sempra Energy	SRE US	Utilities	6	Johnson Controls International	JCI US	Industrials	6	Skyworks Solutions Inc	SWKS US	Information Technology	6	First Republic Bank/CJ	FRC US	Financials	6
Hess Corp	HES US	Energy	6	S&P Global Inc	SPGI US	Financials	6	Weyerhaeuser Co	WY US	Real Estate	6	Dollar General Corp	DG US	Consumer Discretionary	6
Mattel Inc	MAT US	Consumer Discretionary	6	Bank of New York Mellon	BK US	Financials	6	Southern Co/The	SO US	Utilities	6	Weyerhaeuser Co	WY US	Real Estate	6
Signet Jewelers Ltd	SIG US	Consumer Discretionary	6	Time Warner Inc	TWX US	Consumer Discretionary	6	Prologis Inc	PLD US	Real Estate	6	Snap-on Inc	SNA US	Industrials	6

Source: J.P. Morgan Quantitative and Derivatives Strategy

Figure 18: Asia ex-Japan Stocks: ESG, Environmental, Social and Governance (November 30, 2016)

ESG				Environmental				Social				Governance			
Name	Ticker	Sector	Rank	Name	Ticker	Sector	Rank	Name	Ticker	Sector	Rank	Name	Ticker	Sector	Rank
Mirvac Group	MGR AU	Real Estate	1	China Mobile Ltd	941 HK	Telecommunication Services	1	Transurban Group	TCL AU	Industrials	1	Mercury NZ Ltd	MCY NZ	Utilities	1
City Developments Ltd	CIT SP	Real Estate	1	Telstra Corp Ltd	TLS AU	Telecommunication Services	1	Astro Malaysia Holding	ASTRO MK	Consumer Discretionary	1	Fletcher Building Ltd	FBU NZ	Materials	1
MTR Corp Ltd	66 HK	Industrials	1	Cheil Worldwide Inc	030000 KS	Consumer Discretionary	1	APA Group	APA AU	Utilities	1	Challenger Ltd/Australi	CGF AU	Financials	1
Stockland	SGP AU	Real Estate	1	Taiwan Mobile Co Ltd	3045 TT	Telecommunication Services	1	Media Nusantara Citra	MNCN IJ	Consumer Discretionary	1	Tenaga Nasional Bhd	TNB MK	Utilities	1
Yes Bank Ltd	YES IN	Financials	1	LG Uplus Corp	032640 KS	Telecommunication Services	1	Sydney Airport	SYD AU	Industrials	1	Semen Indonesia Pers	SMGR IJ	Materials	1
Brambles Ltd	BXB AU	Industrials	1	Singapore Exchange	LSGX SP	Financials	1	Origin Energy Ltd	ORG AU	Energy	1	Stockland	SGP AU	Real Estate	1
BTS Group Holdings	PBTS TB	Industrials	1	KT Corp	030200 KS	Telecommunication Services	1	City Developments Ltd	CIT SP	Real Estate	1	AMP Ltd	AMP AU	Financials	1
LendLease Group	LLC AU	Real Estate	2	KEPCO Plant Service	051600 KS	Industrials	2	Global Mediacom Tbk	BMTR IJ	Consumer Discretionary	2	Hang Seng Bank Ltd	11 HK	Financials	2
Minor International PC	MINT TB	Consumer Discretionary	2	Axiata Group Bhd	AXIATA MK	Telecommunication Services	2	Santos Ltd	STO AU	Energy	2	Ascendas Real Estate	AREIT SP	Real Estate	2
Woodside Petroleum	LWPL AU	Energy	2	Mahindra & Mahindra	IMMFS IN	Financials	2	Woodside Petroleum	LWPL AU	Energy	2	Brambles Ltd	BXB AU	Industrials	2
Dexus Property Group	DXS AU	Real Estate	2	True Corp PCL	TRUE TB	Telecommunication Services	2	PTT PCL	PTT TB	Energy	2	Mirvac Group	MGR AU	Real Estate	2
Transurban Group	TCL AU	Industrials	2	SK Telecom Co Ltd	017670 KS	Telecommunication Services	2	BTS Group Holdings	PBTS TB	Industrials	2	Meridian Energy Ltd	MEL NZ	Utilities	2
Geely Automobile Hold	175 HK	Consumer Discretionary	2	Chunghwa Telecom	C2412 TT	Telecommunication Services	2	UOL Group Ltd	UOL SP	Real Estate	2	Insurance Australia	GnIAG AU	Financials	2
Fletcher Building Ltd	FBU NZ	Materials	2	Westpac Banking Corp	WBC AU	Financials	2	Siliconware Precision	I2325 TT	Information Technology	2	Huadian Power Intern	1071 HK	Utilities	2
Hang Seng Bank Ltd	11 HK	Financials	3	Globe Telecom Inc	GLO PM	Telecommunication Services	3	BEC World PCL	BEC TB	Consumer Discretionary	3	ACC Ltd	ACC IN	Materials	3
Keppel Corp Ltd	KEP SP	Industrials	3	Advanced Info Service	ADVANC TB	Telecommunication Services	3	Airports of Thailand	PAOT TB	Industrials	3	Lenovo Group Ltd	992 HK	Information Technology	3
Public Bank Bhd	PBK MK	Financials	3	StarHub Ltd	STH SP	Telecommunication Services	3	IRPC PCL	IRPC TB	Energy	3	Caltex Australia Ltd	CTX AU	Energy	3
Kasikombank PCL	KBANK TB	Financials	3	Spark New Zealand	LtSPK NZ	Telecommunication Services	3	Thai Oil PCL	TOP TB	Energy	3	Shriram Transport Fin	SHTF IN	Financials	3
Kasikombank PCL	KBANK/F TB	Financials	3	Singapore Telecommu	ST SP	Telecommunication Services	3	GS Holdings Corp	078930 KS	Energy	3	Singapore Press Holdi	SPH SP	Consumer Discretionary	3
Siam Cement PCL/The	SCC/F TB	Materials	3	Hong Kong Exchange	388 HK	Financials	3	Caltex Australia Ltd	CTX AU	Energy	3	Medibank Pvt Ltd	MPL AU	Financials	3
Siam Cement PCL/The	SCC TB	Materials	3	ASX Ltd	ASX AU	Financials	3	Mirvac Group	MGR AU	Real Estate	3	Contact Energy Ltd	CEN NZ	Utilities	3
British American Tobac	ROTH MK	Consumer Staples	4	Auckland International	AIA NZ	Industrials	4	Central Pattana PCL	CPN TB	Real Estate	4	ASM Pacific Technolo	522 HK	Information Technology	4
Tabcorp Holdings Ltd	TAH AU	Consumer Discretionary	4	Brambles Ltd	BXB AU	Industrials	4	Treasury Wine Estates	TWE AU	Consumer Staples	4	Marico Ltd	MRCO IN	Consumer Staples	4
SEEK Ltd	SEK AU	Industrials	4	National Australia Ban	NAB AU	Financials	4	Auckland International	AIA NZ	Industrials	4	AAC Technologies Hol	2018 HK	Information Technology	4
GPT Group/The	GPT AU	Real Estate	4	Fubon Financial Holdi	2881 TT	Financials	4	LendLease Group	LLC AU	Real Estate	4	Treasury Wine Estates	TWE AU	Consumer Staples	4
Mercury NZ Ltd	MCY NZ	Utilities	4	Shandong Weigao Gr	1066 HK	Health Care	4	AKR Corporatio	Tbk FAKRA IJ	Industrials	4	Dexus Property Group	DXS AU	Real Estate	4
Sydney Airport	SYD AU	Industrials	4	BTS Group Holdings	PBTS TB	Industrials	4	Swire Properties Ltd	1972 HK	Real Estate	4	Yes Bank Ltd	YES IN	Financials	4
Boral Ltd	BLD AU	Materials	4	Chailease Holding Co	15871 TT	Financials	4	Jardine Cycle & Carria	JCNC SP	Consumer Discretionary	4	GPT Group/The	GPT AU	Real Estate	4
Origin Energy Ltd	ORG AU	Energy	5	DiGi.Com Bhd	DIGI MK	Telecommunication Services	5	Perusahaan Gas Neg	PGAS IJ	Utilities	5	Flight Centre Travel	GrFLT AU	Consumer Discretionary	5
Chunghwa Telecom	C2412 TT	Telecommunication Services	5	Cochlear Ltd	COH AU	Health Care	5	CLP Holdings Ltd	2 HK	Utilities	5	China Southern Airline	1055 HK	Industrials	5
BOC Hong Kong Holdi	2388 HK	Financials	5	LendLease Group	LLC AU	Real Estate	5	Singapore Airlines Ltd	SIA SP	Industrials	5	Coca-Cola Amatil Ltd	CCL AU	Consumer Staples	5
Hysan Development C	14 HK	Real Estate	5	AMOREPACIFIC Grou	002790 KS	Consumer Staples	5	Stockland	SGP AU	Real Estate	5	Maruti Suzuki India	LtdMSIL IN	Consumer Discretionary	5
Bank Mandiri Persero	BMRI IJ	Financials	5	Unilever Indonesia	TbUNVR IJ	Consumer Staples	5	Minor International	PC MINT TB	Consumer Discretionary	5	Felda Global Ventures	FGV MK	Consumer Staples	5
Aurizon Holdings Ltd	AZJ AU	Industrials	5	Sonic Healthcare Ltd	SHL AU	Health Care	5	Taiwan Semiconducto	2330 TT	Information Technology	5	Aurizon Holdings Ltd	AZJ AU	Industrials	5
Healthscope Ltd	HSO AU	Health Care	5	Idea Cellular Ltd	IDEA IN	Telecommunication Services	5	Boral Ltd	BLD AU	Materials	5	New China Life Insur	1336 HK	Financials	5
Alumina Ltd	AWC AU	Materials	6	Bharti Infratel Ltd	BHIN IN	Telecommunication Services	6	Jasa Marga Persero	TJSMR IJ	Industrials	6	Alibaba Pictures Grou	1060 HK	Consumer Discretionary	6
LG Display Co Ltd	034220 KS	Information Technology	6	Hindustan Unilever	LtdHUVR IN	Consumer Staples	6	Hysan Development	C 14 HK	Real Estate	6	Infosys Ltd	INFO IN	Information Technology	6
Tatts Group Ltd	TTS AU	Consumer Discretionary	6	Computershare Ltd	CPU AU	Information Technology	6	HAP Seng Consolida	HAP MK	Industrials	6	Boral Ltd	BLD AU	Materials	6
Shinhan Financial Gro	055550 KS	Financials	6	Platinum Asset Manag	PTM AU	Financials	6	SK Hynix Inc	000660 KS	Information Technology	6	Hong Kong Exchange	388 HK	Financials	6
Westpac Banking Corp	WBC AU	Financials	6	SEEK Ltd	SEK AU	Industrials	6	Bharti Infratel Ltd	BHIN IN	Telecommunication Services	6	DBS Group Holdings	LDBS SP	Financials	6

Source: J.P. Morgan Quantitative and Derivatives Strategy

### Segregating the investment universe on ESG scores

The underlying investment universe may also be segregated into two, firstly the best ranking stocks on the ESG scores in one portfolio (“stocks to prefer”) and the second portfolio of stocks with poorest ESG scores (IAS) (“stocks to avoid”). This is an exercise similar to the one in the previous section where we segregated the universe based on ESG ratings. Rather than having portfolios with unequal number of stocks, this current approach allows us to monitor equal-sized portfolios of, say, 50 stocks.

We find a portfolio of 50 stocks made up of the highest ESG scores typically outperforms the portfolio of 50 with lowest ESG scores though the performance is inverted in the broader regions. The outperformance for high over low ESG score portfolios is particularly stark for Europe (and UK). Interestingly, the two portfolios have extremely similar performance within US.

Table 13: Annualized Returns (excess over the respective benchmark)

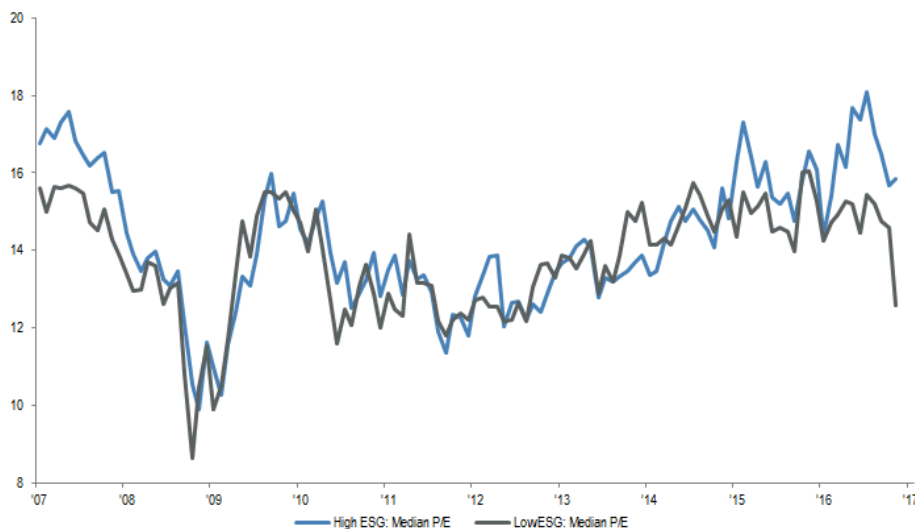
	ACWI	GDM	GEM	USA	Europe	Japan	UK	Asia Ex JP
<b>Top 50</b>	0.3%	(0.6%)	3.9%	2.8%	4.0%	3.7%	1.6%	3.3%
<b>Bottom 50</b>	3.0%	1.9%	4.2%	2.5%	(1.9%)	2.6%	(0.4%)	2.2%

Source: J.P. Morgan Quantitative and Derivatives Strategy

We also look at these segregated portfolios and analyse if they show differences behaviourally. For example, we look at the median Price/Earnings multiple for both portfolios to see if there is a difference in valuation of the two.

For example, in the global ACWI universe, we find the P/E ratios to be similar for most part, though the high ESG scores have trading at a higher P/E multiple over the last year.

Figure 19: Median P/E ratio for the high and low ESG scores portfolios in MSCI ACWI

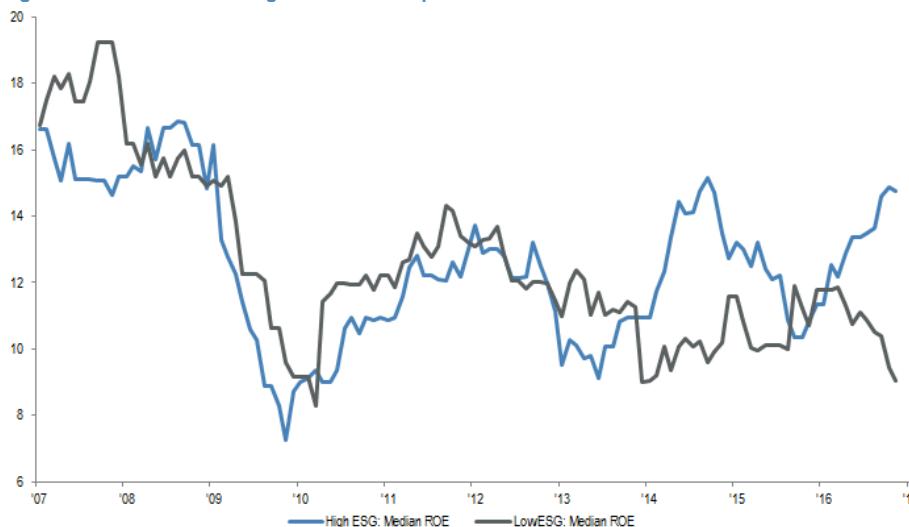


Source: J.P. Morgan Quantitative and Derivatives Strategy



Similarly, we look at the median ROE for each of the two portfolios. Once again, we find the global high ESG portfolio to have a higher ROE in recent years while historically the two have been similar.

Figure 20: Median ROE of high and low ESG portfolios in MSCI ACWI



Source: J.P. Morgan Quantitative and Derivatives Strategy

We summarise these metrics for major regions in the table below. For the most part, we find higher P/E ratios for the portfolio of stocks with high ESG scores (i.e. more expensive compared to portfolio of stocks with low ESG scores). However, the difference is not very big and for most practical considerations, may be considered similar.

Similarly, we find marginally higher ROEs for the high ESG portfolios, though, once again, the difference is not significant. We also look at realised volatility of both portfolios in each region and generally observe the high ESG portfolios to have lower volatility than the low ESG portfolios.

Figure 21: Fundamental Metrics (long term average) of High and Low ESG Portfolios across Regions

	ACWI	GDM	GEM	Japan	Europe	US	UK	Asia Ex
Avg. P/E (Top)	12.6	12.5	16.0	7.2	13.8	17.4	17.0	13.2
Avg. P/E (Bottom)	12.6	12.6	14.0	7.4	13.0	13.7	17.2	12.7
Avg. ROE (Top)	14.3	14.3	12.5	15.8	13.9	15.3	13.5	14.9
Avg. ROE (Bottom)	13.8	14.0	13.2	16.0	12.6	14.6	13.1	13.3
Avg. Volatility (Top)	28.4%	28.4%	31.1%	33.5%	28.3%	26.3%	27.5%	29.9%
Avg. Volatility (Bottom)	32.9%	31.4%	34.4%	34.2%	30.5%	31.7%	31.9%	35.2%

Source: J.P. Morgan Quantitative and Derivatives Strategy

## Comparing ESG High/Low scores to ESG Momentum

It is often unclear whether the most useful information for an investor is in the level of the ESG score or whether the change in the score (its Momentum) is a better guide to how the behaviour of a company may be changing.

To investigate, we have used top 50 and bottom 50 stocks split into a quadrant by looking at the change in ESG score within each half. Each half is now two groups in itself, one with improving ESG scores (over the last 12 months) and the other with declining ESG scores over the period. In effect, we have a quadrant where the horizontal axis splits stocks above and below the median ESG score and the vertical axis splits the stocks into improving or declining ESG scores.

In the ACWI region, we find a split in performance between all four quadrants with High and Rising favoured versus Low and Falling. The Sharpe ratios for the high ESG level scores as expected are much higher than the low ESG level scores.

However, what is most intriguing is the difference in returns and Sharpe ratio between the High and Rising and High and Falling quadrants.

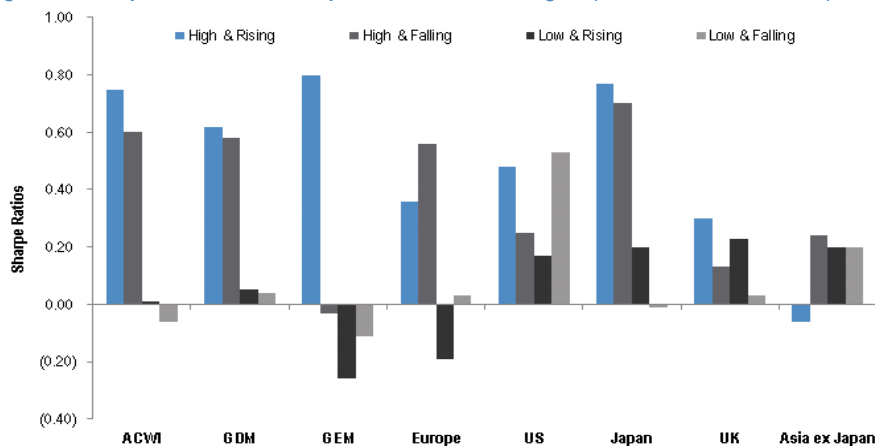
Table 14: Performance of each Quadrant in MSCI ACWI (excess returns)

ESG Quadrant	Ann Ret	Ann Vol	Sharpe	Max DD	Hit Rate	# Months
High & Rising	6.0%	7.9%	0.75	(8.4%)	57.0%	107
High & Falling	3.5%	5.9%	0.60	(7.9%)	57.9%	107
Low & Rising	0.1%	7.1%	0.01	(22.5%)	49.5%	107
Low & Falling	(0.6%)	10.3%	(0.06)	(25.3%)	50.5%	107

Source: J.P. Morgan Quantitative and Derivatives Strategy

We repeated the exercise for other regions. In GDM, GEM, Europe and USA, Japan and the UK, we find the “High and Rising” quadrant delivered good outperformance relative to the other groups. In Asia Pac ex-Japan, the results are less conclusive.

Figure 22: Sharpe ratios for the four portfolios from each region (based on excess returns)



Source: J.P. Morgan Quantitative and Derivatives Strategy

## Does Exclusions (negative screening) really work?

In the first section of the report, we discussed how the largest exposure to SRI/ESG investments involved looking at exclusion strategies (“sin stocks” etc). We now look at ESG for qualitative filtering of stocks from a systematic Long/Short portfolio strategy. The thought behind this exercise is to assess whether we could avoid adverse performance in our Long (or Short) portfolios by excluding stocks that may otherwise rank poorly (highly) on ESG scores.

For a Long/Short factor strategy (such as trailing Price/Earnings), we adopt an additional layer of filter that will not allow stocks in the Long basket that are rated in the “CCC” rating category, while the Short basket excludes all stocks that are rated “AAA”.

Our analysis shows there a few significant differences in the original P/E ratio for Longs and Shorts, though we do observe Shorts adjusted for ESG ratings are worse off. This helps the Long/Short strategy to look marginally better than the pure P/E Long/Short strategy.

For an ACWI portfolio, adjusting for exclusions does not appear to enhance long portfolios but the long/short benefits from improved performance from the shorts.

Table 15: Performance summary in ACWI by filtering for top and bottom rated ESG stocks

Excess returns	Returns	Volatility	Sharpe	Hit Rate	DD	t-Stat	Skew	Kurtosis
<b>Long</b>	3.0%	15.7%	0.19	53.0%	-41.8%	0.83	1.48	10.3
Adjusted Longs	2.7%	15.7%	0.17	50.4%	-41.4%	0.76	1.41	10.0
<b>Short</b>	(4.2%)	17.0%	(0.25)	41.9%	-58.6%	-0.54	1.51	8.3
Adjusted Shorts	(4.8%)	16.4%	(0.30)	40.2%	-59.4%	-0.70	1.39	8.0
<b>Long / Short</b>	6.6%	12.3%	0.54	65.8%	-21.9%	1.81	0.77	7.2
Adjusted Long / Short	7.0%	12.1%	0.58	66.7%	-22.7%	1.93	0.84	8.2

Source: J.P. Morgan Quantitative and Derivatives Strategy.

The results appear to be better in the GDM with the Longs improving their annualised returns performance by 30bps and Shorts getting poorer by 40bps. The Long/Short annualized returns went from 1.3% to 2.3%.

Table 16: Performance summary in GDM by filtering for top and bottom rated ESG stocks

Excess returns	Returns	Volatility	Sharpe	Hit Rate	DD	t-Stat	Skew	Kurtosis
<b>Longs</b>	0.3%	13.6%	0.02	52.1%	-44.5%	0.27	1.26	11.7
Adjusted Longs	0.6%	14.0%	0.04	53.0%	-46.0%	0.34	1.35	12.7
<b>Short</b>	(1.9%)	15.7%	(0.12)	45.3%	-41.1%	-0.14	1.49	7.9
Adjusted Shorts	(2.3%)	14.7%	(0.16)	44.4%	-40.6%	-0.28	1.14	7.0
<b>Long / Short</b>	1.3%	10.9%	0.12	54.7%	-21.6%	0.53	-0.62	6.2
Adjusted Long / Short	2.3%	10.6%	0.22	54.7%	-24.1%	0.83	0.18	5.0

Source: J.P. Morgan Quantitative and Derivatives Strategy.

For a GDM universe, adjusting for exclusions does appear to improve longs, and shorts, but at the expense of suffering slightly larger drawdowns.

We found few changes in the GEM region for the additional filter strategy, though it may partially be explained by the lack of stocks in those extreme rating categories.

Table 17: Performance summary in GEM by filtering for top and bottom rated ESG stocks

Excess returns	Returns	Volatility	Sharpe	Hit Rate	DD	t-Stat	Skew	Kurtosis
Longs	9.2%	12.1%	0.76	53.0%	-14.8%	2.46	1.25	5.3
Adjusted Longs	9.0%	12.0%	0.75	53.0%	-15.6%	2.44	1.27	5.5
Short	(7.8%)	9.1%	(0.85)	33.3%	-59.0%	-2.62	1.02	5.0
Adjusted Shorts	(7.7%)	9.1%	(0.85)	34.2%	-58.9%	-2.62	1.02	5.0
Long / Short	17.8%	11.9%	1.50	68.4%	-9.0%	4.51	1.24	7.0
Adjusted Long / Short	17.6%	11.7%	1.51	69.2%	-9.9%	4.55	1.36	7.4

Source: J.P. Morgan Quantitative and Derivatives Strategy.

### Can ESG be explained by traditional Quant Factors?

We have run a *univariate regression* for ESG factors against the conventional Quant factors looking at the factor loadings

Earlier in this section, we discussed “benchmark data” and how the ESG benchmark indices perform in line with their parent indices. Later, we will try to investigate how ESG scores can be used to construct “smart beta” portfolios along the lines of Value, Minimum Variance, Quality, and other such factors prominently in use. However, in order to understand whether ESG is or could be used as a “new” source of alpha, we first analyse whether ESG factors can be explained by traditional Quant/Style factors.

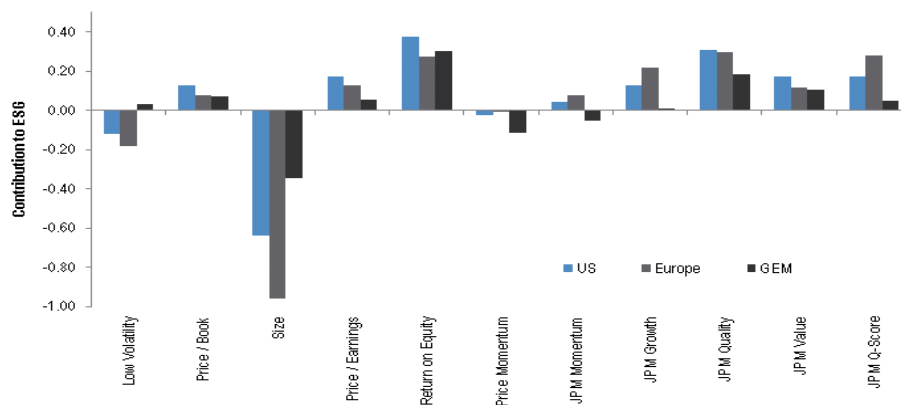
We have run a *univariate regression* for ESG factors against the conventional Quant factors looking at the factor loadings. The objective is to see what we can learn about ESG scores, and their relationships with traditional factors.

Every month, for each factor including ESG, we have built portfolios of top 50 stocks ranked on the underlying factor and take the portfolio performance (excess returns) on a monthly basis.

We see in the chart below that based on the portfolio returns of the top 50 names, size seems to have a negative loading on the ESG factor, implying a non-large cap bias (or bias towards smaller cap stocks). Since our portfolio selection is based on top 50 names on each factor, the size portfolio is made up of the mega-caps within each of the three regions. It therefore follows that strong ESG ratings are not necessarily limited to large-cap names.

Using the top 50 stocks for each factor we find a bias towards smaller capitalised stocks

Figure 23: Individual Factor loadings based on univariate regression for 50 stock portfolio



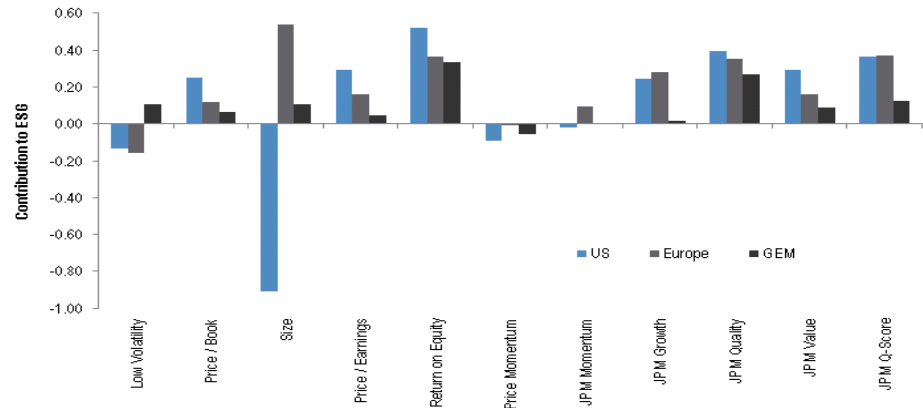
Source: J.P. Morgan Quantitative and Derivatives Strategy

It must be remembered that these regressions were run for ESG against one Quant factor at a time. Therefore, the factor loadings depicted in the chart are independent of each other.

To better understand if the largest Size loading changes if we alter a few back-test settings, we reran the analysis, this time considering portfolios of top ranking 100 stocks (rather than 50). Interestingly, we find the loadings for most factors remain similar except Size in Europe and GEM. These loadings are now positive in the two regions, strongly so in the case of Europe. Once again, these loadings are independent of each other since we ran a univariate regression.

Using the top 100 stocks for each factor we find the Size bias fades in Europe and GEM

Figure 24: Individual Factor loadings based on univariate regression for 100 stock portfolio

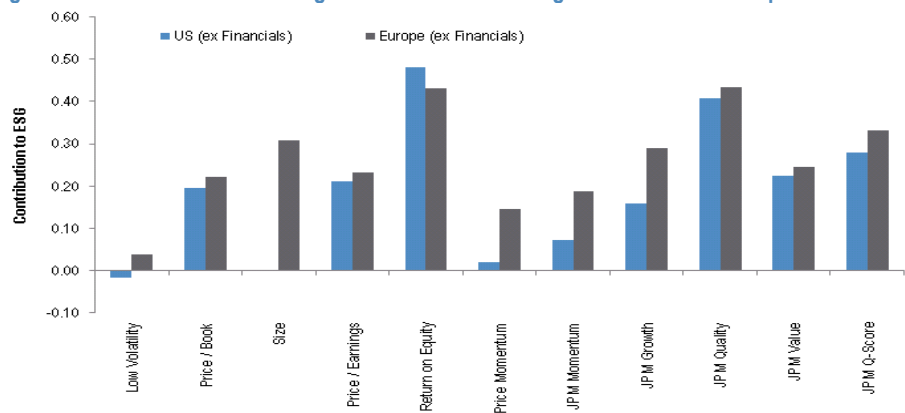


Source: J.P. Morgan Quantitative and Derivatives Strategy

We also ran these regressions in US and European regions after excluding all financials. These factor loadings are comparable to those observed for the Top 100 ranking stock portfolios except Size for the US, which is now observed to be closer to zero.

Excluding Financials suggests the Size bias fades in the USA

Figure 25: Individual Factor loadings based on univariate regression for 100 stock portfolio

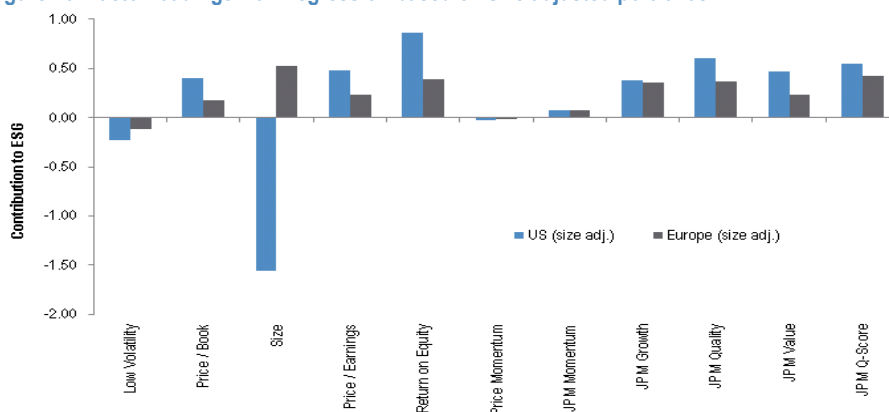


Source: J.P. Morgan Quantitative and Derivatives Strategy

As a further test, we look at size normalising factor portfolios. We first take the underlying universe and split it into 5 size baskets (biggest 20% stocks, next biggest 20% stocks and so on). Within each basket, we select 10 best ranking stocks on the selected factor (for example, Price/Book). This ensures that our factor portfolio isn't biased (positively or negatively) by the market cap.

Once again, barring size, we find similar factor loadings across most other Styles for both US and Europe.

Figure 26: Factor loadings from regression based on size adjusted portfolios



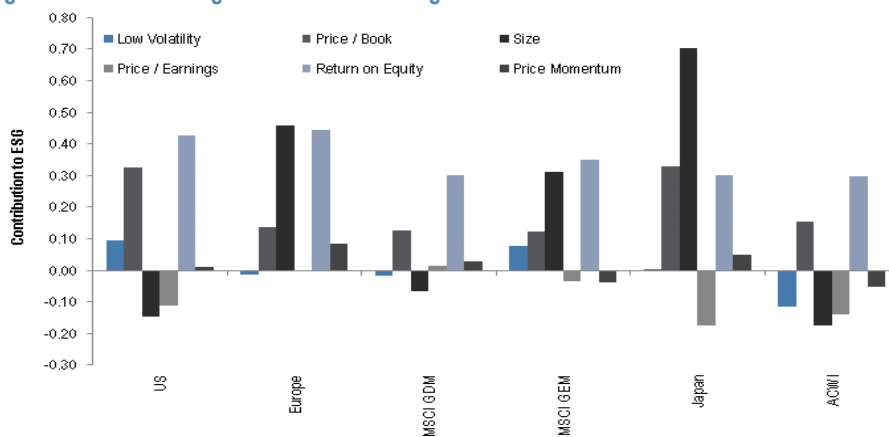
Source: J.P. Morgan Quantitative and Derivatives Strategy

We then ran multi-variate regressions using Factor and Style groups. We ran the two groups separately (i.e. one multi-variate regression for Factors and another for the Composite Styles). We try to assess when regressed against a range of factors, which of these factors have [high/low] bearing on the performance.

One common theme from the results of this regression across regions is that ROE does come up with a high loading across regions. Size has the highest loading of the factors in Japan and, to a large extent, in Europe and GEM. Unsurprisingly, we find Japan has a high Price/Book loading though interestingly the US has a high loading on the factor too.

ESG can be partly explained by Quality (RoE) and Value (P/E) and Size to some extent.

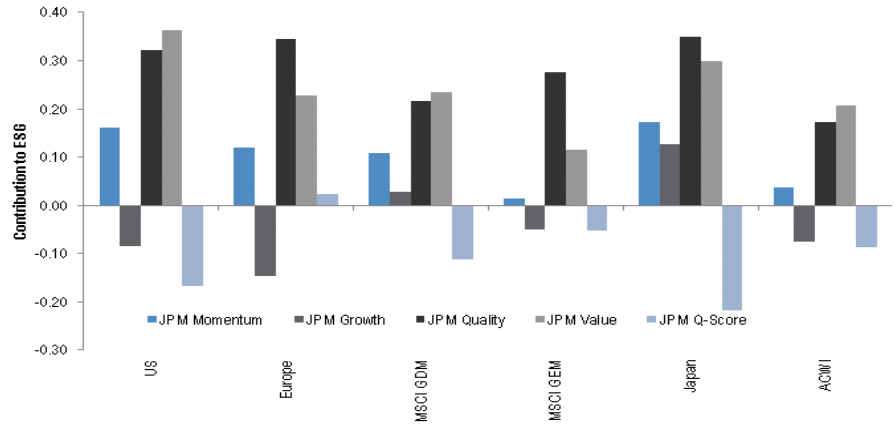
Figure 27: Factor loadings from multi-variate regression



Source: J.P. Morgan Quantitative and Derivatives Strategy

Running a similar analysis on composite Styles (such as Value, Quality etc.), we find Quality to have the largest loadings for most regions. Interestingly, we find Value has the largest loading in the US. While surprising on first look, it may be understandable given that our Value composite contains Dividend Yield, Free Cashflow Yield and Shareholder Yield, which are on defensive side of Value factors and most of which have been successful in the US over the long term.

Figure 28: Style loadings based on a multi-variate regression



Source: J.P. Morgan Quantitative and Derivatives Strategy

**We may conclude here based on results from the univariate and multi-variate regression analysis that Size, ROE, Value and Quality do indeed have a bearing on the ESG scores.**



## How can ESG Enhance your Portfolio?

### Can ESG be used as an Alpha factor?

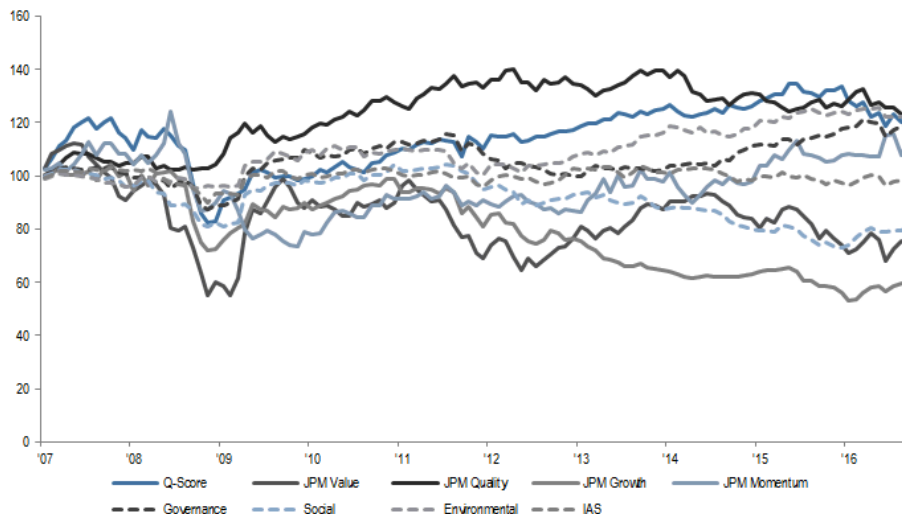
Among the first questions we looked at answering was whether we could use these ESG scores in a similar vein for portfolio construction as we use factors such as P/E, P/B, ROE and the like. A rather simplistic approach is, within a given universe like MSCI Europe, to select best ranking “n” stocks (say top 50) on a given metric (P/E), and build an equal-weighted portfolio. Each stock in the portfolio would weight 2% in such a scenario and our performance could be measured as reflective of the performance of cheapest stocks during that period.

We ran a similar approach for Industry Adjusted ESG Score (IAS) sourced directly from the MSCI dataset for stocks within the MSCI benchmark universe. To keep it comparable across regions, we used 50 stocks as a threshold<sup>6</sup> and ran the numbers for the ESG scores as well as several other commonly employed factors.

We start by looking at the two broader regions, Global Developed Markets (GDM) and Global Emerging Markets (GEM). We observed that most ESG factors we considered have struggled to outperform the benchmark within GDM, as evidenced by the annualised excess returns being flat to negative for most. This also compares for the general styles such as Growth and Value that have underperformed during this period. Interestingly, the Environmental and Governance score portfolio shows outperformance that is comparable to the performance of the JPMorgan Quality Composite Model. See the table below for performance statistics.

How do ESG factors compare to other Styles?

**Figure 29: Cumulative excess returns performance for a top 50 portfolio on factors in GDM. Dotted lines represent the ESG factors**



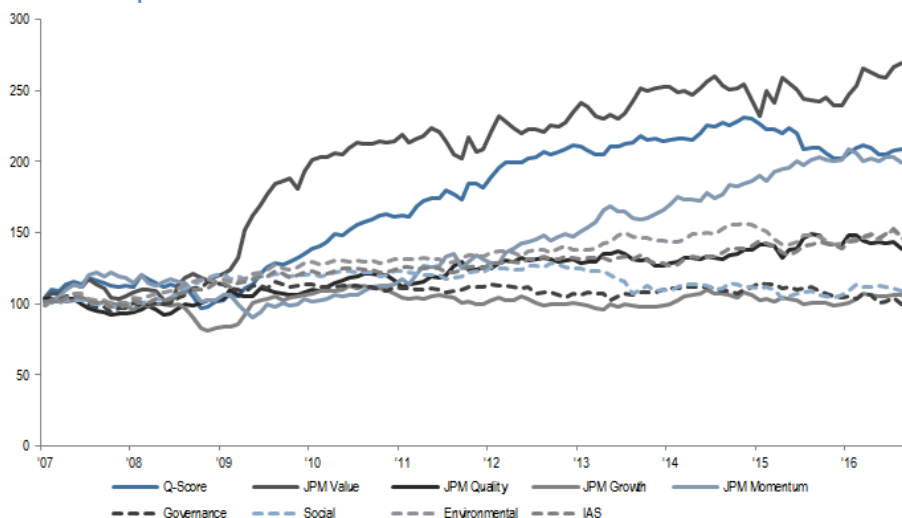
Source: J.P. Morgan Quantitative and Derivatives Strategy. Performance between Jan 2007 and Sep 2016

<sup>6</sup> We also ran tests with 30 stocks (since that is the number of stocks we use to build portfolios in our Style Investing work) and 100 stocks. The results are more or less comparable and covered later on in the section.

Within GEM, on the other hand, we found that most of the ESG factors considered did indeed outperform the benchmark index, however to a much lesser extent than other conventional Styles such as Momentum, Value and Q-Score.

E, S and G have outperformed the benchmark in GEM but to a lesser extent than many of the traditional quant styles.

Figure 30: Cumulative excess returns performance for a top 50 portfolio on factors in GEM. Dotted lines represent the ESG factors



Source: J.P. Morgan Quantitative and Derivatives Strategy

Even within MSCI GEM, the best performing ESG factors have returns statistics similar to the performance of the JPMorgan Quality Model. The table below lists performance statistics on an annualised basis (and excess returns) for both the markets.

Table 18: Top 50 stocks on each factor, equal-weight, rebalanced monthly

Excess Returns over respective benchmarks	MSCI Developed Markets			MSCI Emerging Markets		
	Returns	Sharpe	Max DD	Returns	Sharpe	Max DD
Industry Adjusted Score (ESG)	(0.1%)	(0.02)	-13.1%	4.2%	0.78	-7.0%
Weighted Average Score (ESG)	(0.9%)	(0.14)	-19.7%	3.5%	0.68	-6.3%
Eq. Weighted Average Score (ESG)	(0.7%)	(0.10)	-18.2%	3.0%	0.52	-12.4%
Environmental Score	2.1%	0.39	-10.2%	3.8%	0.70	-9.3%
Social Score	(2.1%)	(0.30)	-30.0%	0.7%	0.12	-19.5%
Governance Score	1.9%	0.30	-15.5%	(0.0%)	(0.00)	-14.0%
Low Volatility	1.1%	0.09	-31.3%	1.5%	0.11	-31.9%
Price / Book	(2.8%)	(0.11)	-53.5%	4.5%	0.29	-30.7%
Size	0.8%	0.22	-10.1%	(2.1%)	(0.63)	-22.2%
Price / Earnings	(2.8%)	(0.15)	-57.7%	9.8%	0.70	-18.5%
Return on Equity	4.1%	0.83	-4.7%	1.9%	0.27	-16.8%
Price Momentum	(0.6%)	(0.05)	-44.5%	0.2%	0.02	-43.5%
JPMorgan Momentum Model	1.3%	0.10	-40.7%	7.3%	0.78	-25.9%
JPMorgan Growth Model	(5.1%)	(0.46)	-49.3%	0.4%	0.05	-22.2%
JPMorgan Quality Model	2.0%	0.33	-13.2%	3.3%	0.43	-11.1%
JPMorgan Value Model	(3.0%)	(0.16)	-51.0%	10.7%	0.91	-15.0%
JPMorgan Q-Score Model	2.2%	0.23	-32.4%	7.9%	0.95	-19.6%

Source: J.P. Morgan Quantitative and Derivatives Strategy. Performance between Jan 2007 and Sep 2016

Splitting the analysis into a regional level, we look at US, Europe, and Japan among others. As we did with the broader GEM and GDM analysis, we look at selecting the best ranking 50 stocks on each metric, equally weighted to construct the specific factor portfolio. The performance once again is measured in excess returns terms, i.e. returns of the portfolio less the benchmark returns. Across all of these markets, we do find the top 50 stocks on ESG (equal-weighted) approach outperforms the benchmark, though the results are generally comparable to the performance of Quality factors.

Table 19: Top 50 stocks on each factor, equal-weight, rebalanced monthly

	Excess Returns over respective benchmarks	Sharpe Ratios			Annualized Returns		
		US	Europe	Japan	US	Europe	Japan
<b>Factors</b>	Industry Adjusted Score (ESG)	0.49	0.95	0.75	2.5%	4.0%	3.7%
	Weighted Average Score (ESG)	0.54	0.31	0.51	3.1%	1.5%	2.7%
	Eq. Weighted Average Score (ESG)	0.45	0.31	0.49	3.0%	1.6%	2.6%
	Environmental Score	0.77	0.15	0.86	4.6%	0.9%	4.1%
	Social Score	0.25	0.42	0.70	1.4%	2.3%	3.4%
	Governance Score	0.19	0.59	0.67	1.3%	3.0%	3.4%
	Low Volatility	0.10	0.53	0.39	1.0%	4.5%	5.1%
	Price / Book	(0.14)	(0.34)	0.69	(2.8%)	(7.3%)	7.1%
	Size	0.26	(0.33)	0.07	0.8%	(0.9%)	0.2%
	Price / Earnings	0.00	(0.18)	0.30	0.1%	(2.9%)	2.6%
	Return on Equity	0.67	0.79	0.10	3.2%	4.0%	0.7%
	Price Momentum	(0.15)	0.17	(0.12)	(1.8%)	1.5%	(1.2%)
<b>Styles</b>	JPMorgan Momentum Model	(0.07)	0.30	0.32	(0.7%)	2.8%	2.8%
	JPMorgan Growth Model	(0.08)	(0.33)	(0.06)	(0.8%)	(2.8%)	(0.3%)
	JPMorgan Quality Model	0.62	0.92	0.36	3.9%	5.2%	2.7%
	JPMorgan Value Model	0.13	(0.33)	0.57	2.1%	(5.3%)	5.1%
	JPMorgan Q-Score Model	0.15	0.26	0.01	1.2%	2.0%	0.0%

Source: J.P. Morgan Quantitative and Derivatives Strategy. Performance between Jan 2007 and Sep 2016

While the broader ESG metrics (like IAS) have successful Sharpe ratios, we find an interesting takeaway from the performance of the “Environmental” component of ESG. Portfolios constructed on high Environmental scores have the best Sharpe ratios in the US and Japan of all factors analysed in the table. Conversely, it was the poorest of ESG metrics tested in Europe. The strongest of the ESG pillars in Europe was the “Governance” pillar, which came up as the weakest pillar in US and Japan (still posting a robust Sharpe ratio in Japan).

### Can ESG enhance an existing Strategy?

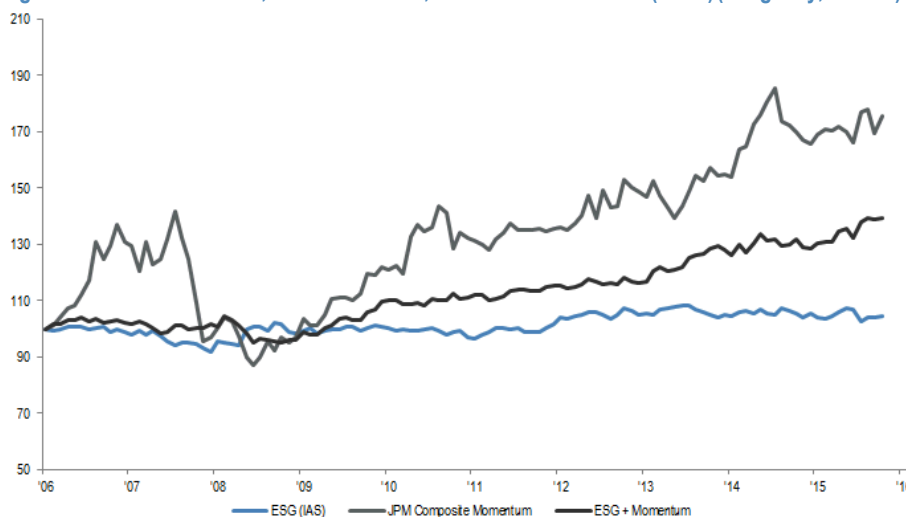
Most Quant managers construct factor-based portfolios classified under Style investing models such as Value, Growth, Quality, Momentum etc. We have established that ESG scores provide an upside opportunity and could be used as a portfolio selection tool. A very encouraging aspect of the performance statistics for the ESG factors was their comparatively lower drawdowns.

We run a simple two factor Model made up equally of ESG (IAS) and another fundamental quant factor (like P/E, ROE etc.). We select a portfolio of top 50 stocks on the combined score, monitoring the performance over the month and at the end of month, repeat the process to rebalance.

In the Global region (ACWI), we find general improvements to most quant factors that we analysed for the combined Model compared to the single factor. Consider the chart for ESG and JPM Composite Momentum combination in the figure below. While the standalone JPM Composite Momentum does indeed seem to have outperformed its combination with ESG, as well the standalone ESG factor, it also experiences high volatility and large drawdowns compared to the other two strategies.

Adding ESG to Momentum can reduce drawdowns but the return profile is weaker

Figure 31: Stand-alone ESG, JPM Momentum, and ESG + Momentum (50:50)(Long only, excess)



Source: J.P. Morgan Quantitative and Derivatives Strategy

The performance is summarised in the table below. The largest improvement from the introduction of ESG components to the Momentum strategy is the reduction of drawdowns. The risk-reward is much better for the combined strategy

A higher Sharpe ratio due to lower volatility and a significant reduction in drawdowns, but the return profile is more muted. ESG seems to benefit most in the aspects of portfolio construction.

Table 20: Backtest summary of Momentum, ESG and the equal-weight combination

ACWI Region	Returns	Volatility	Sharpe	Hit Rate	DD	T-Stat	Turnover	IC
ESG Scores (IAS)	0.5%	4.7%	0.10	51.3%	-9.0%	0.38	75%	0.7%
Composite Momentum	6.0%	14.6%	0.41	54.7%	-38.5%	1.47	650%	3.0%
ESG + Momentum	3.5%	4.9%	0.70	57.3%	-8.9%	2.24	480%	1.8%

Source: J.P. Morgan Quantitative and Derivatives Strategy. Performance between Jan 2007 and Sep 2016

Similarly, the table below lists performance for the standalone factors alongside the ESG combination for the ACWI region. All performance numbers in the table are Long-only and measured as excess returns over the ACWI total returns benchmark index.

Table 21: Backtest summary of factor and its equal-weight ESG combination

Overall ESG factors reduce volatility, increase Sharpe ratios and lead to lower drawdowns, the merits of ESG investing are observed most in Quality, Dividend Yield, Price Momentum, RoE and Low Volatility strategies.

Factor	Returns	Volatility	Sharpe	Hit Rate	DD	T-Stat	Turnover	IC
ESG (IAS)	0.5%	4.7%	0.10	51.3%	-9.0%	0.38	75%	0.7%
Q-Score	6.5%	12.9%	0.51	65.0%	-35.6%	1.75	458%	3.2%
ESG + Q-Score	2.5%	5.1%	0.50	59.8%	-12.8%	1.61	384%	1.8%
Value	1.8%	18.6%	0.10	51.3%	-41.9%	0.58	300%	1.0%
ESG + Value	0.9%	12.6%	0.07	47.9%	-35.3%	0.41	270%	0.8%
Growth	(2.7%)	13.9%	(0.19)	44.4%	-51.2%	-0.40	285%	(0.2%)
ESG + Growth	0.6%	5.8%	0.10	53.0%	-18.5%	0.39	290%	0.4%
Momentum	6.0%	14.6%	0.41	54.7%	-38.5%	1.47	650%	3.0%
ESG + Momentum	3.5%	4.9%	0.70	57.3%	-8.9%	2.24	480%	1.8%
Quality	1.4%	6.9%	0.20	51.3%	-17.5%	0.74	101%	2.9%
ESG + Quality	2.3%	4.3%	0.53	60.7%	-9.2%	1.70	150%	1.5%
Div. Yld	0.7%	16.9%	0.04	49.6%	-53.9%	0.37	229%	1.1%
ESG + Div. Yld	2.5%	9.3%	0.27	54.7%	-22.3%	0.98	209%	1.1%
PMOM	(2.3%)	14.6%	(0.16)	50.4%	-47.7%	-0.27	447%	2.4%
ESG + PMOM	1.7%	5.4%	0.31	52.1%	-10.4%	1.04	381%	1.1%
EPS Revs	2.5%	7.0%	0.35	55.6%	-13.1%	1.18	586%	2.4%
ESG + EPS Revs	0.7%	4.5%	0.15	51.3%	-14.6%	0.55	435%	1.4%
Size	1.0%	4.3%	0.22	47.0%	-14.6%	0.76	53%	1.1%
ESG + Size	(0.2%)	3.6%	(0.06)	47.0%	-12.9%	-0.12	100%	0.2%
ROE	3.7%	5.3%	0.69	58.1%	-6.9%	2.20	99%	2.6%
ESG + ROE	4.4%	5.0%	0.88	61.5%	-7.1%	2.77	149%	1.2%
Low Vol	0.8%	11.2%	0.07	48.7%	-24.3%	0.40	363%	2.4%
ESG + Low Vol	3.4%	5.0%	0.68	58.1%	-9.5%	2.16	252%	1.1%

Source: J.P. Morgan Quantitative and Derivatives Strategy. Performance between Jan 2007 and Sep 2016

We find similar improvement for the factors in other regions such as the broad Global Developed (GDM) and Global Emerging (GEM) markets, Europe, US, and Japan. Tables for these regions are provided in the [Appendix I](#).

Figure 32: Equal-Weight ESG Composite Screens | MSCI ACWI (November 30, 2016)

ESG + Quality					ESG + Div Yield					ESG + ROE					ESG + Low Vol				
Name	Ticker	Sector	Country	Rank	Name	Ticker	Sector	Country	Rank	Name	Ticker	Sector	Country	Rank	Name	Ticker	Sector	Country	Rank
Kuehne + Nagel Intern	KNIN VX	Industrials	Switzerland	1	ITV PLC	ITV LN	Cons Disc	United Kingdom	1	Accenture PLC	ACN US	IT	Ireland	1	WhiteWave Foods Co/WVAV	US	Cons Stap	United States	1
Accenture PLC	ACN US	IT	Ireland	1	BTS Group Holdings	PBTS TB	Industrials	Thailand	1	ITV PLC	ITV LN	Cons Disc	United Kingdom	1	Public Bank Bhd	PBK MK	Financials	Malaysia	1
Actelion Ltd	ATLN VX	Health Care	Switzerland	1	Intesa Sanpaolo SpA	ISPR IM	Financials	Italy	1	Pandora A/S	PNDORA DC	Cons Disc	Denmark	1	3M Co	MMM US	Industrials	United States	1
Pandora A/S	PNDORA DC	Cons Disc	Denmark	1	Telia Co AB	TELIA SS	Telcos	Sweden	1	Coca-Cola European	FCCEA IX	Cons Stap	United Kingdom	1	MAN SE	MAN GR	Industrials	Germany	1
Novo Nordisk A/S	NOVOB DC	Health Care	Denmark	1	Berkeley Group Holdin	BKG LN	Cons Disc	United Kingdom	1	RELX NV	REN NA	Industrials	United Kingdom	1	Ecolab Inc	ECL US	Materials	United States	1
British American Tobac	ROTH MK	Cons Stap	Malaysia	1	Vivendi SA	VIV FP	Cons Disc	France	1	Vodacom Group Ltd	VOD SJ	Telcos	South Africa	1	Kuehne + Nagel Intern	KNIN VX	Industrials	Switzerland	1
Hennes & Mauritz AB	HMB SS	Cons Disc	Sweden	1	Intesa Sanpaolo SpA	ISPR IM	Financials	Italy	1	RELX PLC	REL LN	Industrials	United Kingdom	1	Deutsche Post AG	DPW GR	Industrials	Germany	1
Industria de Diseno Te	ITX SM	Cons Disc	Spain	1	EDP - Energias de Por	EDP PL	Utilities	Portugal	1	Novo Nordisk A/S	NOVOB DC	Health Care	Denmark	1	SAP SE	SAP GR	IT	Germany	1
Expeditors International	EXPD US	Industrials	United States	1	Banco Bilbao Vizcaya	BBVA SM	Financials	Spain	1	Clorox Co/The	CLX US	Cons Stap	United States	1	MTR Corp Ltd	66 HK	Industrials	Hong Kong	1
Hindustan Unilever Ltd	HUVR IN	Cons Stap	India	1	Komercon banka as	KOMB CP	Financials	Czech Republic	1	British American Tobac	ROTH MK	Cons Stap	Malaysia	1	Microsoft Corp	MSFT US	IT	United States	1
Unilever Indonesia Tbk	UNVR IJ	Cons Stap	Indonesia	1	Telefonaktiebolaget L	ERICB SS	IT	Sweden	1	Intertek Group PLC	ITRK LN	Industrials	United Kingdom	1	Diageo PLC	DGE LN	Cons Stap	United Kingdom	1
ITV PLC	ITV LN	Cons Disc	United Kingdom	1	Casino Guichard Perr	CO FP	Cons Stap	France	1	Coloplast A/S	COLOB DC	Health Care	Denmark	1	Red Electrica Corp SA	REE SM	Utilities	Spain	1
Core Laboratories NV	CLB US	Energy	Netherlands	1	E.ON SE	EOAN GR	Utilities	Germany	1	Actelion Ltd	ATLN VX	Health Care	Switzerland	1	Swisscom AG	SCMN VX	Telcos	Switzerland	1
Tractor Supply Co	TSCO US	Cons Disc	United States	1	Marks & Spencer Grou	MKS LN	Cons Disc	United Kingdom	1	Capita PLC	CPI LN	Industrials	United Kingdom	1	L'Oreal SA	OR FP	Cons Stap	France	1
3M Co	MMM US	Industrials	United States	1	Advanced Info Service	ADVANC TB	Telcos	Thailand	1	3M Co	MMM US	Industrials	United States	1	CPFL Energia SA	CPFE3 BZ	Utilities	Brazil	1
Intuit Inc	INTU US	IT	United States	1	Telefonica SA	TEF SM	Telcos	Spain	1	Kimberly-Clark Corp	KMB US	Cons Stap	United States	1	Societe BIC SA	BB FP	Industrials	France	1
Robert Half Internation	RHI US	Industrials	United States	1	Electricite de France	SEDF FP	Utilities	France	1	PepsiCo Inc	PEP US	Cons Stap	United States	1	Kellogg Co	K US	Cons Stap	United States	1
easyJet PLC	EZJ LN	Industrials	United Kingdom	1	Stockland	SGP AU	Real Estate	Australia	1	Campbell Soup Co	CPB US	Cons Stap	United States	1	Accenture PLC	ACN US	IT	Ireland	1
Mr Price Group Ltd	MRP SJ	Cons Disc	South Africa	1	Vodafone Group PLC	VOD LN	Telcos	United Kingdom	1	Mettler-Toledo Internat	MTD US	Health Care	United States	1	Vodafone Group PLC	VOD LN	Telcos	United Kingdom	1
Coloplast A/S	COLOB DC	Health Care	Denmark	1	Snam SpA	SRG IM	Utilities	Italy	1	AmerisourceBergen C	ABC US	Health Care	United States	1	Aeroports de Paris	ADP FP	Industrials	France	1
Johnson Matthey PLC	JMAT LN	Materials	United Kingdom	1	Fortum OYJ	FUM1V FH	Utilities	Finland	1	Croda International PL	CRDA LN	Materials	United Kingdom	1	Croda International PL	CRDA LN	Materials	United Kingdom	1
Skanska AB	SKAB SS	Industrials	Sweden	1	easyJet PLC	EZJ LN	Industrials	United Kingdom	1	Kimberly-Clark de Mex	KIMBERA MM	Cons Stap	Mexico	1	Hang Seng Bank Ltd	11 HK	Financials	Hong Kong	1
Bunge Ltd	BG US	Cons Stap	United States	1	AES Tiete Energia SA	TIET11 BZ	Utilities	Brazil	1	Intuit Inc	INTU US	IT	United States	1	Orkla ASA	ORK NO	Cons Stap	Norway	1
Tata Consultancy Serv	TCS IN	IT	India	1	Telenor ASA	TEL NO	Telcos	Norway	1	Hindustan Unilever Lt	HUVR IN	Cons Stap	India	1	Canadian Imperial Ban	CM CN	Financials	Canada	1
Mettler-Toledo Internat	MTD US	Health Care	United States	1	Aberdeen Asset Manag	ADN LN	Financials	United Kingdom	1	Unilever Indonesia Tbk	UNVR IJ	Cons Stap	Indonesia	1	City Developments Ltd	CIT SP	Real Estate	Singapore	1
President Chain Store	2912 TT	Cons Stap	Taiwan	2	Commercial Bank QSC	CBQK QD	Financials	Qatar	2	Kuehne + Nagel Intern	KNIN VX	Industrials	Switzerland	2	Segro PLC	SGRO LN	Real Estate	United Kingdom	2
Vodacom Group Ltd	VOD SJ	Telcos	South Africa	2	Natixis SA	KN FP	Financials	France	2	Rockwell Collins Inc	COL US	Industrials	United States	2	Stockland	SGP AU	Real Estate	Australia	2
Neste Oyj	NESTE FH	Energy	Finland	2	Siliconware Precision	12325 TT	IT	Taiwan	2	Core Laboratories NV	CLB US	Energy	Netherlands	2	Iberdrola SA	IBE SM	Utilities	Spain	2
Novozymes A/S	NZYMB DC	Materials	Denmark	2	Petrofac Ltd	PFC LN	Energy	United Kingdom	2	Advanced Info Service	ADVANC TB	Telcos	Thailand	2	Akzo Nobel NV	AKZA NA	Materials	Netherlands	2
Paddy Power Betfair	PPPB ID	Cons Disc	Ireland	2	J Sainsbury PLC	SBRY LN	Cons Stap	United Kingdom	2	DiGi.Com Bhd	DIGI MK	Telcos	Malaysia	2	Danone SA	BN FP	Cons Stap	France	2
Marriott International	IRMAR US	Cons Disc	United States	2	Telet2 AB	TEL2B SS	Telcos	Sweden	2	StarHub Ltd	STH SP	Telcos	Singapore	2	Merck KGaA	MRK GR	Health Care	Germany	2
Henry Schein Inc	HSIC US	Health Care	United States	2	Abu Dhabi Commercia	ADCB UH	Financials	United Arab Emir	2	Coronation Fund Manag	CML SJ	Financials	South Africa	2	General Electric Co	GE US	Industrials	United States	2
Cardinal Health Inc	CAH US	Health Care	United States	2	Endesa SA	ELE SM	Utilities	Spain	2	United Parcel Service	UPS US	Industrials	United States	2	Gildan Activewear Inc	GIL CN	Cons Disc	Canada	2
IDEXX Laboratories In	IDXX US	Health Care	United States	2	Cobham PLC	COB LN	Industrials	United Kingdom	2	International Business	IBM US	IT	United States	2	TELLUS Corp	T CN	Telcos	Canada	2
DiGi.Com Bhd	DIGI MK	Telcos	Malaysia	2	Barclays Africa Group	BGA SJ	Financials	South Africa	2	Lockheed Martin Corp	LMT US	Industrials	United States	2	WPP PLC	WPP LN	Cons Disc	United Kingdom	2
Croda International PL	CRDA LN	Materials	United Kingdom	2	Investec Ltd	INL SJ	Financials	South Africa	2	IDEXX Laboratories In	IDXX US	Health Care	United States	2	Unibail-Rodamco SE	UL NA	Real Estate	France	2
Texas Instruments Inc	TXN US	IT	United States	2	Cia Energetica de Min	CMIG4 BZ	Utilities	Brazil	2	Next PLC	NXT LN	Cons Disc	United Kingdom	2	Chunghwa Telecom Co	2412 TT	Telcos	Taiwan	2
VW Grainger Inc	GWV US	Industrials	United States	2	Mirvac Group	MGR AU	Real Estate	Australia	2	Boeing Co/The	BA US	Industrials	United States	2	Bank of Montreal	BMO CN	Financials	Canada	2
Kimberly-Clark Corp	KMB US	Cons Stap	United States	2	AXA SA	CS FP	Financials	France	2	Roche Holding AG	ROG VX	Health Care	Switzerland	2	Brambles Ltd	BXB AU	Industrials	Australia	2
Rockwell Collins Inc	COL US	Industrials	United States	2	SSE PLC	SSE LN	Utilities	United Kingdom	2	Kellogg Co	K US	Cons Stap	United States	2	Skanska AB	SKAB SS	Industrials	Sweden	2

Source: J.P. Morgan Quantitative and Derivatives Strategy

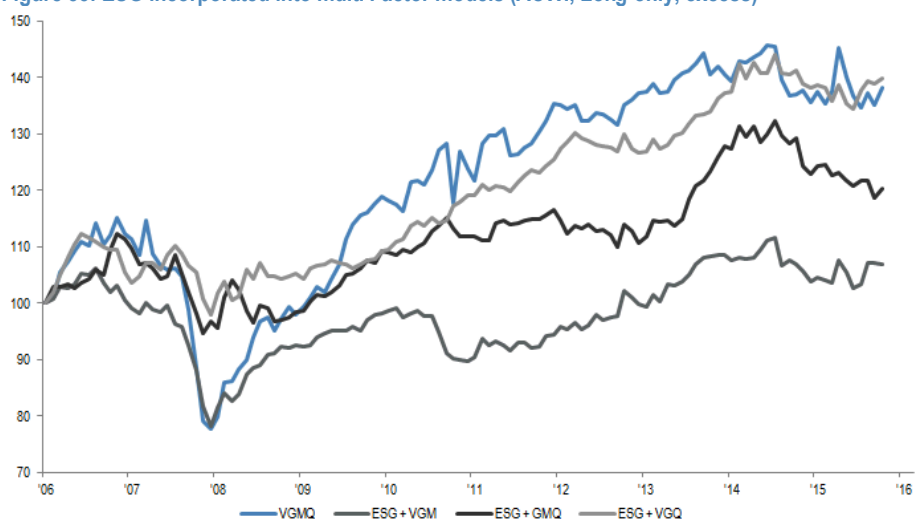
## Building a Multi-Factor Model

We then look at extending this concept of adding ESG into a factor investing framework by introducing it into a multi-factor model. A general diversified 4-factor framework could combine factors and style components like Value, Growth, Quality, and Momentum (VGMQ).

We first run an equal-weighted 4-factor model, i.e. Value, Growth, Quality, and Momentum (VGMQ) and then introduce the ESG factor into this Model substituting it for one factor at a time, giving us 3 new possible combinations for the original 4-factor Model. For example, we analyse the 4-factor model without Value (with ESG taking the place of Value) and then without Growth (once again, replaced by the ESG factor) and finally ESG taking the place of Momentum factor.

In ACWI, we find not all combinations prove to be an improvement over the equal-weighted VGMQ though it does have lower volatility in each of its combinations. Interestingly, the combination that does best is where Momentum is replaced by ESG, leading to a Sharpe of 0.65 (compared to 0.35 for VGMQ) and maximum drawdowns of only 13% (compared to over 32% for VGMQ).

Figure 33: ESG incorporated into multi-Factor models (ACWI, Long-only, excess)



Source: J.P. Morgan Quantitative and Derivatives Strategy

The backtest statistics for the region are summarised in the table below. The 4-factor ESG Model replacing Momentum has similar returns, turnover and IC to the starting VGMQ model, but achieves these with a lower realised volatility leading to an enhanced Sharpe Ratio.

Table 22: Backtest summary of ESG within a multi-factor framework

ACWI	Returns	Volatility	Sharpe	Hit Rate	DD	T-Stat	Turnover	IC
VGMQ	3.4%	9.8%	0.35	61.5%	-32.4%	1.22	447%	2.4%
ESG + VGM	0.7%	6.5%	0.11	57.3%	-26.2%	0.43	471%	1.6%
ESG + GMQ	1.9%	6.0%	0.32	58.1%	-15.6%	1.09	387%	1.9%
ESG + VGQ	3.5%	5.4%	0.65	59.0%	-13.0%	2.08	455%	2.3%

Source: J.P. Morgan Quantitative and Derivatives Strategy. Performance between Jan 2007 and Sep 2016



The exact same methodology is then applied across various regions. Once again, the 4-factor model where ESG replaces Momentum did very well across all regions. For example, in GDM, the VGMQ model has negative returns but with the ESG factor as one of the components, 2 of the 3 combinations are positive with Sharpe above 0.5. The VGMQ model is negative in the US, too, however all combinations with ESG have positive annualised returns and the ESG + VGQ model, i.e. the model excluding Momentum, has a Sharpe ratio of 0.66.

In Europe, the multi-factor model with ESG has improved results for the variations without Value and Momentum with Sharpe ratios more than twice that of VGMQ model.

Table 23: Backtest summary of ESG within a multi-factor framework (Long only, excess returns)

Factor	Returns	Volatility	Sharpe	Hit Rate	DD	T-Stat	Turnover	IC
VGMQ (GDM)	(0.7%)	7.3%	(0.10)	53.0%	-30.4%	-0.20	410%	1.6%
ESG + VGM (GDM)	(0.1%)	6.1%	(0.02)	54.7%	-25.5%	0.03	452%	1.2%
ESG + GMQ (GDM)	2.9%	5.7%	0.51	57.3%	-13.2%	1.65	368%	1.5%
ESG + VGQ (GDM)	3.6%	5.3%	0.68	62.4%	-11.6%	2.18	430%	1.9%
VGMQ (GEM)	7.8%	7.2%	1.08	59.8%	-11.0%	3.36	401%	4.0%
ESG + VGM (GEM)	7.3%	5.0%	1.47	65.4%	-4.1%	4.19	357%	3.5%
ESG + GMQ (GEM)	5.6%	5.6%	1.01	60.4%	-6.6%	2.95	292%	3.3%
ESG + VGQ (GEM)	5.9%	5.3%	1.12	64.4%	-5.5%	3.24	335%	4.2%
VGMQ (US)	(0.1%)	6.2%	(0.02)	52.1%	-20.1%	0.02	359%	0.6%
ESG + VGM (US)	1.7%	7.2%	0.23	54.7%	-20.8%	0.83	393%	0.1%
ESG + GMQ (US)	1.0%	4.3%	0.24	50.4%	-9.4%	0.81	317%	0.4%
ESG + VGQ (US)	4.2%	6.4%	0.66	57.3%	-9.0%	2.11	324%	0.8%
VGMQ (Europe)	2.1%	6.4%	0.33	61.5%	-23.4%	1.12	348%	3.3%
ESG + VGM (Europe)	2.3%	6.3%	0.36	55.6%	-27.9%	1.21	352%	2.4%
ESG + GMQ (Europe)	4.0%	5.2%	0.78	65.8%	-18.2%	2.46	276%	3.7%
ESG + VGQ (Europe)	3.9%	5.1%	0.75	65.8%	-19.1%	2.38	310%	4.0%
VGMQ (Japan)	1.1%	5.8%	0.18	55.6%	-15.7%	0.65	312%	0.4%
ESG + VGM (Japan)	2.5%	5.3%	0.47	61.5%	-10.5%	1.52	313%	0.1%
ESG + GMQ (Japan)	2.1%	5.9%	0.35	56.4%	-14.9%	1.19	263%	(0.1%)
ESG + VGQ (Japan)	2.6%	5.5%	0.47	59.8%	-10.2%	1.53	281%	0.8%

Source: J.P. Morgan Quantitative and Derivatives Strategy. Performance between Jan 2007 and Sep 2016

## Appendix I: Enhancing factor strategies with ESG

As outlined in the main paper, we analysed whether factor performance across regions could be enhanced by building an equal-weighted 2-factor Model with ESG as the other Factor. We generally found encouraging results for all regions and most factors tested.

### Global Developed Markets

We generally find improvements in all Factors with the addition of ESG component, even if all the combinations do not result in positive performance. Dividend Yield goes from an annual underperformance of 2.5% (over the benchmark) to outperforming it by 2.3% with the introduction of ESG. Composite Quality goes from a Sharpe of 0.33 to a Sharpe approaching 1. The annualised returns are marginally lower only in combination with Q-Score but with the Volatility coming down by half; the Sharpe ratio for Q-Score + ESG actually sees an improvement

Table 24: Backtest summary of factor and its equal-weight ESG combination

Factor	Returns	Volatility	Sharpe	Hit Rate	DD	T-Stat	Turnover	IC
ESG (IAS)	(0.1%)	5.0%	(0.02)	44.4%	-13.1%	0.01	75%	(0.2%)
Q-Score	2.2%	9.8%	0.23	59.0%	-32.4%	0.85	427%	2.3%
ESG + Q-Score	2.0%	4.8%	0.42	59.8%	-15.0%	1.38	361%	1.4%
Value	(3.0%)	18.4%	(0.16)	47.0%	-51.0%	-0.23	292%	0.2%
ESG + Value	0.9%	12.7%	0.07	51.3%	-39.9%	0.41	251%	0.5%
Growth	(5.1%)	11.1%	(0.46)	50.4%	-49.3%	-1.28	257%	(0.4%)
ESG + Growth	(0.2%)	5.7%	(0.03)	54.7%	-18.3%	0.01	269%	0.0%
Momentum	1.3%	12.8%	0.10	52.1%	-40.7%	0.51	588%	2.1%
ESG + Momentum	3.4%	4.3%	0.80	53.0%	-9.7%	2.53	460%	1.5%
Quality	2.0%	6.1%	0.33	54.7%	-13.2%	1.12	92%	2.9%
ESG + Quality	3.7%	4.0%	0.94	62.4%	-2.9%	2.94	137%	1.1%
Yld	(2.5%)	16.6%	(0.15)	51.3%	-47.2%	-0.22	208%	0.0%
ESG + Yld	2.3%	8.8%	0.26	58.1%	-23.0%	0.93	191%	0.9%
PMOM	(0.6%)	12.7%	(0.05)	57.3%	-44.5%	0.05	421%	1.8%
ESG + PMOM	2.7%	5.0%	0.55	56.4%	-9.9%	1.76	360%	0.9%
EPS Revs	(0.5%)	7.7%	(0.06)	52.1%	-27.0%	-0.07	574%	1.4%
ESG + EPS Revs	0.3%	4.2%	0.08	52.1%	-14.3%	0.32	418%	1.1%
Size	0.8%	3.8%	0.22	49.6%	-10.1%	0.75	52%	0.6%
ESG + Size	0.8%	3.2%	0.23	56.4%	-7.1%	0.78	89%	0.0%
ROE	3.3%	4.8%	0.69	58.1%	-5.9%	2.21	96%	2.5%
ESG + ROE	4.7%	4.3%	1.08	62.4%	-6.7%	3.38	150%	0.8%
Low Vol	1.1%	11.8%	0.09	48.7%	-31.3%	0.46	353%	1.7%
ESG + Low Vol	3.9%	4.4%	0.87	60.7%	-4.6%	2.75	236%	0.9%

Source: J.P. Morgan Quantitative and Derivatives Strategy

### Global Emerging Markets (GEM)

As in GDM, we find improvements for most Factors with the addition of the ESG component, though not all combinations result in enhanced returns (or Sharpe ratios). Composite Value, for example, goes from annualised returns of 10.7% (Sharpe of 0.91) to 5.8% when combined with ESG (Sharpe of 0.84). Composite Quality goes from a Sharpe of 0.43 to a Sharpe over 0.7 with better returns and a similar improvement observed for Composite Growth. Momentum loses some returns but the reduction in volatility pulls the Sharpe ratio by 1.

Size (large caps) on its own underperforms the benchmark but when combined with ESG has outperformance and low single digit drawdowns. All factors except Composite Value see an improvement in the Sharpe ratios when combined with ESG.

Table 25: Backtest summary of factor and its equal-weight ESG combination

Factor	Returns	Volatility	Sharpe	Hit Rate	DD	T-Stat	Turnover	IC
ESG (IAS)	4.2%	5.5%	0.76	58.8%	-7.0%	2.24	75%	0.9%
Q-Score	7.9%	8.3%	0.95	59.8%	-19.6%	2.98	396%	4.4%
ESG + Q-Score	5.7%	5.2%	1.11	65.4%	-4.7%	3.21	277%	3.4%
Value	10.7%	11.7%	0.91	56.4%	-15.0%	2.89	257%	2.8%
ESG + Value	5.8%	6.9%	0.84	54.9%	-10.3%	2.49	196%	2.4%
Growth	0.4%	7.8%	0.05	50.4%	-22.2%	0.29	260%	0.4%
ESG + Growth	3.2%	4.5%	0.70	57.8%	-3.3%	2.09	232%	1.1%
Momentum	7.3%	9.4%	0.78	61.5%	-25.9%	2.51	572%	3.7%
ESG + Momentum	6.1%	5.0%	1.23	61.4%	-4.7%	3.55	356%	3.1%
Quality	3.3%	7.6%	0.43	55.6%	-11.1%	1.44	94%	2.6%
ESG + Quality	4.2%	5.9%	0.72	59.8%	-8.4%	2.14	133%	2.7%
Yld	4.2%	9.6%	0.44	51.3%	-26.5%	1.50	180%	3.0%
ESG + Yld	5.2%	6.3%	0.82	52.9%	-8.8%	2.42	164%	2.1%
PMOM	0.2%	11.1%	0.02	52.1%	-43.5%	0.23	383%	2.0%
ESG + PMOM	2.9%	5.9%	0.49	58.8%	-10.7%	1.50	279%	1.2%
EPS Revs	5.5%	7.1%	0.77	63.3%	-13.3%	2.46	527%	3.3%
ESG + EPS Revs	4.9%	4.9%	1.01	64.4%	-5.2%	2.93	328%	2.5%
Size	(2.1%)	3.4%	(0.63)	41.0%	-22.2%	-1.92	74%	(0.1%)
ESG + Size	1.7%	4.5%	0.38	55.9%	-6.1%	1.16	101%	(0.1%)
ROE	1.9%	6.9%	0.27	58.1%	-16.8%	0.94	90%	3.2%
ESG + ROE	3.5%	6.3%	0.56	56.9%	-10.7%	1.71	131%	2.2%
Low Vol	1.5%	12.8%	0.11	53.0%	-31.9%	0.55	286%	2.6%
ESG + Low Vol	2.0%	6.2%	0.33	54.9%	-10.5%	1.03	204%	1.7%

Source: J.P. Morgan Quantitative and Derivatives Strategy

## Europe

The ESG factor by itself has strong performance statistics in Europe.

When used in combination with other fundamental quant factors, we once again find most combinations to be successful. Interestingly, the combination of ESG with ROE yields less impressive results than standalone ROE or standalone ESG.

Other than that, we find strong improvements in Quality, Momentum, Value, and Growth composite factors.

Table 26: Backtest summary of factor and its equal-weight ESG combination

Factor	Returns	Volatility	Sharpe	Hit Rate	DD	T-Stat	Turnover	IC
ESG (IAS)	4.0%	4.2%	0.95	65.8%	-8.1%	2.99	69%	2.0%
Q-Score	2.0%	7.8%	0.26	63.3%	-27.0%	0.92	350%	3.1%
ESG + Q-Score	3.3%	5.4%	0.61	60.7%	-19.5%	1.96	275%	3.2%
Value	(5.3%)	16.3%	(0.33)	47.9%	-51.3%	-0.80	209%	(1.5%)
ESG + Value	2.7%	10.2%	0.26	58.1%	-30.0%	0.96	211%	0.8%
Growth	(2.8%)	8.5%	(0.33)	48.7%	-34.2%	-0.92	202%	(0.4%)
ESG + Growth	2.5%	4.5%	0.55	53.9%	-15.5%	1.77	203%	1.2%
Momentum	2.8%	9.3%	0.30	62.4%	-31.9%	1.07	448%	3.9%
ESG + Momentum	4.3%	4.7%	0.91	60.7%	-17.3%	2.85	352%	3.4%
Quality	5.2%	5.7%	0.92	59.0%	-11.4%	2.91	82%	4.4%
ESG + Quality	5.6%	4.8%	1.16	67.5%	-8.6%	3.60	102%	3.2%
Yld	(4.3%)	12.2%	(0.35)	44.4%	-47.1%	-0.92	159%	(0.7%)
ESG + Yld	1.1%	8.6%	0.12	54.7%	-35.8%	0.52	154%	1.4%
PMOM	1.5%	8.7%	0.17	57.3%	-24.5%	0.66	356%	3.6%
ESG + PMOM	2.1%	5.3%	0.38	59.0%	-18.0%	1.27	285%	2.6%
EPS Revs	2.6%	7.4%	0.35	59.0%	-25.8%	1.21	440%	3.1%
ESG + EPS Revs	2.3%	4.6%	0.51	57.3%	-22.3%	1.64	338%	3.0%
Size	(0.9%)	2.7%	(0.33)	42.7%	-14.7%	-1.00	55%	0.9%
ESG + Size	3.1%	3.2%	0.96	61.5%	-4.0%	3.00	71%	1.4%
ROE	4.0%	5.1%	0.79	59.0%	-9.0%	2.49	78%	3.5%
ESG + ROE	3.5%	4.7%	0.75	65.8%	-19.1%	2.38	117%	2.9%
Low Vol	4.5%	8.5%	0.53	63.3%	-20.3%	1.76	271%	2.6%
ESG + Low Vol	5.2%	4.2%	1.25	67.5%	-8.8%	3.88	206%	2.5%

Source: J.P. Morgan Quantitative and Derivatives Strategy

## US

In the US, Size and ROE barely show any changes when combined with ESG. On the other hand, when ESG is combined with Quality, we get poorer results than those observed for Quality by itself.

Besides these, all other factors show improvements as ESG is overlaid on to a fundamental quant factor.

Other than that, we find strong improvements in Quality, Momentum, Value, and Growth composite factors. Importantly, the drawdowns for Price Momentum come down from nearly 45% to less than 9%. Similarly, we see strong improvements in the drawdowns profile for Composite Momentum and EPS revisions.

Table 27: Backtest summary of factor and its equal-weight ESG combination

Factor	Returns	Volatility	Sharpe	Hit Rate	DD	T-Stat	Turnover	IC
ESG (IAS)	2.5%	5.2%	0.49	56.4%	-8.4%	1.58	70%	(0.2%)
Q-Score	1.2%	7.9%	0.15	56.4%	-24.7%	0.58	338%	1.8%
ESG + Q-Score	3.1%	6.1%	0.51	58.1%	-13.5%	1.66	267%	0.2%
Value	2.1%	16.4%	0.13	52.1%	-47.1%	0.65	196%	0.4%
ESG + Value	3.1%	11.4%	0.27	51.3%	-29.4%	0.99	182%	(0.2%)
Growth	(0.8%)	9.6%	(0.08)	50.4%	-29.0%	-0.09	205%	(1.5%)
ESG + Growth	1.4%	6.6%	0.22	52.1%	-18.4%	0.77	196%	(1.2%)
Momentum	(0.7%)	9.9%	(0.07)	48.7%	-38.1%	-0.05	533%	1.5%
ESG + Momentum	2.4%	4.9%	0.49	58.1%	-6.1%	1.57	384%	0.6%
Quality	3.9%	6.2%	0.62	59.0%	-10.1%	2.01	79%	2.2%
ESG + Quality	2.3%	4.3%	0.53	50.4%	-9.8%	1.69	107%	0.3%
Yld	(0.5%)	13.9%	(0.03)	48.7%	-40.9%	0.10	126%	0.2%
ESG + Yld	3.0%	7.6%	0.39	53.0%	-15.9%	1.31	124%	0.3%
PMOM	(1.8%)	11.5%	(0.15)	53.9%	-44.6%	-0.30	359%	1.1%
ESG + PMOM	1.8%	5.0%	0.37	54.7%	-8.8%	1.21	288%	0.1%
EPS Revs	1.8%	6.3%	0.29	57.3%	-22.6%	0.99	475%	1.4%
ESG + EPS Revs	1.7%	4.1%	0.40	52.1%	-6.9%	1.31	320%	0.6%
Size	0.8%	3.0%	0.26	56.4%	-8.7%	0.86	45%	(0.4%)
ESG + Size	0.7%	2.8%	0.26	53.0%	-5.0%	0.86	61%	(0.7%)
ROE	3.2%	4.8%	0.67	53.9%	-7.2%	2.15	83%	1.7%
ESG + ROE	2.7%	4.1%	0.67	57.3%	-5.7%	2.12	117%	(0.2%)
Low Vol	1.0%	10.0%	0.10	50.4%	-23.4%	0.46	268%	1.5%
ESG + Low Vol	1.0%	3.6%	0.26	54.7%	-6.3%	0.88	174%	(0.3%)

Source: J.P. Morgan Quantitative and Derivatives Strategy

### Japan

Dividend Yield is one of the better factors to construct portfolios in Japan and we observe that it pares some gains when combined with ESG. Low Volatility is also a good factor in the region and this too pares some gains when combined with ESG.

With the Composite Value, we observe returns are lower when combined with ESG though we see drawdowns come down into single digits and Sharpe ratio goes up.

Most other factors show improvement on combination with ESG – for example, Q-Score performance is flat relative to the benchmark, however, when combined with ESG, it outperformance by 2.6% annualised.

Table 28: Backtest summary of factor and its equal-weight ESG combination

Factor	Returns	Volatility	Sharpe	Hit Rate	DD	T-Stat	Turnover	IC
ESG (IAS)	3.7%	5.0%	0.75	62.4%	-4.2%	2.38	58%	0.5%
Q-Score	0.0%	7.6%	0.01	53.9%	-24.4%	0.13	338%	1.0%
ESG + Q-Score	2.6%	5.2%	0.50	54.7%	-7.4%	1.64	260%	0.5%
Value	5.1%	9.0%	0.57	54.7%	-16.8%	1.87	206%	1.6%
ESG + Value	3.6%	5.6%	0.64	55.6%	-9.6%	2.06	174%	0.6%
Growth	(0.3%)	5.2%	(0.06)	49.6%	-13.7%	-0.12	211%	(1.1%)
ESG + Growth	0.8%	4.1%	0.20	56.4%	-6.2%	0.68	186%	(0.2%)
Momentum	2.8%	8.8%	0.32	58.1%	-17.3%	1.12	432%	(0.0%)
ESG + Momentum	2.7%	5.8%	0.47	61.5%	-7.7%	1.53	301%	(0.1%)
Quality	2.7%	7.4%	0.36	55.6%	-17.3%	1.22	69%	1.9%
ESG + Quality	3.7%	4.5%	0.82	62.4%	-6.7%	2.58	91%	0.4%
Yld	7.4%	7.8%	0.95	58.1%	-8.4%	3.00	164%	2.7%
ESG + Yld	4.5%	4.7%	0.96	64.1%	-7.3%	3.00	142%	1.5%
PMOM	(1.2%)	9.9%	(0.12)	54.7%	-25.8%	-0.22	326%	(0.4%)
ESG + PMOM	0.6%	6.0%	0.09	55.6%	-11.8%	0.38	259%	(0.7%)
EPS Revs.	0.4%	8.0%	0.04	54.7%	-16.5%	0.26	417%	(1.1%)
ESG + EPS Revs.	2.6%	5.4%	0.49	61.5%	-6.6%	1.58	282%	(0.6%)
Size	0.2%	2.7%	0.07	50.4%	-9.8%	0.25	49%	(1.9%)
ESG + Size	1.2%	3.4%	0.34	52.1%	-7.5%	1.12	64%	(1.3%)
ROE	0.7%	7.1%	0.10	57.3%	-25.3%	0.42	91%	(0.4%)
ESG + ROE	1.9%	4.5%	0.43	57.3%	-8.5%	1.39	113%	(0.6%)
Low Vol.	5.1%	13.2%	0.39	53.9%	-19.2%	1.40	233%	2.0%
ESG + Low Vol.	1.9%	6.2%	0.30	56.4%	-10.1%	1.03	196%	0.5%

Source: J.P. Morgan Quantitative and Derivatives Strategy

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