ESG IN EQUITY COUNTRY SELECTION

by

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ABSTRACT

Recent years have witnessed a rise in Environmental, Social and Governance (ESG) investing across global markets and asset classes. While this has spurred a growing body of literature on the topic, existing empirical studies have focused on the stock level in the equities space, leaving the application of ESG investing to cross-country equity allocation unexplored. Considering the vast opportunities associated with country-level asset allocation supported by the rise of passive investments and ETFs, it is imperative to extend the literature on ESG investing to this space, in order to enable the incorporation of ESG considerations in country allocation strategies, as part of a wider effort to provide investment guidance on ESG investing in all asset classes and approaches to investing. This research is the first to comprehensively examine the relationship between ESG scores and cross-sectional country returns.

The first paper focuses on firm-level ESG scores aggregated to the country-level and examines their relationship with cross-sectional country returns. The findings show that countries populated with firms that exhibit better ESG practices significantly outperform countries with worst firm-level ESG practices. Furthermore, the paper finds that incorporating "ESG Momentum" - a country's change in its firm-level ESG profile, markedly improves returns, demonstrating statistical significance in both developed and emerging markets. The paper proceeds to measure the impact of incorporating ESG considerations on the investment returns of a cross-country equity allocation model, demonstrating that the portfolio's ESG exposure can be increased and the financial returns improved.

The second paper focuses on country-level ESG assigned to the sovereign and examines its relationship with cross-sectional country returns. In particular, the paper intends to explore whether this relationship could be translated into a profitable country selection strategy built on the paradigm of factor investing. The research finds that in developed markets, ESG attributes are associated with positive financial performance, exhibiting Sharpe ratios greater than that of standard country equity factors including value, momentum, size and quality. This effect translates into superior returns from integrating ESG considerations with factor investing in a country selection strategy. The findings are more mixed in the emerging markets sample. While the Environmental factor exhibits positive returns, the Social and Governance factors demonstrate negative returns. However, a holistic approach of ESG-integration using the overall ESG factor exhibits a substantial enhancement in the ESG tilt of the portfolio without an impediment to returns. In exploring the link between firm-level ESG attributes and country-level ESG attributes, the research finds that in developed markets, incorporating country ESG attributes alongside firm ESG level and momentum factors produces the strongest returns, while in emerging markets integrating firm ESG level and momentum factors alone is most profitable.

The results of this analysis are consistent with the growing empirical literature that documents a positive association between ESG attributes and financial performance.

KEYWORDS: ESG investing, sustainable investing, country ESG, ESG Momentum, Combined ESG, equity country selection, factor investing

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1. The Role of Firm-Level ESG and ESG Momentum in the Predictability of Cross-Sectional Country Returns

Lina Nassar

ABSTRACT

This paper is the first to comprehensively examine the relationship between firm-level ESG scores aggregated to the country-level and cross-sectional country returns. The findings show that countries populated with firms that exhibit better ESG practices significantly outperform countries with worst firm-level ESG practices. Furthermore, the paper examines the effect of "ESG Momentum" - a country's change in its firm-level ESG profile, finding that markets with improving ESG practices - positive ESG Momentum, significantly outperform those with negative ESG Momentum. Incorporating both the level and momentum of ESG attributes markedly improves returns, demonstrating statistical significance in both developed and emerging markets. These results are robust to country equity factors as well as stock Fama and French factors. The paper proceeds to measure the impact of incorporating ESG considerations on the investment returns of a cross-country equity allocation model, demonstrating that the portfolio's ESG exposure can be increased and the financial returns improved. The results of this analysis are consistent with the growing empirical literature that documents a positive association between ESG attributes and financial performance.

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1.1 Introduction

Over the past decade, the incorporation of environmental, social and governance (ESG) considerations into the investment decision-making process has become increasingly commonplace and has had a substantial impact on global financial markets. Underpinning this trend is an increased awareness of the role of financial markets in contributing to sustainable welfare goals by governments and regulating bodies and a shift in investor preferences for sustainable assets. As of 2020, the assets under management (AUM) committed to applying some variant of ESG investing stood at circa $103trn, up from just $22trn in 20101. The Global Sustainable Investment Alliance (GSIA, 2020) estimated that in the five major markets[2], the value of assets under management (AUM) invested using some application of ESG considerations amounted to 35 trillion USD, representing more than a third of the AUM in 2021 with estimates for this to grow further to 50 trillion USD by 2040.

While there is now a vast body of literature on ESG investing, it has mostly focused on the company level in the equity and bond space. There has been a growing strand of research addressing country-level ESG and its application in the sovereign bond space but its application in the country equity space remains unexplored. It is important to address this gap in the literature in order to understand and enable the incorporation of ESG considerations in country allocation strategies, as part of a wider effort to provide investment guidance on incorporating ESG in all domains of investing.

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1 United Nations Principles for Responsible Investment, March 2020

[2] Europe, USA, Japan, Canada and Australia and New Zealand

To the best of our knowledge, this paper is the first empirical analysis to comprehensively examine ESG level and momentum factors in the predictability of cross-sectional country equity returns. The research is carried out across two samples representing 23 developed markets and 16 emerging markets countries over the period 2012-2020 and relies on a combination of portfolio sorts and time-series regressions. It proceeds to measure the impact of incorporating country-level ESG indicators on the investment returns of a country allocation model.

The second contribution of this research is related to structural changes whereby global equity markets have witnessed an impressive rise of passive investments and exchange-traded-funds in recent years. These investment products facilitate country equity allocation by providing easy access to country indices, whilst greatly reducing the impact of transaction costs in markets with less liquidity (Angelidis & Tessaromatis, 2018). Considering the vast opportunities associated with country-level asset allocation, it is imperative to extend the literature on ESG investing to this domain. Stock-level investing benefits from a deep and broad literature addressing cross-sectional predictive signals, including an increasing focus of empirical analysis in the ESG investing space. In the field of country asset allocation, further tools remain to be developed and are mostly limited to the standard factors of value, size, momentum, and quality. Thus by testing the relationship between country ESG and future return, we explore alternative predictors of cross-country equity. The paper therefore contributes in two ways. First, it contributes to the broader literature on ESG investing by extending it to the country equity space. Second, by introducing ESG and its individual pillars as country selection factors, it broadens the set of tools available for investors for tactical asset allocation across national markets which

has become increasingly important as standard factors increasingly show signs of depreciating predictive power (Zaremba et al., 2020).

The main findings can be summarized as follows. The results show that countries populated with firms that exhibit better ESG practices significantly outperform countries with worst firm ESG practices. In developed markets this effect is present and statistically significant in each of the three pillars: Environmental, Social and Governance. Further analysis confirms that these returns are not fully accounted for by standard country factors returns or stock Fama and French five factor returns. In emerging markets, while the effect is positive, it mostly lacks statistical significance. The paper proceeds to examine the effect of "ESG Momentum" - a country's change in its firm-level ESG profile, finding that markets with improving ESG practices - positive ESG Momentum, significantly outperform those with negative ESG Momentum. Incorporating both the level and momentum of ESG attributes markedly improves returns, demonstrating a positive and statistically significant effect in both developed and emerging markets. These results are robust to standard country factors as well as stock Fama and French factors. The paper proceeds to measure the impact of incorporating ESG considerations on the investment returns of a cross-country equity allocation model, demonstrating that the portfolio's ESG exposure can be increased and the financial returns improved in both developed and emerging markets.

The results of this analysis are consistent with the growing empirical literature that documents a positive association between ESG attributes and financial performance. The positive association may be somewhat puzzling in that it entails that common risk factors

fail to account fully for the observed results in both developed and emerging markets. The findings therefore lend support to the theoretical literature supporting a mispricing story in which ESG attributes are predictors of future firm profits in a way that the market has not fully appreciated as presented by Pedersen, Fitzgibbons and Pomorski (2020), Manescu (2011), and Giese et al. (2019). Another possible explanation for the outperformance of ESG assets is offered by Pastor, Stambaugh, and Taylor (2019), whereby a sufficient increase in demand for ESG assets, could push up their prices and therefore the observed outperformance from realized prices may be more of an ex-post than an ex-ante effect. On the contrary, if demand for ESG assets rises, ESG strategies have positive short-term performance, but their long-term expected returns would decline (Pastor et al., 2019; Cornell, 2020).

The rest of this paper is organized as follows. Section 2 presents a summary of the literature on ESG investing on the firm level as well as the country level in fixed income and a brief summary of the literature on factor investing in country equity markets. Section 3 presents the sample and elaborates the construction of main variables. Section 4 provides descriptive statistics of the ESG data used in the study. Section 5 examines the relationship between ESG factors of level and momentum and cross-sectional country returns. Section 6 assesses the performance of ESG level and momentum factors with asset pricing models, testing for abnormal returns. Section 7 measures the investment impact of incorporating ESG considerations in a standard cross-country equity allocation model. Section 8 concludes the findings of this paper and presents suggestions for further research.

1.2 Literature Review

The literature review will be organized in three sections. We begin by covering the asset-pricing literature on ESG investing with a summary of the empirical studies focused on firm-level ESG investing in equities, followed by studies that cover country-level ESG investing. Finally, we summarize the findings from the academic literature on factor investing in equity country allocation – this will inform the construction of the base equity country allocation model that is used later in the analysis.

1.2.1 ESG Investing in Equity Markets

The rising importance of ESG investing has naturally attracted considerable academic and practitioner research. Empirical studies in this space typically focus on the relationship between ESG attributes and investing performance, however conclusions of these studies have been varied, lacking consensus on the impact of ESG investing on financial returns. This is not surprising given the heterogeneous nature of ESG investing. Berg et al. (2019), Dimson et al. (2020) and Abhayawansa and Tyagi (2021) highlight significant inconsistencies between ESG ratings from different ESG data providers. There are also significant differences in terminology, definitions, strategies and practical implementation of ESG investing (Sandberg et al., 2009).

From a theoretical perspective, there are plausible arguments supporting both positive and negative performance of ESG investing. We begin by covering the asset-pricing literature

on ESG investing, offering a theoretical discussion on the topic and proceed with a summary of the findings from the empirical literature.

A theoretical argument for negative performance of ESG investing finds its roots in neo-classical finance theory, which argues for the benefits of diversification. Given ESG strategies typically involve a restriction in the investable universe, they would impede on optimal diversification, forego potentially good investments and hence infer an opportunity cost (Cortez et al., 2009).

Another argument for the negative performance of ESG follows from Merton (1987) who posits that stocks neglected by a large segment of investors will tend to have depressed prices, hence higher future returns, thus arguing for a negative relationship between ESG ratings and future investment returns. A growing theoretical literature has followed Merton with Zechner et al. (2001), Luo and Balvers (2017), and Zerbib (2020) showing that in equilibrium, market segmentation of this nature leads to higher expected returns for neglected stocks. Pedersen, Fitzgibbons and Pomorski (2020) offer support of this argument for the S in ESG, submitting that the negative performance associated with good Social stocks arises because investors are willing to accept lower returns for more responsible stocks. Pastor, Stambaugh, and Taylor (2019) build on this argument showing how ESG preferences reduce the costs of capital for good ESG stocks and therefore are associated with a lower expected return due to investors' preferences for holding them as well as their role in hedging climate risk.

On the other hand, the main argument for outperformance of ESG-investing reinforces that the market does not fully price in ESG information. Pedersen, Fitzgibbons and Pomorski

(2020) show that ESG is a positive return predictor when ESG is a positive predictor of future firm profits and the value of ESG is not fully priced in the market. They find evidence for this in the G of ESG, arguing that G is related to higher firm profits in a way that the market has not fully appreciated. Manescu (2011) provides support for this theory, referred to as the "mispricing scenario". This theory states that investors underestimate the benefits of ESG or overestimate its costs resulting in a mispricing of the value relevance of ESG concerns. Providing evidence of this argument, Manescu, (2010) finds that ESG performance does affect a firm's cash flows, though investors do not incorporate this correctly in their valuations. A similar hypothesis finds its basis in the stock market's undervaluation of certain intangibles. Intangibles are often less apparent to investors than tangibles and with less certainty around their valuation, hence leaving more room for mispricing. Edmans (2011) supports this view with evidence of under-reaction to intangibles includes R&D costs, patent citations, advertising, and software development costs. Likewise, ESG investments by firms are typically intangibles, and it is possible that the stock market underreacts to the information in ESG-related initiatives.

Similarly, in providing a theoretical framework for how ESG affects firms' performance and returns, Giese et al. (2019) summarize the effects into transmission channels. Firstly, through the cashflow channel, where the economic rationale is backed by Gregory, Tharyan, and Whittaker (2013) which posits that companies better at managing intangible capital (such as employee satisfaction) are more competitive and exhibit superior profitably and abnormal returns over time. This argument is similar to that of Edmans (2011). The second channel they refer to is the idiosyncratic risk channel which argues that high ESG companies typically have stronger risk-management practices and this results in them

experiencing fewer severe incidents, such as accidents or fraud, that trigger unanticipated costs. The economic rationale for this channel is by backed by Godfrey, Hansen and Merrill (2009), Jo and Na (2012), and Oikonomou, Brooks, and Pavelin (2012). Lastly, they refer to the systematic risk channel whereby high ESG companies that use resources more efficiently may be less susceptible to market shocks and systematic risks.

Another theoretical argument proposed to explain the recorded profitability of ESG investing lies in the "demand effect" argument. Pastor, Stambaugh, and Taylor (2019) argue that as ESG investing gains popularity, the prices of high ESG assets are pushed up, thus creating a re-enforcing spiral of ESG investing outperformance and end-investor demand. This would suggest that outperformance of ESG investing that has been observed in the past is not necessarily repeatable in the future. As argued by Pastor, Stambaugh, and Taylor (2019), this makes it difficult to distinguish between ex ante versus ex post effects of ESG concerns by looking at realized returns over periods during which ESG tastes shift. In particular, if demand for ESG assets rises, ESG strategies have positive short-term performance, but their long-term expected returns decline (Pastor, Stambaugh, and Taylor 2019; Cornell 2020).

In terms of empirical studies, there is a large body of literature that finds evidence of a positive relationship between ESG considerations and financial returns. Friede et al. (2015) who conduct a meta study combining the findings of about 2,200 individual papers conclude that the majority of the studies found a positive ESG-financial performance relationship. In their study, Kempf and Osthoff (2007) construct long-short ESG-integrated portfolios, finding significantly positive four-factor alphas of around 5%

per annum. Likewise, Awaysheh et al. (2020) find that firms with high ESG scores outperform their industry peers. Similar results of ESG outperformance were found by Dunn et al., (2018), Porse et al., (2017), Statman and Glushkov (2009), Gompers, Ishii, and Metrick (2003), Edmans (2011), Nagy, Kassam and Lee (2016) and Pollard et al. (2018).

At the other end of the spectrum, there are a number of papers that find that ESG considerations detract from returns. Hong and Kacperczyk (2009), investigate the impact of negative screening on financial performance using a long sample period from 1926 - 2006, finding that excluded stocks, "sin" stocks, outperform by 3-4%. They argue that social norms lead investors to demand higher returns for holding sin stocks. Similar conclusions on the underperformance of ESG attributes were drawn by Trinks and Scholtens (2017), Fabozzi, Ma and Oliphant (2008), Filbeck, Holzhauer and Zhao (2014), Humpfrey and Tan (2014), Brammer, Brooks and Pavelin (2006), Chava (2011), Bhagat and Bolton (2008).

Some studies have looked beyond the aggregate ESG score to analyze the efficacy of the three ESG pillars separately. Focusing the on the Environmental component, Derwall, et al. (2005) find that a portfolio that scores highly on eco-efficiency outperforms a portfolio that scores poorly on this measure and that the performance differential cannot be explained by differences in market sensitivity, investment style, or industry-specific components and is robust to the inclusion of transaction costs. Contrary to this finding, Kempf and Osthoff (2007) did not find a relationship between environmental factors and investment returns. On the Social component, there is evidence of outperformance of

highly rated stocks. Edmans (2011) concludes that firms with high employee satisfaction exhibit high future stock returns. Kempf and Osthoff (2005) and Statman and Glushkov (2009) confirm similar results. On the Governance component, Gompers, Ishii and Metrick (2003) found that good governance firms outperform for a sample of 1500 large US firms during 1990-1999. However, extending that period to 2008, Bebchuk, Cohen and Wang (2013) find that the relationship is insignificant. Using a negative screening approach, Auer et al. (2016) found that excluding poor governance firms from portfolios enhanced Sharpe ratios.

In an effort to understand the role of materiality, Khan, Serafeim and Yoon (2016) looked into whether performance varied between factors identified as financially material, on an industry-by-industry basis, by the Sustainability Accounting Standard Board (SASB). They found that firms scoring well on material ESG issues deliver up to 6% annualized alpha performance. In contrast, firms with good ratings on immaterial sustainability issues, in other words the "noise" of sustainability reporting, do not significantly outperform firms with poor ratings on the same issues.

A second type of ESG strategy that has been studied in the literature is "ESG momentum", which refers to changes of ESG ratings, either upgrades or downgrades, as a way to gauge improving and deteriorating trends. Derwall et al., 2005 argues that investors underestimate the benefits and overestimate the costs to improvements or deteriorations in ESG performance. While these affect the long-term performance of firms, due to common short-term views, this long-term value is often mispriced and thus corrected for at a later

stage (Derwall et al., 2005). Nagy, Kassam, and Lee (2016) show that an investment strategy that tilts a hypothetical standard market cap–weighted portfolio toward companies that show a positive ESG rating trend significantly outperformed both the benchmark and a comparable strategy that tilted the portfolio weights toward companies with high ESG ratings. Similarly, Khan, Serafeim, and Yoon (2016) used MSCI ESG Ratings data to create customized ESG scores and performed a regression analysis of stock returns to ESG score changes, ESG momentum, neutralized with respect to changes in size, market-to-book ratio, leverage, profitability, R&D intensity, advertising intensity, institutional ownership, and sector membership, findings statistically significant predictive power of ESG momentum for stock returns. Giese et al. (2020) found that ESG momentum showed the strongest positive performance of any ESG characteristic and was more consistent over time. Companies with higher ESG ratings, on average, had lower frequency of stock-specific risks, avoiding large drawdowns, and thus representing a "risk-mitigation premium." Shanaev and Ghimire (2021) studied MSCI Ratings changes over the sample period from 2016 to 2021 in the United States and found that rating downgrades were particularly detrimental to stock performance. Similar results on the predictive power of ESG momentum were confirmed by Antoncic et al. (2020), Conen and Hartmann (2019) and Tsai and Wu (2021).

1.2.2 ESG Investing on the country-level

The majority of the studies looking at country-level ESG have focused on the fixed income market. A number of these studies, including Drut (2010), Badia, Pina & Torres (2019)

and Hubel (2019) find that incorporating ESG considerations in sovereign bond investing does not compromise financial returns.

Zhou et al. (2020) assess the impact of ESG on macroeconomic performance using firm-level ESG scores aggregated to the country-level. Specifically they investigate the relationship between firm-level ESG efforts and macroeconomic growth proxied by GDP per capita. They find that an increase of micro-ESG performance is associated with an improve in GDP per capita in emerging markets, whilst this relationship is only true for the social factor in Developed Markets, with the environmental and governance effects showing as insignificant. Given stock market and economic performance have long been understood to be linked, these findings bye Zhou et al. make a case for the motivation of this study whereby an approach of aggregating firm-level ESG to the country-level is also pursued.

Morgenstern et al. (2021) explore the application of macro ESG (country-level ESG) in traditional trend-following strategies. They find that incorporating both ESG levels and momentum does not hurt performance and in some cases improves it.

To the best of our knowledge, there are no studies explicitly analyzing the relationship between ESG ratings and the cross-sectional returns of national equity markets or the incorporation of ESG considerations to a country allocation model. It is important to address this gap in the literature to understand and enable the incorporation of ESG consideration in country selection investing strategies, as part of a wider effort to provide investment guidance on the impact of incorporating ESG in all domains and forms of investing.

1.2.3 Equity country selection factors

In this section, we provide a summary of the literature on determinant factors of cross-sectional country equity returns. These findings inform the construction of the base equity country allocation model which is used as the benchmark portfolio model in the analysis of this research.

Attempts to identify determinant factors of cross-sectional country-level equity returns have largely drawn on parallels from cross-sectional patterns found in stock level returns, notably beta, value, momentum, size and quality. As with the case on the stock level, the capital asset pricing model (Sharpe, 1964; Lintner, 1965), which includes two specified parameters, being a risk-free rate and the risk of the examined asset relative to the market's risk, proved to be an incomplete description of expected returns on the country level. Exploring country-level return determinants, Asness et al. (1997) find that similar to the Fama and French findings on the stock level, country level indices with higher book-to-market, smaller size, and upward momentum have higher average returns. They conclude that "examining equity markets as a whole, in contrast to individual stocks, we uncover strong parallels between the explanatory power of these variables for individual stocks and for countries." A number of studies have since confirmed these findings. Below is a review of the literature on the individual factors found to demonstrate explanatory power on the cross-sectional selection of country equity returns.

Size

The Size effect is the tendency for small-capitalization stocks to outperform large-capitalization stocks. Applying this to the country level, Keppler and Traub (1993) were the first to demonstrate that small-capitalization equity markets outperform large-capitalization equity markets in a study focused on the MSCI Developed Markets universe. More recent studies applied to a broader universe confirm these findings. Zaremba and Umutlu (2018) demonstrate the size effect in a large international sample, and Li and Pritamani (2015) show that it drives the returns on emerging and frontier markets. Through efforts to understand the size premium, Fisher et al. (2017) provide evidence that the country-size effect is not simply a firm-size effect "in disguise" (the effect does not arise because smaller markets are populated by smaller firms), the potential explanations usually oscillate around the concept of risk. Rikala (2017) explains that "Intuitively, small countries producing higher returns is logical because of the widely acknowledged return profile of small stocks; investing in small firms produces higher returns in exchange for greater volatility and possibly even a return premium; a return in excess of the required compensation for additional risk." Furthermore, Zaremba (2016) shows that accounting for country-specific risks such as sovereign and political can largely explain the abnormal returns for small markets.

Value

The Value effect refers to the tendency of assets with low valuation ratios, such as the price-to-earnings ratio or price-to-book ratio, to outperform assets with high valuation ratios. A number of studies have found that this well-known stock anomaly translates into

the country level including Angelidis and Tessaromatis (2018), Asness et al. (1997), and Zaremba and Szczygielski (2019). Interestingly, Kim (2012) and Zaremba (2016) show that the effect is stronger among the emerging markets rather than in developed countries. Interestingly, Zaremba (2016) finds evidence that the country specific risks such as sovereign and political risks explain a large part of the country-level value premium.

Momentum

The Momentum effect, which is the tendency of assets with high (low) past returns to continue to outperform (underperform) in the future, is one the strongest asset pricing anomalies ever documented. It has been demonstrated in stocks globally as well as commodities, bonds, currencies, and national equity market indices. The first empirical evidence for the momentum effect in country equity indices was found in found in Ferson and Harvey (1994b), Macedo (1995a, 1995b), Richards (1997), and Asness et al. (1997), and confirmed in more recent studies by Zaremba (2016) and Angelidis and Tessaromatis (2018).

Quality

The Quality effect is the observation that stocks with high quality, often defined as low leverage or high profitability, outperform low quality stocks. Novy-Marx (2013) and Watanabe et al. (2013) documented the benefits of adding profitability as one of the additions to the recently augment Fama-French five-factor model on the stock-level. Zaremba (2015) examined this effect on the country-level, finding that it confirms stock-

level conclusions, with quality factors on the country-level outperforming the market and also benefitting the performance of country-level value strategies.

In line with the literature, the country allocation model that we will use as a base for our analysis will include size, value, momentum and quality factors. The objective of this paper is to understand the relationship between ESG indicators and cross-sectional country-level equity returns. Moreover, it is important to isolate the impact of ESG indicators by controlling for the known factors of size, value, momentum and quality. Finally, to address practical applicability, we will investigate the impact on investment returns of incorporating ESG considerations to the base country allocation model. The details of the data and the construction of the relevant factors will be covered in the next section.

1.3 Data and Methodology

This section presents a detailed description of the sample and dataset as well as the methodology of factor construction used in the study. As determined in the previous section, we begin by presenting the construction of the size, value, momentum and quality factors that will form the base country allocation model. We will then provide an explanation of the ESG dataset provided by MSCI and the construction of the firm-level ESG factors[3] to the country level.

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[3] While we do not take a view as to whether ESG attributes should be considered factors, we use the term for ease of reference.

1.3.1 Sample

The analysis is carried out on international stock market indices of 23 developed markets and 16 emerging markets in the MSCI® ACWI index4 from 12/31/2012 through 12/31/2020 with return data on a monthly basis. Table 1.A1 in the Appendix contains the list of countries included in the analysis for both the developed markets and emerging markets samples as well as the start years of each country which is a result of data availability.

Investment returns are obtained monthly from MSCI, are calculated in US dollars and are "net" indexes which represent the reinvestment of dividends after the deduction of withholding taxes. The risk-free rate is calculated as the annualized return on the one-year Treasury bill and is obtained from the Federal Research Bank of St. Louis' FRED database.

1.3.2 Country Factor Construction Methodology

To construct the country value portfolio, we rank at the end of each year *t,* all developed and emerging market countries separately by a composite valuation indicator that combines a country's price to book ratio and price to earnings ratio, weighted equally. Using a composite valuation indicator using two measures of value reduces the measurement error

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4 A few countries from the MSCI ACWI Index are excluded due to lack of data availability.

of individual value indicators (Asness, Moskowitz, & Pedersen, 2012). We form three portfolios containing one third of the countries in each of the developed and emerging markets samples and calculate the monthly returns over the next 12 months: Portfolio 1 consists of the low-ranked countries and Portfolio 3 consists of the high-ranked countries. The returns of the value portfolio are the returns of the portfolio with the lowest price to book and price to earnings ratio (Portfolio 3) minus the returns of the portfolio with the highest price to books and price to earnings ratio (Portfolio 1).

The size portfolio is constructed using aggregate market capitalization of listed companies in USD with yearly data from the World Bank's World Development Indicators database which cites Standard & Poor's and the Global Markets Factbook. We form three portfolios annually containing one third of the countries in each sample and calculate the monthly returns over the next 12 months. Portfolio 1 consists of the low-ranked countries and Portfolio 3 consists of the high-ranked countries. The returns of the size portfolio are the returns of the portfolio with the lowest market capitalization (Portfolio 3) minus the returns of the portfolio with the highest market cap (Portfolio 1).

The quality portfolio is calculated as a country's return on equity (ROE) using the trailing 12-month earnings per share figure and latest book value per share, obtained from MSCI. We rank at the end of each year t, the developed and emerging markets countries separately. We form three portfolios annually containing one third of the countries in each sample and calculate the monthly returns over the next 12 months. Portfolio 1 consists of the low-ranked countries and Portfolio 3 consists of the high-ranked countries. The returns of the

quality portfolio are the returns of the portfolio with the highest ROE (Portfolio 3) minus the returns of the portfolio with the lowest ROE (Portfolio 1).

The momentum portfolio is constructed as a composite indicator combining, with equal weight, two measures of price momentum. The first indicator is the past 12-month cumulative return of a country index, subtracting the most recent month's return (12-1) and the second indicator is the past 3-month cumulative return of a country index, subtracting the most recent month's return (3-1). The subtraction of the most recent month's return is commonly done in the literature to avoid the 1-month reversal in stock returns which could be a function of liquidity or microstructure issues as found by Jegadeesh (1990). We use the combination of 12-1 and 3-1 momentum factors in order to minimize measurement error of an individual momentum factor. Unlike all the other factors which are formed on yearly data, the momentum factors are formed on monthly data. This is common practice in the literature due to the fast-changing nature of momentum factors. We form three portfolios monthly containing the highest, medium and lowest momentum countries. Portfolio 1 consists of the low-ranked countries and Portfolio 3 consists of the high-ranked countries. The returns of the momentum portfolio are the returns of the portfolio with the highest momentum (Portfolio 3) minus the returns of the portfolio with the lowest momentum (Portfolio1).

1.3.3 Stock-based Fama and French factors

As a robustness check in the analysis, we use the Fama and French Five Factor Model portfolio returns in order to test whether the ESG portfolio returns could be explained by

any of the Five Factors. We choose the Five Factor model for completeness, which includes the additional Profitability (Robust Minus Weak) and Investment (Conservative Minus Aggressive) factors as well as Market, Size and Value. The returns of the Fama-French five factors are obtained from the Kenneth French Data Library for both the Developed Markets and Emerging Markets respectively. As indicated on the Kenneth French website, the Fama/French Five factors are constructed using the 6 value-weight portfolios formed on size and book-to-market, the 6 value-weight portfolios formed on size and operating profitability, and the 6 value-weight portfolios formed on size and investment. To construct the SMB, HML, RMW, and CMA factors, stocks in a country are sorted into two market cap and three respective book-to-market equity (B/M), operating profitability (OP), and investment (INV) groups at the end of each June. Big stocks are those in the top 90% of June market cap for the country, and small stocks are those in the bottom 10%. The B/M, OP, and INV breakpoints for a country are the 30th and 70th percentiles of respective ratios for the big stocks of the country (Kenneth French, 2020). Description of the individual factors construction are as follows:

- *MktRf (Market): return on a region's value weight market portfolio minus the U.S. one month T-bill rate*

- *SMB (Small Minus Big): average return on the nine small stock portfolios minus the average return on the nine big stock portfolios*

- *HML (High Minus Low): average return on the two value portfolios minus the average return on the two growth portfolios*

- *RMW (Robust Minus Weak) is the average return on the two robust operating profitability portfolios minus the average return on the two weak operating profitability portfolios*

- *CMA (Conservative Minus Aggressive) is the average return on the two conservative investment portfolios minus the average return on the two aggressive investment portfolios*

3.3 ESG Data and Factor Construction

ESG data on the firm-level is obtained from the MSCI ESG database, a well-known and widely-used source of ESG ratings and information. The MSCI ESG Ratings system provides information on 35 ESG key issues covering over 8500 companies in over 30 countries. A score of 0 (worst ESG performance) to 10 (best ESG performance) is assigned for each ESG key issue deemed material for an industry, based on the company's core business and the industry-specific issues that may create significant risks and opportunities for the company with scores determined based on the firm's risk exposure and risk management. A weight is assigned to the issue according to its contribution to environmental and social impacts. The scores and weights for each ESG key issue are then grouped into ten themes. These themes are associated with one of the three ESG pillars (environmental, social and governance issues). Within the Environmental pillar, the associated themes are Climate Change, Natural Capital, Pollution and Waste and Environmental Opportunities. Within the Social Pillar, the associated themes are Human Capital, Product Liability, Stakeholder Opposition and Social Opportunities. Within the Governance Pillar, the associated pillars are Corporate Governance and Corporate Behavior. The scores and weights relevant to each theme and pillar are grouped together to arrive at a weighted average score ranging from 0 (worst) to 10 (best) for each pillar- the Environmental Pillar Score, the Social Pillar Score, the Governance Pillar score, and

from the combination of the three pillars a weighted-average ESG score. The weighted average ESG scores are subsequently normalized to the industry level to obtain the final industry-adjusted average score (0 to 10) for each company. We use the ESG Scores rather than the Ratings for finer granularity. Further information on the construction of the MSCI ESG scores is provided in MSCI (2020).

In conducting this research, we employ average firm-level ESG scores in a country as an indicator of the country's microeconomic ESG performance. We construct an equally weighted mean of E (Environmental), S (Social), G (Governance) and the overall ESG score of the stocks listed in the MSCI Developed Markets and MSCI Emerging Markets, subject to data availability. Countries that contain ESG scores for fewer than ten firms are excluded from this study in order to avoid a small number of firms representing the microeconomic ESG performance of a country, whilst balancing out the benefit of a larger sample size of countries. The data availability of the MSCI ESG scores largely determines the period and sample of study for this research, with scores calculated over the period 2012-2020 for 39 countries, grouped into 23 developed market countries and 16 emerging market countries. The full list of countries included in the study are presented in table A1 in the Appendix.

For each of the pillars, Environmental, Social, Governance and the overall ESG score, we form three portfolios annually containing the highest (Portfolio 3), medium (Portfolio 2) and lowest (Portfolio 1) ESG countries within developed markets and emerging markets separately. The returns of the E, S, G and ESG portfolios are the returns of the portfolio

with the highest relevant ESG score (Portfolio 3) minus the returns of the portfolio with the lowest relevant ESG score (Portfolio 1).

In addition to the level of ESG scores we will also examine the change of the ESG score, which we call 'ESG momentum' (ESG_Mom). This is the one-year change in the ESG score calculated on the country level. Once again, for each of the pillars, Environmental, Social, Governance and the overall ESG score, we form three portfolios annually containing the highest (Portfolio 3), medium (Portfolio 2) and lowest (Portfolio 1) ESG momentum countries within developed markets and emerging markets separately. The returns of the E, S, G and ESG momentum portfolios are the returns of the portfolio with the highest relevant ESG momentum (Portfolio 3) minus the returns of the portfolio with the lowest relevant ESG momentum (Portfolio 1).

A third measure, combined ESG (ESG_Comb), is calculated as an average of the ESG level and the ESG Momentum to measure the combined level and change of ESG. Once again, we form three portfolios monthly containing the highest (Portfolio 3), medium (Portfolio 2) and lowest (Portfolio 1) combined ESG countries. The returns of the combined ESG portfolio are the returns of the portfolio with the highest combined ESG minus the returns of the portfolio with the lowest combined ESG.

In that regard we examine three versions of ESG factors in this study for each of the four fields (E, S, G and ESG): ESG factors which refer to the level of ESG scores, ESG Momentum (ESG_Mom) which refers to the change in ESG scores and finally a combined approach of the level and momentum (ESG_Comb).

Tables A2 and A3 shows the average factor ranks over the sample period for the developed markets and emerging markets samples respectively.

1.4 Descriptive Statistics of ESG attributes

1.4.1 ESG attributes in Developed Markets and Emerging Markets

In this section we provide descriptive statistics of company-level ESG attributes aggregated to the country-level in Developed Markets and Emerging Markets in order to gain an understanding of the data ahead of conducting the analysis in the proceeding sections.

Figure 1.1 provides four graphs of the ESG, Environmental, Social and Governance scores respectively through time aggregated for the developed market sample and the emerging market sample. The sample aggregates are calculated as the mean of the score of the countries within each sample. Evident from these graphs is that developed market countries demonstrate better ESG performance than do emerging market countries, with this being true in each of the three pillars: Environmental, Social and Governance. The gap is most pronounced in the Environmental and Governance pillars, whereas it is significantly smaller in the Social pillar, particularly in recent year.

Whilst the level of ESG scores is higher in developed markets, it is clear that emerging markets show more improvement in the overall ESG score than do developed countries. Specifically this improvement appears to be driven by the Environmental and the Social pillars where emerging markets have seen fairly consistent improvement throughout the sample period while developed markets show no clear trend. The opposite is true of the

Governance pillar whereby the developed markets exhibit a clearer improvement whilst emerging markets exhibit a slight worsening of the scores over the sample period. These trends translate into a convergence of the Environmental and particularly the Social score between developed markets and emerging markets over the sample period, with the Governance pillar demonstrating the opposite trend.

Figure 1.2 shows scatterplot graphs of the average ESG level ranks on the x axis and trend on the y axis for each developed market country over the sample period, 2012-2020. The ESG trend is the rank of the average annual change in ESG score over the sample period. Figure 1.3 shows the same scatterplot graphs for countries in the emerging markets sample. The scatterplot graphs for the Environmental, Social and Governance scores for both samples are presented in the Appendix in Figure 1.A8–A15. The time-series graphs of the aggregated ESG, Environmental, Social and Governance scores through time for the individual countries are presented in the Appendix in Figures A1 – A7.

Figure 1.2 shows that within developed markets, New Zealand, Finland, Sweden and Australia rank highest on the overall ESG score over the sample period, with the USA, Israel and Hong Kong rank worst. In terms of trend, Hong Kong and Finland exhibit the most positive trend, meaning the most improvement in ESG performance whilst Italy, Spain and the Netherlands exhibit the lowest trend or the most deteriorating ESG performance.

Figure 1.3 shows that within emerging markets, South Africa and Thailand rank highest on the overall ESG score over the sample period, whilst China, Qatar and Russia rank worst. In terms of trend, Malaysia, Mexico and India exhibit the most positive trend, meaning the

most improvement in ESG performance whilst Indonesia and Korea exhibit the lowest trend or the most deteriorating ESG performance.

1.4.2 Correlations of ESG factors with country-selection factors

To gain further insight into the characteristics of ESG attributes on the country level, in this section we look at the correlations of the ESG, Environmental, Social and Governance factor portfolios amongst each other and known country-selection factors of Size, Value, Momentum and Quality. We use the factor portfolio methodology outlines in Section 3 and calculate average pairwise correlations of the factor portfolio returns over the sample period. The correlation matrices for the Developed Markets sample and the Emerging Markets sample are presented in Table 1.1 and Table 1.2 respectively.

Within the developed markets sample, the ESG factors exhibit high correlations amongst each other, with the Social factor demonstrating the highest correlation with the overall ESG factor at 84%. Amongst the individual pillars, the Environmental and Social pillars demonstrate the highest correlation at 54% whilst the Environmental and Governance pillars demonstrate the lowest correlation at 13%. Within the emerging markets sample, correlations for the ESG factors are similarly high although less so than in developed markets with the highest correlation being again that of the Social pillar at 57%. Amongst the individual pillars, the Environmental and Governance pillars demonstrate the highest correlation at 26% whilst the Social and Governance pillars demonstrate the lowest correlation at 11%.

The correlations between the ESG factors and the country factor portfolios present a different picture in the developed markets sample than they do in the emerging markets sample. Within the developed markets sample, the correlations are generally more muted with the ESG factors displaying a negative correlation to Value and a positive correlation to Quality. Interestingly, the Governance factor displays the strongest correlations, with a strong positive correlation to Quality at 35% and a strong negative correlation to Value at -41%. Interestingly, the positive correlation between ESG and Quality is a characteristic that has been documented on the stock level (Bruno et al., 2021). In Emerging Markets, the ESG factor is most highly correlated to Size at 23% and displays a slight positive correlation to Value at 11%. Amongst the individual pillars, the most notable correlations are for the Governance pillar which displays a strong negative correlation to Size at -27% and a strong positive correlation to Quality at 25%, once again echoing the characteristic found on the stock level.

1.5 Performance of Portfolio sorts on ESG factors

In this section we conduct portfolio sorts on ESG factors to examine their effectiveness in explaining cross-country equity returns. As outlined in Section 3 of this paper, we do this by creating zero-investment portfolios for each factor and calculating the annualized return and standard deviation from 2012 till 2020. We also calculate the annualized average investment returns, standard deviations and Sharpe ratios of the zero-investment portfolio returns over the analyzed period. This is conducted for the both the developed markets and emerging markets samples. Zero-investment portfolios are constructed for the following ESG factors:

- *ESG, Environment (E), Social (S), Governance (G): Average of ESG, E, S, G scores (level)*

- *ESG_Mom, E_Mom, S_Mom, G_Mom: One year change of ESG, E, S, G scores (ESG Momentum)*

- *ESG_Comb, E_Comb, S_Comb, G_Comb: Average of level and momentum (Combined)*

We begin by analyzing the performance of the zero-investment portfolios of the ESG factors (level) in the first subsection and turn to ESG momentum and combined ESG level and momentum factors in the second subsection.

1.5.1 Portfolio sorts on ESG Level factors

In this section we conduct portfolio sorts on ESG level factors to examine their effectiveness in explaining cross-sectional country equity index returns.

Table 1.3 shows the results in the developed markets sample. In developed markets, the ESG factor portfolio demonstrates strong performance with an annualized return of 3.8% which is statistically significant and represents a Sharpe ratio of 0.60. This means that countries with the best ESG scores outperform countries with the worst ESG scores by an average of 3.8% per year. Interestingly, the performance of the individual pillars demonstrate positive returns, however the S factor is not statistically significant. Comparing amongst the pillars, we find that the Environmental factor demonstrates the strongest performance with an annualized return of 4.0% and the highest Sharpe ratio at 0.54.

Table 1.4 refers to the results in the emerging markets sample. In emerging markets, the ESG factor demonstrates positive performance with an annualized return of 2.4%, however

it is not statistically significant. The performance of the individual pillars is comparable ranging from 3.2% to 3.4% however in each case is statistically insignificant. It is possible that the lack of significance is attributable to a small sample and a short history.

1.5.2 Portfolio sorts on ESG Momentum factors

In this sub-section, we look at zero-investment portfolios formed using the one-year change in ESG scores, 'ESG Momentum' (ESG_Mom) and zero-investment portfolios formed using 'combined ESG' (ESG_Comb), the average of the ESG level and the ESG momentum for each country.

Table 1.5 shows the results in the Developed Markets sample. In Developed Markets, the ESG momentum factor portfolio demonstrates strong performance with an annualized return of 3.4% which is statistically significant and represents a Sharpe ratio of 0.58. This means that countries with improving ESG scores outperform countries with deteriorating ESG scores on a relative basis by an average of 3.4% per year. Looking at the ESG Momentum of the individual pillars shows that the momentum effect in each of the three pillars demonstrate positive returns, however the Social momentum factor is not statistically significant. Comparing amongst the pillars we find that the Governance momentum factor demonstrates the strongest performance with an annualized return of 5.9% and the highest Sharpe ratio at 1.01.

Looking at the combined ESG level and momentum factor, ESG_Comb, performance is markedly improved relative to either the level or momentum factors individually, with an annual return of 4.6% and a Sharpe ratio of 0.86. Each of the individual pillars demonstrates

strong and statistically significant performance, with Sharpe ratios ranging from 0.92 for the Environmental factor to 0.46 for the Social factor. Interestingly, the combined approach markedly improves Sharpe ratios on both the level and the momentum factors individually, with the exception of the Governance momentum factor which had come from a high base.

Table 1.6 shows the results in the Emerging Markets sample. In Emerging Markets, the ESG momentum factor portfolio demonstrates strong performance with an annualized return of 5.8% which is statistically significant and represents a Sharpe ratio of 0.58. This means that countries with improving ESG scores outperform countries with deteriorating ESG scores on a relative basis by an average of 5.8% per year. Looking at the ESG Momentum of the individual pillars shows that the momentum effect in each of the three pillars demonstrates positive returns, however the Governance momentum factor is not statistically significant. Comparing amongst the pillars we find that the Social momentum factor demonstrates the strongest performance with an annualized return of 6.7% and the highest Sharpe ratio at 0.68.

Looking at the combined ESG level and momentum factor, ESG_Comb, performance is positive and statistically significant with an annual return of 3.9% and a Sharpe ratio of 0.39, thus lower than the performance achieved in the ESG Momentum factor alone. Both the Environmental and the Social pillars demonstrate strong and statistically significant performance, with improved Sharpe ratios relative to either the level or momentum factors alone. The Governance factor witnesses positive but statistically insignificant performance.

The preceding preliminary results indicate that ESG factors may explain differences in cross-sectional country equity returns. Moreover, in developed markets the results show

that ESG factors demonstrate strong and statistically significant performance. While the standalone ESG factors lack statistical significance in Emerging Markets, a combined approach looking at both ESG level and momentum markedly improves performance and is statistically significant in both developed and emerging markets.

While portfolio sorts provide a good indication of how a strategy that goes long countries with good or improving ESG scores and goes short countries with bad or deteriorating ESG scores would have performed over the sample period, the next step is to evaluate whether these returns could be explained by known country selection factor returns. Conducting this analysis will clarify whether the documented ESG factor returns are explained by known country factor returns, or whether there is an effect unaccounted for. We address this topic in the next section where we proceed to conduct multivariate regression analysis.

1.6 Multi-variate Regression Results of ESG factors

While the preceding results suggest that ESG factors explains differences in cross-country equity market returns, the next step is to evaluate this supposition whilst accounting for common country selection factor returns. We do this by regressing the returns of the ESG factors against the market portfolio and country factor portfolios as outlined in Section 3. We will conduct this analysis for the ESG Level factors in the first section and the ESG Momentum and ESG Combined factors in the second section.

1.6.1 Multi-variate Regression Results on country factor portfolios: ESG Level

We begin by regressing the monthly returns of the zero-investment ESG level portfolios on the market portfolio and the country factor portfolios as outlined in Section 3. This is done for the overall ESG factor and repeated for each of the pillars separately: Environmental (E), Social (S) and Governance (G). The following four regressions are carried out in the developed markets sample and the emerging markets sample.

$r_{ESG_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SIZE}r_{SIZE_t} + \beta_{VAL}r_{VAL_t} + \beta_{MOM}r_{MOM_t} + \beta_{QUAL}r_{QUAL_t} + \varepsilon_t$ 　(1)

$r_{E_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SIZE}r_{SIZE_t} + \beta_{VAL}r_{VAL_t} + \beta_{MOM}r_{MOM_t} + \beta_{QUAL}r_{QUAL_t} + \varepsilon_t$ 　(2)

$r_{S_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SIZE}r_{SIZE_t} + \beta_{VAL}r_{VAL_t} + \beta_{MOM}r_{MOM_t} + \beta_{QUAL}r_{QUAL_t} + \varepsilon_t$ 　(3)

$r_{G_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SIZE}r_{SIZE_t} + \beta_{VAL}r_{VAL_t} + \beta_{MOM}r_{MOM_t} + \beta_{QUAL}r_{QUAL_t} + \varepsilon_t$ 　(4)

where:

- r_{ESG}, r_E, r_S, r_G is the return on the ESG, E, S and G level zero-investment portfolios respectively.
- r_f is the return on the one-year Treasury bill.
- α is a constant.
- r_{mkt} is the return on the equity market of the relevant sample.
- r_{SIZE} is the return on the size factor portfolio.
- r_{VAL} is the return on the value factor portfolio.
- r_{MOM} is the return on the momentum factor portfolio.
- r_{QUAL} is the return on the quality factor portfolio.
- β_{MKT}, β_{SIZE}, β_{VAL}, β_{MOM}, β_{QUAL} are regression coefficients.
- ε_t is the error term.

We present estimation results from the equations in Table 1.7 for the Developed Markets sample. Panel A shows the estimation results for equation 1, the ESG factor - the intercept is statistically significant with an annualized value of 3.7%. Interestingly, the Market, Size and Momentum factors partly explain the returns of the ESG factor. Panels B, C and D show the estimation results for equations 2, 3 and 4, representing the Environmental, Social and Governance factors respectively. In each case the intercept is positive but statistically insignificant. The Environmental factor has a negative loading on value while the Social factor has a positive loading on Size. The Governance factor has a strong positive loading on Quality, reflecting the findings from the correlation analysis in Section 4. These results suggest that while the ESG factor portfolio demonstrates statistically significant alpha, capturing abnormal returns that are not explained by exposure to common country selection factors, this is not the case in the individual pillars where the alpha is positive but statistically insignificant.

We present estimation results for the Emerging Markets sample in Table 1.8. Panel A shows the estimation results for equation 1, the ESG factor, which is positive but statistically insignificant. It shows a positive and significant loading to the Value factor indicating that the perceived outperformance of high ESG countries can be explained partly by the Value factor. Panels B, C and D show the estimation results for equations 2, 3 and 4, representing the Environmental, Social and Governance factors respectively. In each case the intercept is positive but statistically insignificant. The lack of statistical significant could be partly explained by the small sample size of countries and the short sample period.

The preceding results confirm that in Developed Markets, the ESG factor explain differences in cross-country equity market returns, even after accounting for known country factors, while the individual pillars are not robust to the inclusion of the common factors. In Emerging Markets, the ESG returns seems to be explained partly by country equity returns with neither the overall ESG factors nor the individual pillars demonstrate statistically significant alpha.

1.6.2 Multi-variate Regression Results on country factor portfolios: ESG Level and Momentum

In this section we analyze the returns of the combined ESG factors, those formed on a combination of level and momentum whilst accounting for known country selection factor returns. We regress the monthly returns of the ESG Comb zero-investment portfolios on the market portfolio and the country factors - Size, Value, Momentum and Quality. This is done for the combined ESG factor and repeated for each of the combined pillars separately: Environmental (E), Social (S) and Governance (G). The following four regressions are carried out in both the developed markets sample and the emerging markets sample.

$$r_{ESG\_Comb_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SIZE}r_{SIZE_t} + \beta_{VAL}r_{VAL_t} + \beta_{MOM}r_{MOM_t} + \beta_{QUAL}r_{QUAL_t} + \varepsilon_t \quad (5)$$

$$r_{E\_Comb_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SIZE}r_{SIZE_t} + \beta_{VAL}r_{VAL_t} + \beta_{MOM}r_{MOM_t} + \beta_{QUAL}r_{QUAL_t} + \varepsilon_t \quad (6)$$

$$r_{S\_Comb_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SIZE}r_{SIZE_t} + \beta_{VAL}r_{VAL_t} + \beta_{MOM}r_{MOM_t} + \beta_{QUAL}r_{QUAL_t} + \varepsilon_t \quad (7)$$

$$r_{G\_Comb_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SIZE}r_{SIZE_t} + \beta_{VAL}r_{VAL_t} + \beta_{MOM}r_{MOM_t} + \beta_{QUAL}r_{QUAL_t} + \varepsilon_t \qquad (8)$$

where:

- $r_{ESG\_Comb}, r_{E\_Comb}, r_{S\_Comb}, r_{G\_Comb}$ is the return on the combined level and momentum ESG, E, S and G level zero-investment portfolios respectively. All other variables are as specified in equations 1-4.
- ε_t is the error term.

We present estimation results from the equations in Table 1.9 for the Developed Markets sample. Panel A shows the estimation results for equation 5, the combined ESG factor - the intercept is high and statistically significant with an annualized value of 3.7%. This confirms that the returns of the zero-investment portfolios of the ESG combined factor cannot be explained by the country factors. Interestingly the combined ESG factor is partially explained by Market, Size, Momentum and Quality. Panels B, C and D show the estimation results for equations 6, 7 and 8, representing the Environmental, Social and Governance factors respectively. The Environmental and Governance factors are positive and statistically significant while the Social factor is positive but statistically insignificant. These results suggest that the combined ESG factor as well as the Environmental and Governance combined factors demonstrates statistically significant alpha, capturing abnormal returns that are not explained by exposure to common country selection factors.

We present estimation results for the Emerging Markets sample in Table 1.10. Panel A shows the estimation results for equation 5, the combined ESG factor, which is positive and statistically significant. This confirms that the returns of the zero-investment portfolios of the ESG combined factor cannot be explained by the country factors. Panels B, C and D

show the estimation results for equations 6, 7 and 8, representing the Environmental, Social and Governance factors respectively. Similarly, for the Environmental and Social combined factors, the intercept is positive and statistically significant. However, for the Governance factor, the intercept is not statistically significant, with the Quality factor partly explaining the returns.

The preceding results confirm that in both developed markets and emerging markets, the ESG combined factor explains differences in cross-country equity market returns, even after accounting for the known country factors. The exception to this is the Social factor in developed markets and the Governance factor in the emerging markets sample which are not robust to the inclusion of the common factors. In emerging markets, the returns on the governance factor appear to be explained by the Quality factor, echoing results from the correlation analysis in Section 4.

1.6.3 Robustness check: Multi-variate regression results on stock based Fama/French factors

While factor portfolios based on countries could be viewed as proxies for Fama and French stock-based factors, they do not necessarily fully capture the factor effects. As a robustness check, we run the ESG portfolio regressions against Fama and French stock-based factors to be able to confirm whether ESG factor returns are spanned by them. We carry out this analysis for both Developed Markets and Emerging Markets and for both the ESG level and the combined level and momentum ESG factors.

Monthly returns of the ESG, E, S and G portfolios are regressed on the monthly returns of the returns of the Fama and French five factors as described in Section 3 of this paper. This analysis is conducted for both the Developed Markets and Emerging Markets samples.

The following four regressions are carried out in the developed markets sample and the emerging markets sample.

$$r_{ESG_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SMB}r_{SMB_t} + \beta_{HML}r_{HML_t} + \beta_{RMW}r_{RMW_t} + \beta_{CMA}r_{CMA_t} + \varepsilon_t \qquad (9)$$

$$r_{E_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SMB}r_{SMB_t} + \beta_{HML}r_{HML_t} + \beta_{RMW}r_{RMW_t} + \beta_{CMA}r_{CMA_t} + \varepsilon_t \qquad (10)$$

$$r_{S_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SMB}r_{SMB_t} + \beta_{HML}r_{HML_t} + \beta_{RMW}r_{RMW_t} + \beta_{CMA}r_{CMA_t} + \varepsilon_t \qquad (11)$$

$$r_{G_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SMB}r_{SMB_t} + \beta_{HML}r_{HML_t} + \beta_{RMW}r_{RMW_t} + \beta_{CMA}r_{CMA_t} + \varepsilon_t \qquad (12)$$

where:

- r_{ESG}, r_E, r_S, r_G is the return on the ESG, E, S and G level zero-investment portfolios respectively.
- r_f is the return on the one-year Treasury bill.
- α is a constant.
- r_{mkt} is the return on the equity market of the relevant sample.
- r_{SMB} is the return on the SMB factor portfolio.
- r_{HML} is the return on the HML factor portfolio.
- r_{RMW} is the return on the RMW factor portfolio.
- r_{CMA} is the return on the CMA factor portfolio.
- $\beta_{MKT}, \beta_{SMB}, \beta_{HML}, \beta_{RMW}, \beta_{CMA}$ are regression coefficients.
- ε_t is the error term.

We present estimation results from the equations in Table 1.11 for the Developed Markets sample. Panel A shows the estimation results for equation 9, the overall ESG factor - Panel A shows the results for the ESG factor - the intercept is high and statistically significant with an annualized value of 4.6%. This confirms that the returns of the zero-investment portfolios of ESG cannot be explained by the Fama and French factors of MktRf, SMB, HML, RMW or CMA. Interestingly the ESG factor has a positive and statistically significant relationship with the SMB factor, suggesting it partly explains the returns of the ESG factor. Panels B, C and D show the estimation results for equations 10, 11 and 12, representing the Environmental, Social and Governance factors respectively. In each case the intercept is positive but statistically insignificant. These results echo the findings in Section 5.1, showing that while the ESG factor portfolio demonstrates statistically significant alpha thus capturing abnormal returns this is not the case in the individual pillars.

We present estimation results from the equations in Table 1.12 for the Emerging Markets sample. Panel A shows the estimation results for equation 9, the overall ESG factor - ESG factor. Panels B, C and D show the estimation results for equations 10, 11 and 12, representing the Environmental, Social and Governance factors respectively. In each case the intercept is positive but statistically insignificant, echoing the findings in Section 5.1.

Next, we analyze the returns of the combined ESG factors, those formed on a combination of level and momentum whilst accounting for known country selection factor returns.

The following four regressions are carried out in the developed markets sample and the emerging markets sample.

$$r_{ESG\_Comb_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SMB}r_{SMB_t} + \beta_{HML}r_{HML_t} + \beta_{RMW}r_{RMW_t} + \beta_{CMA}r_{CMA_t} + \varepsilon_t \quad (13)$$

$$r_{E\_Comb_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SMB}r_{SMB_t} + \beta_{HML}r_{HML_t} + \beta_{RMW}r_{RMW_t} + \beta_{CMA}r_{CMA_t} + \varepsilon_t \quad (14)$$

$$r_{S\_Comb_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SMB}r_{SMB_t} + \beta_{HML}r_{HML_t} + \beta_{RMW}r_{RMW_t} + \beta_{CMA}r_{CMA_t} + \varepsilon_t \quad (15)$$

$$r_{G\_Comb_t} - r_{f_t} = \alpha + \beta_{MKT}(r_{mkt_t} - r_{f_t}) + \beta_{SMB}r_{SMB_t} + \beta_{HML}r_{HML_t} + \beta_{RMW}r_{RMW_t} + \beta_{CMA}r_{CMA_t} + \varepsilon_t \quad (16)$$

where:

- $r_{ESG\_Comb}, r_{E\_Comb}, r_{S\_Comb}, r_{G\_Comb}$ is the return on the combined level and momentum ESG, E, S and G level zero-investment portfolios respectively. All other variables are as specified in equations 9-12.
- ε_t is the error term.

We present estimation results from the equations in Table 1.13 for the Developed Markets sample. Panel A shows the estimation results for equation 13, the combined ESG factor - the intercept is high and statistically significant with an annualized value of 4.7%. This confirms that the returns of the zero-investment portfolios of ESG cannot be fully explained by the Fama and French factors of SMB, HML, RMW or CMA. However the SMB factor and the HML factor partially explain the returns. Panels B, C and D show the results for the Environmental, Social and Governance factors respectively. In each case the intercept is positive and statistically significant and unlike the previous section, here the Social factor is also statistically significant, although weakly so.

Table 1.14 presents the estimation results for the Emerging Markets sample. Panel A shows the results for the combined ESG factor - the intercept is statistically significant with an annualized value of 6.0%. Panels B, C and D show the results for the combined

Environmental, Social and Governance factors respectively. For the Environmental and Social combined factors, the intercept is statistically significant while for the Governance factor it is not. These results echo the findings in the previous section, showing that the combined ESG factor portfolios demonstrate statistically significant alpha thus capturing abnormal returns, with the exception of the combined Governance factor. IT is interesting to note that the Environmental and Social factors demonstrate higher alpha and significance than the overall ESG factors which appears to be dragged down by the Governance factor.

1.7 Incorporating ESG Level and Momentum in equity country allocation

While the results in the preceding sections find that ESG factors exhibit predictability in cross-sectional country equity market returns, the next step is to measure the investment impact of incorporating ESG considerations within the framework of a standard cross-country equity allocation model. In the first subsection we conduct portfolio sorts on standard country factor portfolios as presented in Section 3. In the second subsection we combine the country factor portfolios to create a base multi-factor country allocation model and then we add the ESG factors to the base country model in order to measure the financial impact of incorporating ESG factors in country allocation. In the final subsection, we analyze the effectiveness of incorporating ESG factors in increasing the ESG exposure of the portfolios.

1.7.1 Portfolio sorts on country factor portfolios

We begin with a brief analysis on the performance of common factors in cross-sectional equity selection that we presented in Section 3.

Table 1.15 reports the annualized monthly returns and standard deviations, spanning the full history from 2012 till 2020 for the developed markets sample. In developed markets, momentum is by far the strongest factor, with high momentum countries outperforming low momentum countries by 7.7% per year with statistically significant performance and a Sharpe ratio of 0.94. Contrary to common belief, the Size factor appears to have weak and statistically insignificant performance. This is line with a recent finding by Zaremba (2015) which finds that the size factor has largely lost its strength when updated to more recent periods. Quality also has statistically insignificant and near zero returns in the developed markets sample. Value has statistically significant negative performance during the sample period, a puzzling phenomenon that has been also witnessed on the stock level over recent years. In general, these findings confirm those of Zaremba (2020) who finds that country-selection factors have lost alpha over the more recent period.

Table 1.16 shows the results in the emerging markets sample. Only the Value factor displays positive and statistically significant returns, with a Sharpe Ratio of 0.41. On the contrary, both Size and Momentum demonstrate significantly negative performance. Once again, these findings confirm those of Zaremba (2020) who finds that country-selection factors have lost alpha over the more recent period. This is possibly exacerbated by the reduced size of the Emerging Markets in this sample which is due to limitations of ESG data availability.

It is clear from these results that common country selection factors are showing signs of reduced predictive power, confirming the findings of Zaremba (2020). This makes a further case for turning to alternative country-selection factors, such as ESG factors in order to

broaden the toolset available for investors in the predictability in cross-sectional country returns.

1.7.2 Measuring the financial impact of incorporating ESG in equity country allocation

In this sub-section, we look to measure the impact of incorporating ESG on the financial returns of a country allocation model. We start by combining the country factor portfolios to create a base multi-factor country allocation model and then we add the ESG factors to the base country model in order to measure the financial impact of incorporating ESG factors in country allocation. The base multi-factor country allocation model is an equal combination of the country factor portfolio presented in Section 3 - the Size portfolio, the Value portfolio, the Momentum portfolio and the Quality portfolio. To construct the base model portfolio, we average the monthly ranks for each factor portfolio for emerging markets and developed markets separately. We then form three portfolios containing one third of the countries in each of the developed and emerging markets samples and calculate the monthly returns over the next 12 months. Portfolio 3 includes countries with the highest combined rank and Portfolio 1 includes countries with the lowest combined rank. The zero-investment returns of going long Portfolio 3 and short Portfolio 1 represent the returns of the base model portfolio.

Next, we incorporate the ESG level factor to the base portfolio. To incorporate ESG, we average the monthly ranks for the four country factor portfolios as well as the ESG factor portfolio for emerging markets and developed markets separately. We then form three portfolios containing one third of the countries in each of the developed and emerging

markets samples and calculate the monthly returns over the next 12 months. Once again, Portfolio 3 includes the countries that rank highest on the combined factors, this time including the relevant ESG factor and Portfolio 1 includes the countries ranking lowest on the combined factor ranks. The returns of the ESG-incorporated base model portfolio are the returns of Portfolio 3 minus the returns of Portfolio 1. We refer to this portfolio as Base_ESG.

Finally, we incorporate the combined level and momentum ESG factor to the base portfolio. As before, we average the monthly ranks for the four country factor portfolios as well as the combined ESG factor portfolio for emerging markets and developed markets separately. We then form three portfolios containing one third of the countries in each of the developed and emerging markets samples and calculate the monthly returns over the next 12 months. Once again, Portfolio 3 includes the countries that rank highest on the combined factors, this time including the relevant ESG combined level and momentum factor and Portfolio 1 includes the countries ranking lowest on the combined factor ranks. The returns of the base model portfolio including the ESG combined factor are the returns of the portfolio with the highest ranks (including the ESG combined factor) minus the returns of the portfolio with the lowest ranks. We refer to this portfolio as Base_ESGComb.

We present the performance results for the portfolio sorts of the Base, Base_ESG and Base_ESGComb portfolios for Developed Markets in Table 1.17. On average, the difference in returns of the high rank Base portfolio and the low rank Base portfolio are 1.4% annually, resulting in a fairly low Sharpe ratio of 0.2, with an insignificant t-statistic. These results echo those in the previous section where we found that country factor

portfolios exhibit limited predictability of returns during the sample period covered. Adding the ESG factor to the base model, Base_ESG markedly improves the average return to 3.4% for the zero-investment portfolio, representing a Sharpe ratio of 0.53. Interestingly, the benefit in the return appears to be greater on the low ranked portfolio than the high ranked portfolio, with a more meaningfully reduced return for P1 than an enhanced return for P3. Notably, the volatility amongst the three portfolios is comparable for both Base portfolio and Base_ESG portfolio. Looking at Base_ESGComb, which includes the combined ESG and ESG Momentum factor, we find that the zero-investment portfolio return is higher than that of the base model, with a return of 3.5% versus 1.4%. It is comparable to that of Base_ESG, suggesting there may be limited added benefit to the portfolio return in adding ESG Momentum compared to the ESG level factor. It is worth noting that the volatility is slightly higher for the Base_ESGComb portfolio than the Base_ESG resulting in a slightly lower Sharpe ratio, although this does not constitute a meaningful difference.

We present the performance results for the portfolio sorts of the Base, Base_ESG and Base_ESGComb portfolios for Emerging Markets in Table 1.18. On average, the difference in returns of the high rank Base portfolio and the low rank Base portfolio are negative 2.4% per year. This echoes the results from the previous subsection that showed Size and Momentum factors to have had negative returns in emerging markets over the time period in this study. Notably, the volatility for the high rank portfolio is slightly higher than that of the low rank portfolio. Adding the ESG factor to the base model, Base_ESG improves on this result, with a negative return of -1.4% between the high rank and low rank portfolio. The improved, but still negative return of the zero-investment portfolio is

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driven mostly by an improved performance of the high rank portfolio while the returns of the low rank portfolio do not meaningfully change. Notably, the volatility amongst the three portfolios is comparable for both the Base model and Base_ESG. Moving on to Base_ESGComb, which includes the combined ESG and ESG Momentum factor, we find that the zero-investment portfolio return is enhanced in comparison to both the Base and Base_ESG zero-investment portfolios, however remains slightly negative at -0.6%. Once again, the improved return is driven mostly by an improved performance of the high rank portfolio while the returns of the low rank portfolio do not meaningfully change. The volatility amongst the three portfolios is comparable to that of both Base and Base_ESG.

1.7.3 Analysis of the incorporation of ESG on portfolio ESG exposure

In this final subsection, we analyze the impact of incorporating ESG in a base country allocation model on the ESG exposure of the portfolio. Crucially, we would want to see that incorporating the ESG factors as an additional equally-weighted factor does achieve the goal of increasing the ESG exposure of the portfolio. We proceed to measure this by comparing the average ESG score of the zero-investment portfolio constructed using the base model, 'Base', with the models incorporating the ESG factors, 'Base_ESG', which includes the ESG level factor and 'Base_ESGComb', which includes both ESG level and ESG Momentum.

We present the results for the Developed Markets sample in Table 1.19 below and in graph form in Figure 1.4. The results clearly indicate the incorporating ESG by adding it as an additional factor markedly improves the ESG exposure of the portfolio. The results find

that the base model, Base, has slightly lower ESG exposure for the high ranked portfolio than for the low ranked portfolio, albeit fairly comparable across the three portfolios. Incorporating ESG to the base model, Base_ESG, markedly reverses this characteristic with a meaningful spread of 2.75 points between the high ranked portfolio and the low-ranked portfolio. Moving on to Base_ESGComb, which includes the combined ESG level and ESG Momentum factor, we find that the spread of the ESG exposure between the high-ranked portfolio and the low-ranked portfolio is 1.8 points, slightly less than Base_ESG. However, importantly, both versions of the ESG-incorporated models demonstrate a meaningful increase in ESG exposure between the high ranked and low ranked portfolios.

We present the results for the Emerging Markets sample in Table 1.20 below and in graph form in Figure 1.5. Once again, the results clearly indicate the incorporating ESG by adding it as an additional factor markedly improves the ESG exposure of the portfolio. The results find that the base model, Base, has slightly lower ESG exposure for the high ranked portfolio than for the low ranked portfolio. Incorporating ESG to the base model, Base_ESG, markedly reverses this characteristic with a meaningful spread of 2.82 points between the high ranked portfolio and the low-ranked portfolio. Looking at Base_ESGComb, which includes the combined ESG level and ESG Momentum factor, we find that the spread of the ESG exposure between the high-ranked portfolio and the low-ranked portfolio is 2.13 points, slightly less than Base_ESG. However, importantly, both versions of the ESG-incorporated models demonstrate a meaningful increase in ESG exposure between the high ranked and low ranked portfolios.

In both the developed markets sample and the emerging markets sample and with both models of incorporating ESG factors, including ESG level and combined ESG level and momentum, we find that the ESG exposure of the high ranked (P3) versus the low ranked (P1) portfolios is meaningfully enhanced. Therefore investors may conclude that incorporating ESG considerations by adding ESG as an additional factor to a country allocation model is an effective method in increasing the portfolio's ESG exposure.

The findings in this section would conclude that investors can incorporate ESG considerations into country allocation strategies and meaningfully increasing the ESG exposure of their portfolio while not impeding investment returns, but rather enhancing them.

1.8 Conclusion and suggestions for further research

This paper contributes to the broader literature on ESG investing by extending it to the country equity space, exploring the predictability of ESG level and momentum factors in cross-sectional country equity returns. The relevance of country allocation is further highlighted by recent structural changes whereby global equity markets have witnessed an impressive rise of passive investments and exchange-traded-funds. These investment products facilitate country equity allocation by providing easy access to country indices, whilst greatly reducing the impact of transaction costs in markets with less liquidity. Considering the vast opportunities associated with country asset allocation, it is imperative to extend the literature on ESG investing to this domain. Furthermore, by introducing ESG and ESG momentum as country selection factors, the findings in this research broaden the

set of tools available for investors for tactical asset allocation across global stock markets. Results in Section 7 indicate standard country selection factors including Size, Value, Momentum and Quality show signs of reduced predictive power over the more recent history, echoing the results in Zaremba (2020), thus increasing the need to find alternative factors for cross-sectional country allocation. The positive results of the ESG, ESG Momentum and Combined ESG factors present potential new determinants of cross-sectional country equity selection.

The paper finds that countries exhibiting better firm-level ESG practices outperform countries with worst firm-level ESG practices. In developed markets this effect is present and statistically significant in each of the three pillars: Environmental, Social and Governance and further analysis confirms that these returns are not fully accounted for by known country factors or stock based Fama and French five factor model. In emerging markets, while the effect is positive, it lacks statistical significance in each of the pillars. Incorporating ESG Momentum with the level of ESG markedly improves returns, demonstrating a positive and statistical significant effect in both developed and emerging markets. In developed markets, this effect is present in each of the three pillars however the Social pillar is rendered statistically insignificant when added to a multivariate regression on country selection factors suggesting it is priced by these factors. In emerging markets, this effect is present on the Environmental and the Social pillar which are robust to country factors however it is not statistically significant for the Governance pillar. The paper proceeds to measure the impact of incorporating ESG considerations on the investment returns of a cross-country equity allocation model, demonstrating that the

portfolio's ESG exposure can be increased and the financial returns improved in both developed and emerging markets during the sample period studied.

The findings of this analysis are consistent with the growing empirical literature that documents a positive association between ESG attributes and financial performance and lend support to the theoretical literature supporting a mispricing story in which the value of ESG is not fully priced in the market as presented by Pedersen, Fitzgibbons and Pomorski (2020), Manescu (2011), and Giese et al. (2019).

While the findings in this paper are promising to investors looking to incorporate ESG considerations into country allocation they should be interpreted with caution. There are two main limitations to this study. Firstly, as is well-documented in the literature, notably by Berg et al. (2019), Dimson et al. (2020) and Abhayawansa and Tyagi (2021) there are significant inconsistencies between ESG ratings from different ESG data providers thus the results of this study could be particular to the dataset used. Secondly, the availability of ESG has limited both the time period under study which runs from 2012 to 2020 and the sample size, particularly for emerging market countries. This limitation is aggravated by the fact that the time period under study witnessed a substantial increase in demand for ESG assets, and as argued by Pastor, Stambaugh, and Taylor (2020), looking at realized returns over periods during which demand for ESG has shifted makes it difficult to distinguish between ex ante versus ex post effects of ESG concerns given the increased demand for assets could push up their prices. As the breadth of ESG data improves as more companies report and the length of time period extends as time passes, this will facilitate

research in this space and provide opportunities to examine the performance of ESG assets in different market environments and untangle the causality of performance.

An approach that will address both aspects of the data limitations is to turn to country-level ESG scores, assigned to the country as a sovereign. Country ESG scores are typically used in ESG studies in the fixed income space and benefit from a longer history given the relevant data metrics are typically available from well-known institutions such as the World Bank and the IMF with a long and well-resourced database. Furthermore, in an analysis conducted by Bouye and Menville (2020) it is found that country-level ESG ratings assigned to the country itself benefit from far greater consistency and agreement in the ESG ratings from various data providers than what is witnessed for firm-level ESG ratings. An extended history, and the use of data with high agreement would increase confidence in the findings. Using country ESG scores in equities analysis is an approach unique to country selection in the equities space and may offer additional insight not available to firm-level studies. Furthermore, the relationship between firm-level ESG country scores and country-level ESG country scores has not been covered in the existing literature to date. It would be interesting to gain insight into how the two approaches compare and relate to each other and whether there are benefits to undertaking a combined approach. Nassar (2022) addresses this topic, investigating the relationship between country ESG attributes and cross-national equity performance and how it compares to an approach using firm-level ESG.

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Appendix

Table 1.A1 Developed Markets Sample and Emerging Markets Sample

List of countries in developed markets sample and emerging markets sample including start year and end year of data availability. The analysis was also run excluding countries with an apteryx where data was only available in later years in order to keep the sample constant.

Developed Markets				Emerging Markets			
Country	Country Code	Start Year	End Year	Country	Country Code	Start Year	End Year
Australia	AUS	2012	2020	United Arab Emirates*	ARE	2014	2020
Austria	AUT	2012	2020	Brazil	BRA	2012	2020
Belgium	BEL	2012	2020	Chile	CHL	2012	2020
Canada	CAN	2012	2020	China	CHN	2012	2020
Switzerland	CHE	2012	2020	Indonesia	IDN	2012	2020
Germany	DEU	2012	2020	India	IND	2012	2020
Denmark	DNK	2012	2020	Korea	KOR	2012	2020
Spain	ESP	2012	2020	Mexico	MEX	2012	2020
Finland	FIN	2012	2020	Malaysia	MYS	2012	2020
France	FRA	2012	2020	Qatar*	QAT	2014	2020
United Kingdom	GBR	2012	2020	Russia	RUS	2012	2020
Hong Kong	HKG	2012	2020	Thailand	THA	2012	2020
Ireland	IRL	2012	2020	Turkey	TUR	2012	2020
Israel	ISR	2012	2020	Taiwan	TWN	2012	2020
Italy	ITA	2012	2020	South Africa	ZAF	2012	2020
Japan	JPN	2012	2020	Saudi Arabia*	SAU	2019	2020
Netherlands	NLD	2012	2020				
Norway	NOR	2012	2020				
New Zealand	NZL	2012	2020				
Portugal	PRT	2012	2020				
Singapore	SGP	2012	2020				
Sweden	SWE	2012	2020				
USA	USA	2012	2020				

Table 1.A2 Average factor ranks in Developed Markets Sample

Average factor ranks for ESG, Environmental (E), Social (S), Governance (G) level and momentum (ESG Mom, E Mom, S Mom, G Mom) factor ranks as well as Value (Val), Momentum (Mom), Size and Quality (Qual) factor ranks. Countries are ranked on a scale of 1 through 10 where 1 is the worst rank and 10 is the best rank for each factor. Ranks are averaged over the sample period from 2012-2020) for each country.

Country	ESG	E	S	G	ESG Mom	E Mom	S Mom	G Mom	Val	Mom	Size	Qual
AUS	9.2	6.0	9.3	9.2	5.9	5.3	6.1	5.5	5.1	5.6	3.9	8.0
AUT	4.6	5.0	4.4	5.8	6.4	5.6	5.8	7.5	9.3	6.3	9.6	4.0
BEL	4.6	7.9	4.2	6.2	5.9	6.1	5.6	4.8	3.1	6.3	7.0	5.8
CAN	3.2	1.6	2.9	5.9	6.1	7.1	5.1	5.4	3.8	4.8	2.7	5.1
CHE	6.7	6.3	5.1	8.1	5.9	5.6	5.9	4.6	2.0	6.0	3.9	8.5
DEU	5.0	7.9	4.3	3.7	5.3	5.4	5.4	7.1	7.8	7.5	2.9	6.9
DNK	8.3	6.7	8.2	7.7	5.3	6.5	5.1	6.3	1.1	5.9	7.1	9.0
ESP	7.0	9.7	6.7	3.6	4.3	5.4	4.1	5.6	8.1	5.0	5.0	3.0
FIN	9.3	6.2	8.9	9.7	7.0	6.0	4.8	6.0	3.9	5.8	8.3	6.1
FRA	9.2	9.9	8.9	3.7	5.1	5.1	4.9	6.9	7.1	6.3	2.3	3.4
GBR	6.3	7.0	6.0	8.7	6.1	5.8	6.1	4.9	6.4	5.0	2.0	6.9
HKG	1.9	3.2	2.1	1.1	7.5	6.0	7.1	4.5	8.9	7.0	6.4	4.4
IRL	3.2	4.0	4.6	5.6	5.0	5.9	4.6	6.4	4.0	5.6	9.4	2.9
ISR	1.6	1.1	1.3	5.4	5.0	5.8	6.5	5.3	7.9	5.3	8.8	6.5
ITA	4.0	4.0	5.0	2.6	4.3	5.8	4.9	5.9	7.4	4.5	6.5	1.5
JPN	3.1	4.6	6.1	3.2	5.5	5.5	6.3	4.6	8.0	5.6	1.0	3.0
NLD	7.1	9.3	6.2	5.4	4.6	5.3	5.9	5.1	4.0	7.5	4.0	5.5
NOR	8.0	4.4	7.6	8.6	6.1	5.0	5.4	5.8	7.1	5.0	8.1	6.4
NZL	9.9	9.8	9.6	9.1	6.4	5.1	6.0	6.4	3.8	5.5	10.0	4.9
PRT	3.6	7.0	5.1	2.3	5.9	5.4	7.0	5.6	6.8	2.9	10.0	5.1
SGP	4.9	2.3	3.9	4.2	6.3	6.5	6.5	4.8	9.0	5.1	5.8	5.0
SWE	9.3	5.3	9.3	6.9	5.4	4.5	5.3	6.0	4.8	4.4	5.4	9.4
USA	1.0	1.8	1.2	4.4	6.0	6.5	6.8	6.3	1.9	8.3	1.0	9.9

Table 1.A3 Average factor ranks in Emerging Markets Sample

Average factor ranks for ESG, Environmental (E), Social (S), Governance (G) level and momentum (ESG Mom, E Mom, S Mom, G Mom) factor ranks as well as Value (Val), Momentum (Mom), Size and Quality (Qual) factor ranks. Countries are ranked on a scale of 1 through 10 where 1 is the worst rank and 10 is the best rank for each factor. Ranks are averaged over the sample period from 2012-2020) for each country.

Country	ESG	E	S	G	ESG Mom	E Mom	S Mom	G Mom	Val	Mom	Size	Qual
ARE	7.0	3.7	7.8	4.1	4.7	6.9	4.2	5.0	7.8	4.0	9.0	6.2
BRA	7.9	9.9	6.8	5.8	5.9	5.9	5.9	5.1	6.6	4.8	4.3	2.3
CHL	7.9	5.7	8.9	8.8	6.0	6.0	5.3	6.4	3.6	4.4	9.2	2.1
CHN	1.2	3.0	1.1	6.7	5.9	6.5	7.5	6.1	7.9	7.6	1.0	6.9
IDN	4.8	4.0	5.0	4.1	4.3	4.9	5.9	4.1	2.1	5.5	7.1	10.0
IND	4.6	7.9	4.8	8.2	6.3	4.8	4.1	5.5	2.6	6.3	2.6	8.6
KOR	5.4	7.9	3.6	7.1	4.0	5.6	6.4	5.0	9.4	6.3	3.4	2.9
MEX	4.1	8.0	6.1	3.4	6.4	7.0	6.5	6.8	1.6	5.6	7.0	4.9
MYS	6.6	5.3	3.6	5.0	7.6	6.1	4.9	6.1	5.4	5.6	7.0	3.4
QAT	2.7	1.8	4.7	4.6	5.0	6.1	5.8	5.0	6.0	4.6	10.0	7.4
RUS	2.2	5.8	2.8	2.4	5.5	4.1	5.8	6.0	10.0	6.1	5.6	5.4
THA	9.9	7.8	9.9	3.7	5.8	6.5	6.0	5.6	5.3	7.0	7.4	8.4
TUR	4.3	3.8	8.6	3.7	5.8	4.8	5.5	4.9	8.6	5.3	10.0	7.6
TWN	7.8	4.2	7.4	8.6	6.0	6.4	7.0	7.1	6.4	6.3	2.0	5.0
ZAF	10.0	9.4	7.0	10.0	5.9	5.6	4.5	6.1	2.9	6.3	4.3	5.9
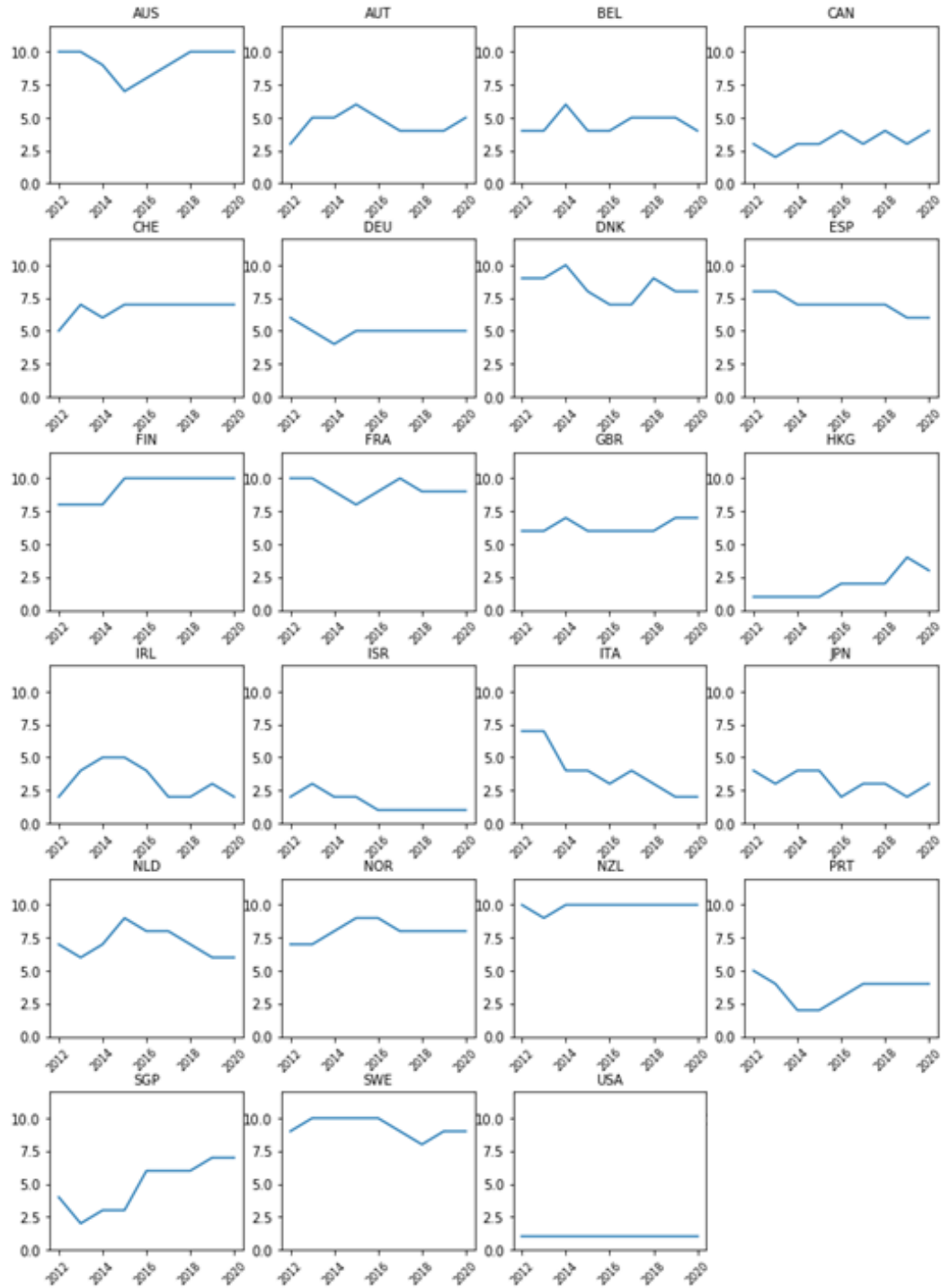
Figure 1.A1 ESG ranks through time in Developed Markets sample

This figure displays the ESG ranks for countries in the developed markets sample over the period (2012-2020). Country scores are calculated as aggregates of firm-level ESG scores by taking the mean of the company scores within each country Countries are ranked on a scale of 1 to 10 where 1 represents the worst ESG score and 10 represents the best ESG score.
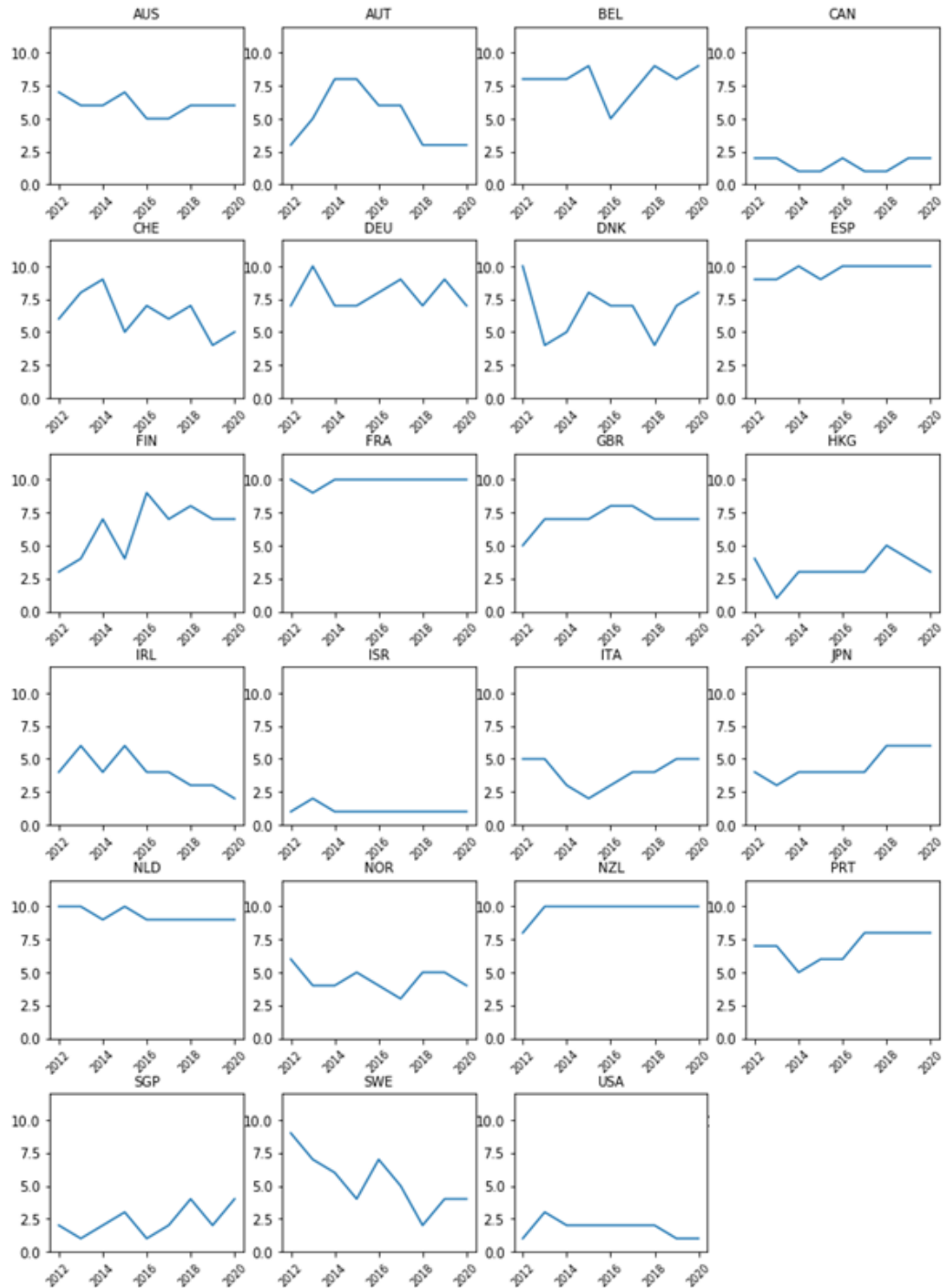
Figure 1.A2. Ranks through time for the Environmental pillar in Developed Markets sample

This figure displays the Environmental pillar ranks for countries in the developed markets sample over the period (2012-2020). Country scores are calculated as aggregates of firm-level Environmental scores by taking the mean of the company scores within each country. Countries are then ranked based on the scores from 1-10 where 1 represents the worst Environmental score and 10 represents the best Environmental score.
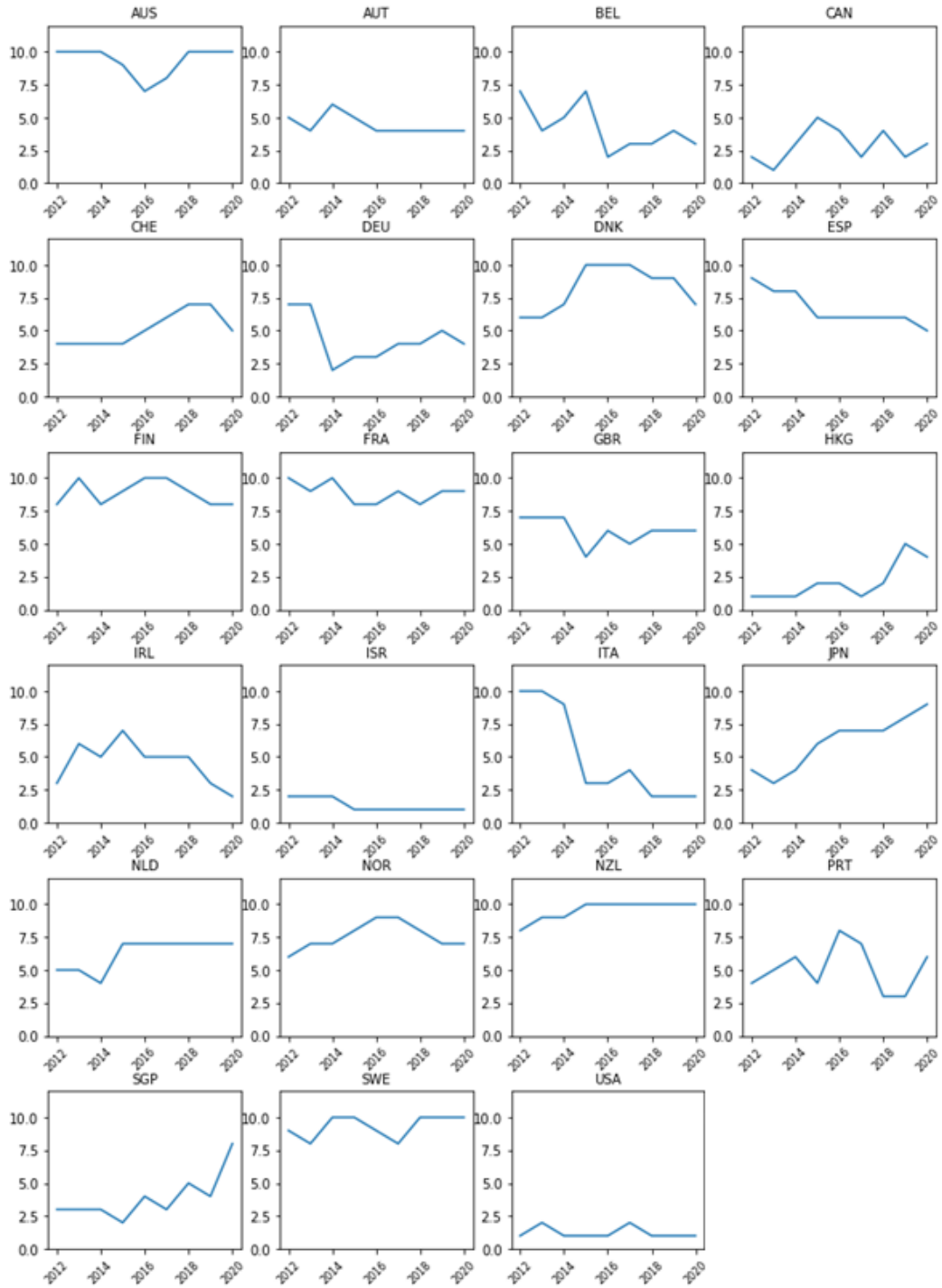
Figure 1.A3. Ranks through time for the Social pillar in Developed Markets sample

This figure displays the Social pillar ranks for countries in the developed markets sample over the period (2012-2020). Country scores are calculated as aggregates of firm-level Social scores by taking the mean of the company scores within each country. Countries are then ranked based on the scores from 1-10 where 1 represents the worst Social score and 10 represents the best Social score.
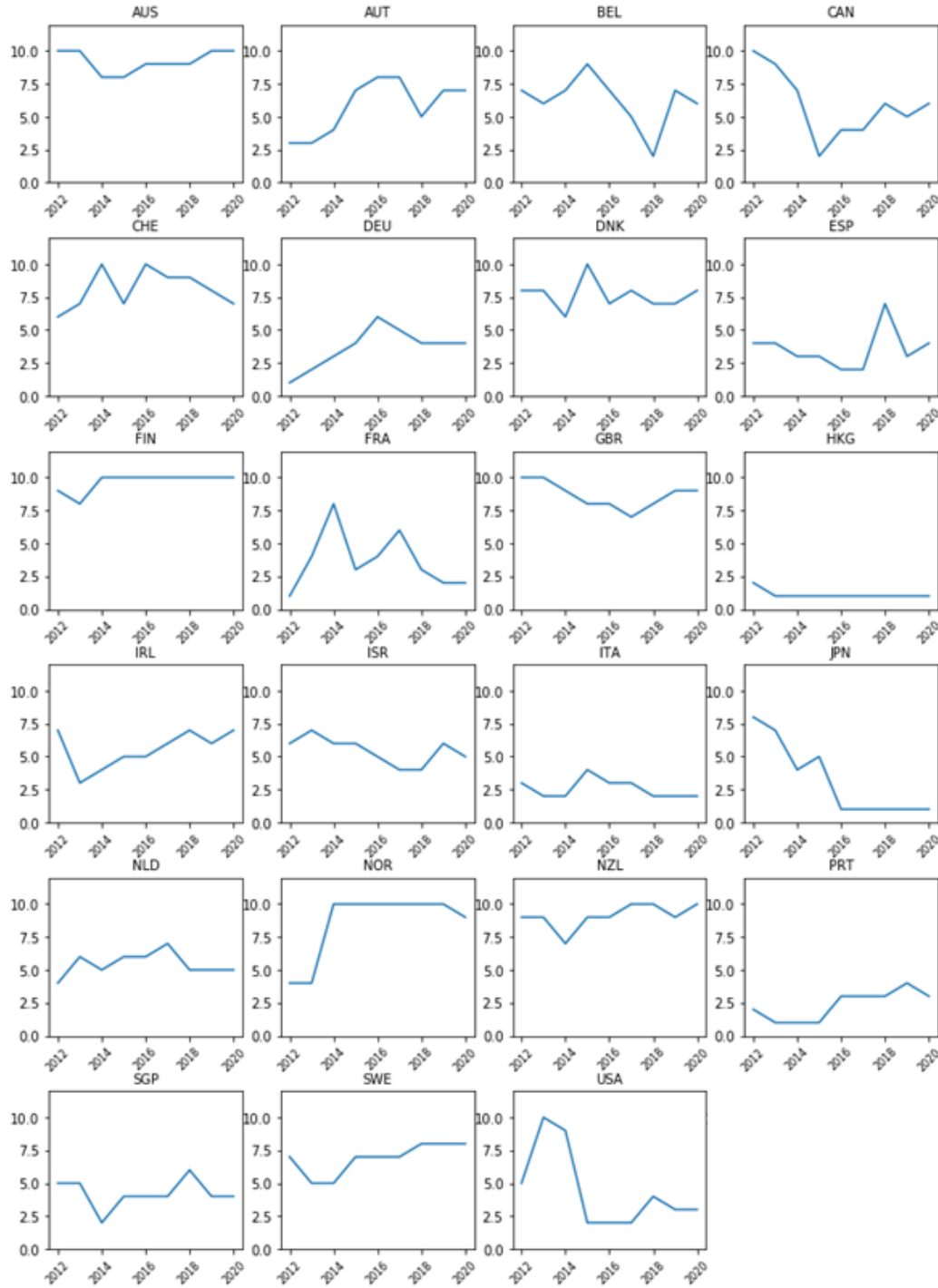
Figure 1.A4 Ranks through time for the Governance pillar in Developed Markets sample

This figure displays the Governance pillar ranks for countries in the developed markets sample over the period (2012-2020). Country scores are calculated as aggregates of firm-level Governance scores by taking the mean of the company scores within each country. Countries are then ranked based on the scores from 1-10 where 1 represents the worst Governance score and 10 represents the best Governance score.
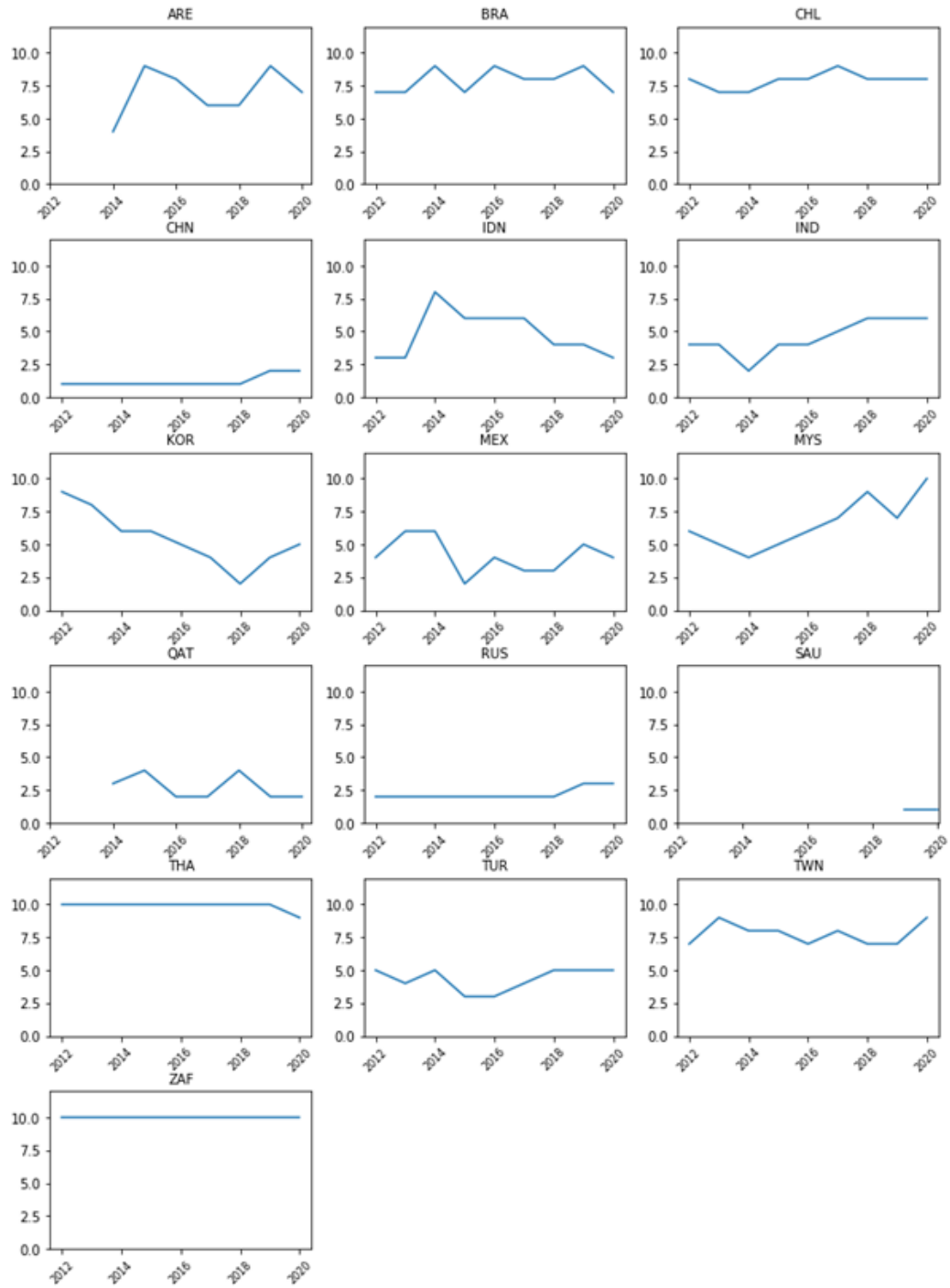
Figure 1.A5 ESG ranks through time in Emerging Markets sample

This figure displays the ESG ranks for countries in the developed markets sample over the period (2012-2020). Country scores are calculated as aggregates of firm-level ESG scores by taking the mean of the company scores within each country. Countries are then ranked based on the scores from 1-10 where 1 represents the worst ESG score and 10 represents the best ESG score.
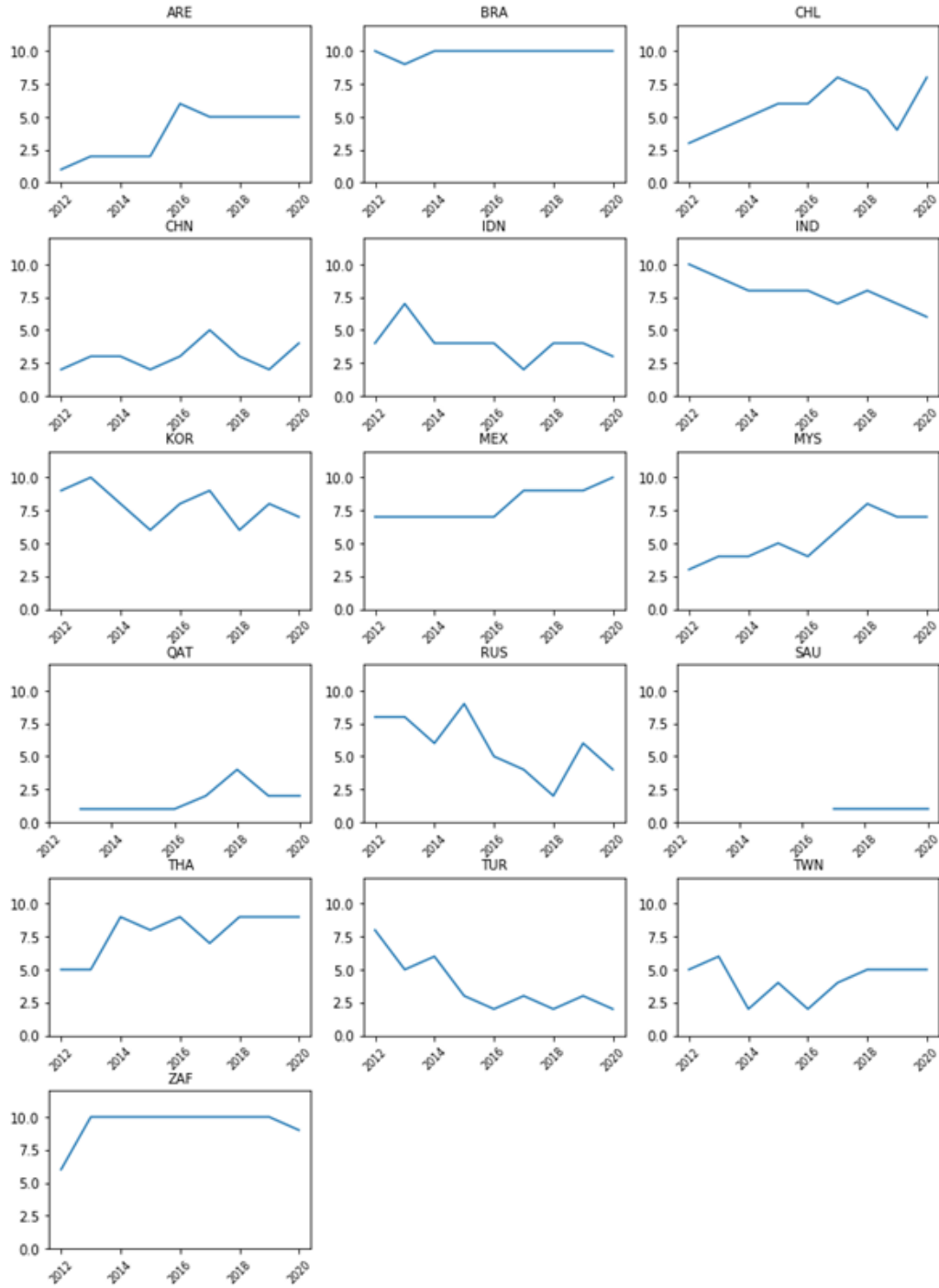
Figure 1.A6 Ranks through time for the Environmental pillar in Emerging Markets sample

This figure displays the Environmental pillar ranks for countries in the emerging markets sample over the period (2012-2020). Country scores are calculated as aggregates of firm-level environmental scores by taking the mean of the company scores within each country. Countries are then ranked based on the scores from 1-10 where 1 represents the worst Environmental score and 10 represents the best Environmental score.
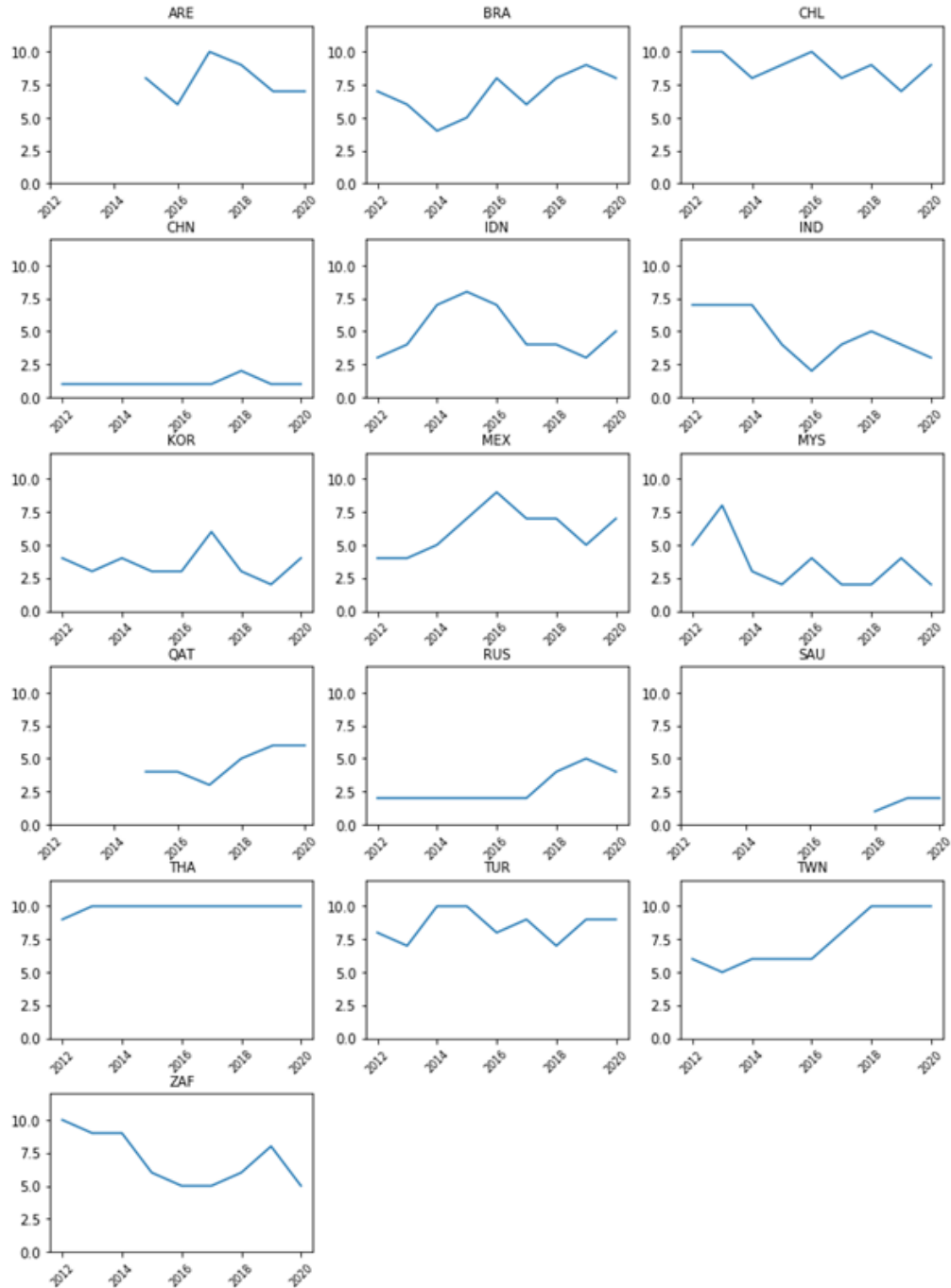
Figure 1.A7. Ranks through time for the Social pillar in Emerging Markets sample

This figure displays the Social pillar ranks for countries in the emerging markets sample over the period (2012-2020). Country scores are calculated as aggregates of firm-level Social scores by taking the mean of the company scores within each country. Countries are then ranked based on the scores from 1-10 where 1 represents the worst Social score and 10 represents the best Social score.

Figure 1.A7 Ranks through time for the Governance pillar in Emerging Markets sample

This figure displays the Governance pillar ranks for countries in the emerging markets sample over the period (2012-2020). Country scores are calculated as aggregates of firm-level Social scores by taking the mean of the company scores within each country. Countries are then ranked based on the scores from 1-10 where 1 represents the worst Social score and 10 represents the best Social score.
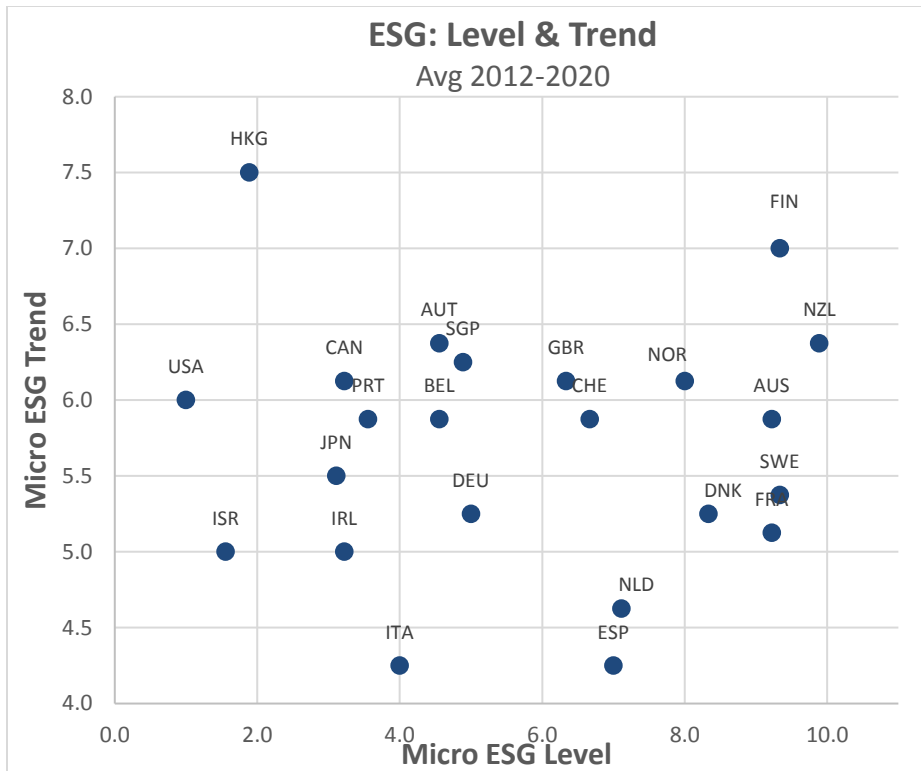
Figure 1.A8 Developed Markets Scatter Plot: Average ESG Level and ESG Momentum ranks (2012-2020)

This figure displays a scatterplot graph of the average ESG level ranks on the x axis and average ESG momentum (trend) on the y axis for each developed market country over the sample period, 2012-2020. The ESG level rank is calculated as the ESG score of the companies within each country, ranked on a scale from 1 through 10, with 10 representing the best ESG profile and then averaged for the sample period. The ESG trend is calculated as the average annual change in ESG score over the sample period for each country, ranked from 1-10 with the highest rank representing the most improved ESG profile (highest ESG momentum).

Figure 1.A9 Developed Markets Scatter Plot: Average Environment Level Momentum ranks (2012-2020)

This figure displays a scatterplot graph of the average Environmental (E) level ranks on the x axis and average Environmental momentum (trend) on the y axis for each developed market country over the sample period, 2012-2020. The Environmental level rank is calculated as the Environmental score of the companies within each country ranked on a scale from 1 through 10, with 10 representing the best Environmental profile and then averaged for the sample period. The Environmental trend is calculated as the average annual change in Environmental score over the sample period for each country, ranked from 1-10 with the highest rank representing the most improved Environmental profile (highest Environmental momentum).

Figure 1.A10. Developed Markets Scatter Plot: Average Social Level Momentum ranks (2012-2020)

This figure displays a scatterplot graph of the average Social (S) level ranks on the x axis and average Social momentum (trend) on the y axis for each developed market country over the sample period, 2012-2020. The Social level rank is calculated as the Social score of the companies within each country, ranked on a scale from 1 through 10, with 10 representing the best Social profile and then averaged for the sample period. The Social trend is calculated as the average annual change in Social score over the sample period for each country, ranked from 1-10 with the highest rank representing the most improved Social profile (highest Social momentum).

Figure 1.A11. Developed Markets Scatter Plot: Average Governance Level Momentum ranks (2012-2020)

This figure displays a scatterplot graph of the average Governance (G) level ranks on the x axis and average Governance momentum (trend) on the y axis for each developed market country over the sample period, 2012-2020. The Governance level rank is calculated as the Governance score of the companies within each country, ranked on a scale from 1 through 10, with 10 representing the best Governance profile and then averaged for the sample period. The Governance trend is calculated as the average annual change in Governance score over the sample period for each country, ranked from 1-10 with the highest rank representing the most improved Governance profile (highest Governance momentum).

Figure 1.A12. Emerging Markets Scatter Plot: Average ESG Level and ESG Momentum ranks (2012-2020)

This figure displays a scatterplot graph of the average ESG level ranks on the x axis and average ESG momentum (trend) on the y axis for each emerging market country over the sample period, 2012-2020. The ESG level rank is calculated as the ESG score of the companies within each country, ranked on a scale from 1 through 10, with 10 representing the best ESG profile and then averaged for the sample period. The ESG trend is calculated as the average annual change in ESG score over the sample period for each country, ranked from 1-10 with the highest rank representing the most improved ESG profile (highest ESG momentum).

Figure 1.A13. Emerging Markets Scatter Plot: Average Environment Level Momentum ranks (2012-2020)

This figure displays a scatterplot graph of the average Environmental (E) level ranks on the x axis and average Environmental momentum (trend) on the y axis for each emerging market country over the sample period, 2012-2020. The Environmental level rank is calculated as the Environmental score of the companies within each country, ranked on a scale from 1 through 10, with 10 representing the best Environmental profile and then averaged for the sample period. The Environmental trend is calculated as the average annual change in Environmental score over the sample period for each country, ranked from 1-10 with the highest rank representing the most improved Environmental profile (highest Environmental momentum).

Figure 1.A14. Emerging Markets Scatter Plot: Average Social Level Momentum ranks (2012-2020)

This figure displays a scatterplot graph of the average Social (S) level ranks on the x axis and average Social momentum (trend) on the y axis for each emerging market country over the sample period, 2012-2020. The Social level rank is calculated as the Social score of the companies within each country, ranked on a scale from 1 through 10, with 10 representing the best Social profile and then averaged for the sample period. The Social trend is calculated as the average annual change in Social score over the sample period for each country, ranked from 1-10 with the highest rank representing the most improved Social profile (highest Social momentum).

Figure 1.A15. Emerging Markets Scatter Plot: Average Governance Level Momentum ranks (2012-2020)

This figure displays a scatterplot graph of the average Governance (G) level ranks on the x axis and average Governance momentum (trend) on the y axis for each emerging market country over the sample period, 2012-2020. The Governance level rank is calculated as the Governance score of the companies within each country, ranked on a scale from 1 through 10, with 10 representing the best Governance profile and then averaged for the sample period. The Governance trend is calculated as the average annual change in Governance score over the sample period for each country, ranked from 1-10 with the highest rank representing the most improved Governance profile (highest Governance momentum).

2. Integrating Country ESG with Factor Investing in Equity Country Selection

Lina Nassar

ABSTRACT

While there exist empirical studies that test the relationship between a range of country Governance attributes and national stock market performance, there are hardly any studies that test this relationship using Environmental, Social or overall ESG attributes. Topical global challenges, such as the Covid-19 pandemic and rising Environmental concerns, have brought the relevance of these matters into the spotlight and whilst these challenges are global in nature, countries continue to respond differently in efforts to address and mitigate them. The motivation of this research paper is to undertake a thorough analysis of the relationship between a country's ESG profile and the financial performance of its equity market. In particular, the paper intends to explore whether this relationship could be translated into a profitable country selection strategy built on the paradigm of factor investing. The research finds that in developed markets, ESG attributes are associated with positive financial performance, exhibiting Sharpe ratios greater than that of standard country equity factors including value, momentum, size and quality. This effect translates into superior returns from integrating ESG considerations with factor investing in a country selection strategy. The findings are more mixed in the emerging markets sample. While the Environmental factor exhibits positive returns, the Social and Governance factors demonstrate negative returns, most pronounced in the robustness tests where country-selection factors and an Economics control variable are included in the regressions. The

excess return lost from not investing in countries ranking lowest on Social and Governance attributes is perceived to be the cost of ESG investing. This translates into a cost to financial performance, largest when the country selection strategy is tilted to Governance attributes. However, a more holistic approach of ESG-integration using the overall ESG factor exhibits a substantial enhancement in the ESG tilt of the portfolio without an impediment to returns. In exploring the link between firm-level ESG attributes and country-level ESG attributes, the research finds that in developed markets, incorporating country ESG attributes alongside firm ESG level and momentum factors produces the strongest returns, while in emerging markets integrating firm ESG level and momentum factors alone is most profitable.

2.1 Introduction

Recent global challenges, such as the Covid-19 pandemic and rising climate concerns, have brought the relevance of country Environmental, Social, and Governance (ESG) attributes into the spotlight. Whilst these challenges are global in nature, countries continue to respond differently in efforts to address and mitigate them, bearing impact on their financial and economic performance (Wang, Yu, & Zhong, 2020). The importance of county ESG attributes to equity markets is not an entirely new phenomenon. On the environmental dimension, it is widely acknowledged that markets that rely heavily on commodity exports are vulnerable to cyclical commodity prices and high volatility. Countries that provide better social conditions, in the form of healthcare capacity, education, and gender equality have been associated with superior economic performance (Bhargava et al., 2001). Good governance, political stability and investor protection have long been identified as drivers of economic growth and financial markets (Abed & Gupta, 2002). However, while there exist empirical studies testing the relationship between a range of country governance attributes and national stock market performance, there are hardly any studies testing this relationship using environmental, social or overall ESG attributes. ESG investing has rapidly gained a foothold in mainstream financial markets and this is paralleled in the academia with a growing body of literature dedicated to the topic. However, the application of ESG investing to cross-country equity selection has hardly received attention. As ESG investing continues to gain momentum and popularity, it is important to extend the empirical literature to address this space in order to better inform the application of ESG-integration in country selection strategies.

This paper contributes to the literature on ESG investing with an empirical analysis on its application in country equity selection. It explores the relationship between country ESG attributes and expected returns in country equity markets, building on the work by Nassar (2021) which uses firm-level (micro) ESG aggregated to the country-level rather than country (macro) ESG in assessing the application of ESG to country equity selection. The analysis is conducted on 43 developed and emerging markets over the period 2000-2020. In particular, this paper intends to examine whether the relationship between country ESG and national stock market performance could be translated into a profitable country selection strategy built on the paradigm of factor investing. The paper analyses the financial impact of integrating country-level ESG attributes with factor investing in equity country selection. Finally, the paper examines the link between country and firm ESG and how a combined approach of both ESG perspectives impacts financial returns. The findings of this research will be of particular interest to global macro investors and country equity allocators seeking to integrate ESG considerations in their investment approaches. The results may also be of interest to policymakers in so far that country ESG practices and policies are associated with national equity performance.

Aside from testing the relevance of country ESG considerations and thus the institutional setting of companies, the benefit of using country ESG data is that it allows for a relatively long sample period of the analysis due to country ESG data being available for a longer history and with wider country coverage than firm ESG data. Hence this research is able to cover a sample period spanning from 2000-2020, a substantial extension compared to common empirical studies in the global equities space that use firm-level ESG data which typically starts in 2010. The other main benefit of using country ESG data is the high

consistency and commonality of country ESG ratings from different data sources, with correlations typically exceeding 80% which is dramatically higher than firm-level ESG data where correlations amongst different providers typically range from 40% to 60% (Bouyé & Menville, 2020). With data quality, availability and inconsistency being a common limitation of empirical studies on firm-level ESG investing, an empirical analysis conducted using country data would provide an opportunity to draw on results that benefit from a longer history, a wider coverage and greater consistency of data. Turning to country ESG data is a unique approach available to country level analysis in the equities space and may offer insights to the stock-level relationship between ESG and financial performance.

The research finds that in developed markets, ESG attributes are associated with positive performance, exhibiting Sharpe ratios greater than that of country equity factors including value, momentum, size and quality. The results are therefore consistent with the empirical literature that documents a positive relationship between ESG attributes and financial performance. Lei and Wisniewski (2018), Perotti and van Oijen (2001) and Diamonte et al. (1996) all find a positive link between social and governance attributes such as Rule of Law, investor protection and political risk and financial performance, where they argue that weak institutional settings harm minority shareholders and that these risks are not priced by the market. In testing the relevance of country ESG momentum, we do not find evidence of statistically significant performance, possibly attributable to the time-series persistency in the scores. Finally, and importantly for practical applicability we show that integrating ESG considerations with factor investing improves financial returns whilst substantially increasing the ESG tilt of the portfolio.

The findings are more mixed in the emerging markets sample. While the Environmental factor exhibits positive returns, the Social and Governance factors exhibit negative returns, most pronounced in the robustness tests where country-selection factors and an Economic control variable are included in the regressions. The excess return lost from not investing in countries ranking lowest on Social and Governance attributes is perceived to be the cost of ESG investing. This finding would align with arguments suggesting that investors require compensation for investing in countries with poor governance attributes and weaker social conditions as found in Zaremba (2018) and Stocker (2016). This effect translates into a cost to financial performance, largest when the country selection strategy is tilted to Governance attributes. However, the analysis finds that a more balanced ESG-integration using the overall ESG factor exhibits a substantial enhancement in the ESG tilt of the portfolio without an impediment to performance.

Lastly, in exploring the link between country (macro) ESG attributes and firm (micro) ESG attributes aggregated to the country level, we document a positive correlation between country ESG attributes and firm ESG attributes in countries. The findings conclude that in developed markets, integrating country ESG attributes alongside firm ESG factors of both level and momentum produces the strongest returns, while in emerging markets integrating firm ESG level and momentum factors alone is most profitable.

In the following section we review the literature on ESG investing on the firm level and the country level. In Section 3, we presents the data and associated factor construction used in the analysis. In Section 4, we provide descriptive statistics of country ESG data in developed and emerging markets. In Section 5 we thoroughly examine the effectiveness of

ESG factors in explaining cross-sectional country equity returns, conducting a series of robustness checks. In Section 6, we explore the practical applicability of integrating ESG with factor investing, measuring the impact on investment performance and ESG portfolio tilts. In Section 7 we proceed to examine the link between country and firm ESG and how a combined approach of both ESG measures impacts financial returns. In Section 8 we conclude.

2.2 Literature Review

The literature review is organized in four sections. We begin with an overview of the asset-pricing literature providing theoretical perspectives on ESG investing. We proceed with a summary of the empirical studies on firm-level ESG investing in equity markets. We then provide an overview of research covering country-level ESG investing in fixed income markets. Lastly, we provide an overview of the research that relates to country-level ESG investing in the equity space.

2.2.1 Theoretical Perspectives on ESG Investing

There exist theoretical explanations arguing for positive, negative and neutral impacts of ESG investing on financial performance.

A number of theories would argue for a negative impact of ESG investing on financial returns. ESG-integration that involves exclusions of the investable universe would reduce portfolio diversification and incur an opportunity cost compared to the optimal portfolio

(Cortez et al., 2009). Another theoretical perspective argues that if poor ESG stocks are excluded by a large proportion of investors, they will consequently have reduced prices and therefore higher expected returns (Merton, 1987; Zechner et al., 2001; Zerbib, 2020). Pedersen, Fitzgibbons and Pomorski (2020) find support of this argument whereby stocks that rank favorably on the Social dimension exhibit relatively worst performance, explaining that investors are willing to accept reduced returns for better Social stocks. Similarly, Pastor, Stambaugh and Taylor (2019) show that the costs of capital and expected return is lower for stocks that rank well on ESG due to investors' preferences.

On the other hand, a number of theories would argue for the outperformance of ESG-investing. Pedersen, Fitzgibbons and Pomorski (2020) offer a theoretical discussion explaining that ESG stocks would outperform when good ESG is positively associated with future firm profits and its value is not fully priced by the market. They find evidence for this in the Governance dimension of ESG, arguing it is a positive predictor of higher firm profits while that value is not fully priced by the market. Similarly, Mănescu (2011) posits that investors tend to not fully appreciate the value of ESG or overestimate its associated costs resulting in the mispricing of ESG considerations. Similarly, Edmans (2011) offers a theoretical explanation framing firms' ESG investments as intangibles, arguing they are undervalued by the market due to reduced certainty in their pricing in a similar way to intangibles such as R&D investments.

Pastor, Stambaugh and Taylor (2019) offer an alternative explanation for the recorded outperformance of ESG assets, arguing that it may be due to an increased demand for ESG assets. As investors' shift to hold more ESG assets, these assets outperform. However this

ex ante effect would not indicate predictive power of ESG considerations thus the perceived outperformance would not be repeatable in the future but rather on the contrary reduce the long-term expected returns of these assets (Pastor, Stambaugh, & Taylor, Sustainable Investing in Equilibrium, 2019). The authors further explore and confirm this theory in another paper (2022) which focuses on the Environmental dimension.

2.2.2 Firm-level ESG Investing in Equity Markets

Empirical analyses studying the impact of ESG investing on financial returns have varied results, lacking a clear consensus. This can be partly attributed to the lack of consistency in ESG ratings from different data providers and a variation in approaches to the practical implementation of ESG-integration. Berg, Kölbel, and Rigobon (2020) analyze ESG data from five widely used ESG rating providers, findings significant inconsistencies amongst the ESG ratings.

A large body of empirical research finds evidence of a positive impact of ESG investing on financial returns. Friede et al. (2015) conduct a meta-study combining the results of about 2,200 individual studies, finding that most of the results provide evidence for a positive performance impact of ESG investing. Notable studies that find a positive relationship between ESG attributes and financial returns include Gompers and Metrick (2003), Kempf and Osthoff (2007), Dunn, Fitzgibbons, and Pomorski (2018), Porse et al. (2017), Statman and Glushkov (2009).

There are also a number of empirical studies that conclude ESG considerations are associated with a cost to investment returns. These include Hong and Kacperczyk (2009),

Fabozzi, Ma, and Oliphant (2008), Brammer, Brooks, and Pavelin (2006), Bhagat and Bolton (2008), Filbeck, Holzhauer, and Zhao (2014) and Humphrey and Tan (2014).

2.2.3 Country-level ESG Investing in Fixed Income Markets

The majority of the studies looking at country-level ESG have focused on the fixed income market. An overview of these studies is provided in this section.

The impact of country ESG attributes on financial performance has been studied both on the fund level and the asset level. On the fund level, Henke (2016) conducted a large empirical study on over 100 ESG-integrated fixed-income funds, finding that they outperformed their comparable peers. Conversely, Derwall et al. (2005) find that on average, ESG-integrated fixed-income funds perform in line with comparable peers. On the asset level, Capelle-Blanchard et al. (2019) conduct a study on 20 OECD from 1996 to 2012, finding that ESG factors are relevant in explaining sovereign bond spreads. Turning to Emerging Markets, Berg et al. (2016) analyze 52 emerging markets from 2000 to 2012, concluding that ESG factors explain credit spreads beyond what is already captured by credit ratings and traditional indicators.

In terms of incorporating ESG investing in sovereign bond investing, Drut (2010) show that investors can construct an ESG-tilted portfolio without compromising on financial returns. He finds that an exclusion of worst-in-class ESG countries does not result in a significant loss of diversification or returns. Similar results are confirmed by Badia, Pina and Torres (2019) who find that integrating ESG scores in sovereign bond markets does

not impede performance and Hübel (2019) who also finds that integrating ESG considerations in sovereign CDS portfolios does not compromise returns.

Vallee and Martellini (2021) use Verisk-Maplecroft ESG scores to look at different ways of implementing ESG considerations in sovereign bond portfolios, finding that negative screening leads to more diversified portfolios at a lower levels of tracking error while positive screening leads to higher levels of improvement of ESG scores and higher levels of risk budgets.

Turning to research from the practice, in a joint study by Bluebay Asset Managers and Verisk Maplecroft (2019), the authors find that countries with better ESG performance are associated with lower sovereign spread and that including ESG factors rather than only using traditional variables adds a meaningful boost to explaining the differences in spread levels between countries. Furthermore, they find that while governance and social factors matter most, environmental factors do not appear to be priced. Allianz (2017) finds evidence that ESG risk factors are not fully reflected in sovereign credit ratings. AXA Investment Managers (2013) find empirical evidence that good-ESG portfolios outperform bad-ESG portfolios in developed countries.

2.2.4 Country-level ESG Investing in Equity Markets

To the best of our knowledge, there are no studies explicitly analyzing the relationship between country-level ESG ratings and the cross-sectional returns of national equity markets, however we provide an overview of the relevant studies on the topic.

Most relevant is the empirical analysis by Nassar (2021) which assesses the relationship between firm-level MSCI ESG scores aggregated to the country level and cross-country equity returns. The study is carried out from 2012-2020 on a developed markets sample and an emerging markets sample. The paper finds that level and momentum of firm-level ESG attributes aggregated to the country level are significant in explaining cross-sectional country equity returns beyond what is already captured by standard country selection factors or stock-level Fama and French factors.

Although the relationship of country ESG attributes and financial markets has largely been unexplored, there have been studies that explore the link between these attributes and economic growth. Since stock markets and the broader economy are, at least to some degree, intertwined we present a brief summary of this literature here. Most notable is a study by Wang et al. (2020) which, using a large sample of 109 countries, documents a positive impact of country-level ESG improvement on economic growth.

Regarding the Environmental component, Chang et al. (2020) study the causal link between country-level CO2 emissions and their impact on stock markets, finding a positive relationship. In an earlier study, Gervich (2011) theorizes: "Environmental indicators may be a sort of "early warning" system that can predict a nation's financial collapse before it is predicted by standard financial indicators (such as debt levels)".

There is an intuitive argument of why Social attributes may matter- they make up the stock of human and social capital in a country and as such contribute to potential productivity that is eventually realized in stock market performance. There are various studies that suggest elements of the 'Social' dimension have a positive impact on a country's economic

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growth, and indirectly benefit the stock market. Bhargava et al. (2001) find that countries with stronger health systems are associated with higher economic growth. The positive effects of education and more generally of human capital on economic growth has been demonstrated by empirical analyses employing both macroeconomic and microeconomic data (Krueger & Lindahl, 2001; Fuente & Ciccone, 2002).

There are a few studies that analyze the relationship of various Governance-related attributes and country equity performance. Lei and Wisniewski (2018) explore the role of democracy, using as a proxy the Political Right Index calculated by the Freedom House. Having researched a sample of 74 countries for the years 1975–2015, they conclude that, compared with autocracies, democratic states are characterized by higher returns despite displaying lower volatility risk, finding that a lack of investor protection explains this effect. In other studies, analyzing the relationship between political risks and stock market returns, Perotti and van Oijen (2001) find that political risk has a positive sign that indicates that politically safer countries have higher excess returns than markets with more political risk; supporting this, Diamonte et al. (1996) posit that portfolios that experienced decreases in their political risk also produced larger returns than portfolios with increased political risk. Khan (2019) highlights the importance of country-level governance scores in cross-country firm -level governance scores and their prediction of stock returns. Building on a theory developed by La Porta et al. (2000) he argues that weak country level institutions characterized by poor rule of law increase the likelihood that controlling shareholders engage in "diversion tactics" without being caught or penalized thus posing an investment loss to minority shareholders investors. Stocker (2016) studies the relationship between "Economic Freedom" and cross-sectional national equity market performance. He finds a

negative relationship for level of Economic Freedom, where countries with low Economic Freedom are associated with higher investment returns and a positive relationship in the change of Economic Freedom where countries with improving Economic Freedom are associated with higher investment returns.

Regarding ESG momentum, Morgenstern et al. (2021), study the impact of incorporating ESG information into a macro trend following strategy in equity index futures, bond futures and foreign exchange markets. They find that incorporating ESG indicators increased ESG exposure of the macro portfolios whilst not detracting from performance.

2.3 Data Sources and Factor Construction

In this section we provide a thorough description of the dataset and the construction of factors used in the analysis. We begin with a detailed explanation of the ESG dataset, provided by Verisk-Maplecroft and the construction of the ESG factors. We will then outline the data sources and construction of the country-selection factors used in the study and in the base country selection strategy.

The research is conducted on stock market indices of 43 countries in the Morgan Stanley Capital International All-Country World Index (MSCI® ACWI) - 23 of these are developed markets and 20 are emerging markets[5]. The full list of countries included in the analysis is presented in the Appendix in table A1. The sample period of the analysis is 01/01/2000 to 01/01/2020 and uses monthly return data.

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[5] A few countries from the MSCI ACWI Index are excluded due to lack of data availability.

2.3.1 Country ESG data

ESG data is obtained from Verisk Maplecroft, a leading research firm specializing in global risk analytics and country risk insights. We use the Verisk Maplecroft database to construct ESG indicators on the country level – what we also refer to as macro ESG. Unlike firm-level ESG data, Bouye and Menville (2020) find that country ESG ratings across different sources demonstrate far more commonality and consistency than they do for firm-level ESG ratings, with cross-sectional and time-series correlations exceeding 80% across main data providers. We chose the Verisk Maplecroft database due to its completeness and wide breadth of coverage of ESG indicators. Given the nature of country ESG data and the high documented consistency across country ESG providers we do not expect that the results would be sensitive to the date provider used. Another advantage of country ESG data is that it also benefits from a longer available history than is typical of firm-level ESG data.

Verisk Maplecroft is a risk analytics company, founded in 2001, providing environment, human rights and development, political and economic risk data and forecasts on the country, industry and commodity level. For the purpose of this paper, we will be using the country database which is divided into four major themes: Environment, Human Rights and Development, Political Risk and Economics, henceforth referred to as the Environmental, Social, and Governance and Economics components respectively. The Economics score is used as a control variable in parts of the analysis but not included in the ESG scores. Risk scores are provided on over 150 risk indices, relating to one of the four components, for nearly 200 countries globally and updated either quarterly or annually. The risk indices are a combination of quantitative and qualitative factors covering

a wide range of topics on the country level including CO2 emissions from energy use, healthcare capacity and government stability. The risk indices are a combination of third-party factors and proprietary quantitative and qualitative factors. Third-party factors are sourced from well-known institutions such as the World Bank and the IMF as well as geospatial data providers such as NASA. As an example, the well-known Rule of Law index, provided by the world justice project, is one of the Governance factors. Proprietary factors are developed internally by Verisk Maplecroft's team of regional and thematic experts and include trailing measures as well as calculated forecasts with qualitative oversight. All of the risk indices are rated on a scale ranging from 0 (worst score) to 10 (best score), offering a standardized measure of risk across numerous factors allowing for comparison and aggregation across multiple risk themes, time periods, and countries.

The individual indicators under each component are equally weighted to obtain Environmental, Social and Governance scores. The three components are then averaged to arrive at the final ESG score for each country. The full list of indicators used in this study are showing in Table 2.A6 in the Appendix. It includes indicators with sufficient coverage for the countries addressed in this study and sum up to a total of 91 ESG indicators (32 Environmental indicators, 27 Social indicators, 32 Political indicators).

For each of the components, Environmental, Social, Governance as well as the combined ESG score, country indices are ranked into deciles on a yearly basis to form the decile rank for each factor. As with the other factors this is done in the Developed Markets sample, the Emerging Markets sample and finally in the combined Full sample. When done for the full sample, the ESG factors are ranked separately within the Developed Markets and Emerging

Markets samples and then re-ranked for the full sample. This is done because as we will see in the next section, the ESG scores for Developed Markets are consistently higher than those in the Emerging Markets and this allows for equal representation from both samples in the full sample. Finally, the factors are then re-ranked into tertiles in each of the samples to form three equally weighted portfolios: a short portfolio, a neutral portfolio and a long portfolio. The short portfolio (S) includes the countries with the lowest (worst) ESG scores while the long portfolio (L) includes the countries with the highest (best) ESG scores.

In addition to the level of ESG scores, the change of the ESG score, termed 'ESG momentum' will also be studied in this research. This is the one-year change in the ESG score, ranked separately for emerging markets and developed markets. As before, the percentage change is then ranked into deciles and then re-ranked into tertiles in each sample to form three portfolio: a short portfolio, a neutral portfolio and a long portfolio. The long portfolio (L) includes the countries with the most positive change (improving) ESG score while the short portfolio (S) includes the countries with most deteriorating ESG scores. A third factor, ESG_Comb, is created by combining the ESG level with the ESG change scores, and again forming three portfolios as before.

The average country scores and ranks for the ESG, Environmental, Social, and Governance factors are presented in the appendix in Table 2.A4 for the developed markets sample and Table 2.A5 for the emerging markets sample.

2.3.2 Economics Control Variable

As mentioned in the prior subsection we use the Economics risk score from Verisk Maplecroft as a control variable in parts of the analysis but it is not included in the ESG scores. The Economics score is comprised of 21 individual macroeconomic indicators including GDP Growth, Fiscal Balance, Foreign Debt and inflation. The full list of indicators is available in Table 2.A7. The individual indices are rated on a scale ranging from 0 (worst score) to 10 (best score). The overall Economics score for countries is then ranked into deciles with a higher score representing better economic conditions. As with the ESG factors, it is then re-ranked into tertiles to form three portfolios: a short portfolio, a neutral portfolio and a long portfolio. The short portfolio (S) includes countries with the lowest (worst) economic conditions while the long portfolio (L) includes the countries with the best economic conditions. The average Economics score and rank by country over the period under study is presented in the appendix in Table 2.A4 for the developed markets sample and Table 2.A5 for the emerging markets sample.

2.3.3 Investment Return Data

Investment returns for the stock markets in the study are obtained from MSCI® on a monthly basis. Returns are calculated in US dollars and are "net" indexes thus representing the reinvestment of dividends. The risk-free rate used in the study is obtained from the Federal Research Bank of St. Louis' FRED database and calculated as the annualized return on the one-year Treasury.

2.3.4 Country Factor Portfolios

In analyzing the relationship between ESG attributes and cross-sectional national stock market returns, it is important to control for known country-selection factors. As is common in the country-selection literature we will construct and control for Size, Value, Momentum and Quality factors and the combination of these factors will form the base country selection strategy against which the ESG-integrated strategies will be compared. In this sub-section we provide an overview of the data sources and construction of the standard country-selection factors.

Size

The Size factor is calculated using the aggregate market capitalization of listed companies in USD terms and is obtained from the World Bank's World Development Indicators database which uses the Standard & Poor's and the Global Markets Factbook. The data is sourced on a yearly basis and country stock market indices are ranked and separated into three equally-weighted portfolios at the start of the year based on the prior year-end score of market capitalization: a short portfolio, a neutral portfolio and a long portfolio. The long portfolio (L) includes the countries that rank best on this measure (low market capitalization) and the short portfolio (S) includes the countries that rank worst (high market capitalization).

Value

The Value factor is constructed as an equally-weighted combination of a country's price to book ratio and its price to earnings ratio. Using two different measures of value is a

common method to reduce the measurement error of any one value indicator. Both ratios are obtained on a yearly basis from MSCI® as of year-end. Country stock market indexes are ranked in deciles at the start of each year based on the prior year-end scores of the price-to-book and price-to-earnings ratios separately. The average of the ranks of each of the two valuation indicators is then taken for each country and then ranked again to finally form tertiles of the Value factor, representing three portfolios: a short portfolio, a neutral portfolio and a long portfolio. The long portfolio (L) includes the countries that rank best on the measure - the cheapest countries while the short portfolio (S) includes countries that rank poorest on the factor (the most expensive countries).

Momentum

The Momentum factor is constructed as an equal combination of the past twelve-month return minus the most recent month's return (Mom12-1) and the past three-month return minus the most recent month's return (Mom3-1). The subtraction of the most recent month's return is typically done in the construction of momentum factors in order to avoid the one-month reversal in returns (Jegadeesh, 1990). Using two different measures of price momentum is common practice in the literature to minimize measurement error of an individual momentum factor and avoid taking a view on the correct time frame. The Momentum factor therefore is constructed using monthly data as opposed to the yearly data construction of the other factors. In combining the two measures, each individual measure is first ranked in deciles at the start of each month and then averaged equally and re-ranked into tertiles to form three portfolios: a short portfolio, a neutral portfolio and a long portfolio. The long portfolio (L) includes the countries that rank best on the factor (highest

momentum) while the short portfolio (S) includes the countries that rank worst (lowest momentum).

Quality

The Quality factor is represented by a country's return on equity (ROE) which is calculated using the trailing 12-month earnings per share and latest book value per share, obtained from MSCI® for each country index. The factor is constructed on a yearly basis whereby country indexes are ranked in deciles at the start of each year using prior year-end ROE. Finally, countries are then re-ranked into tertiles to form three portfolios: a short portfolio, a neutral portfolio and a long portfolio. The long portfolio (L) includes the countries that rank best on this factor (highest ROE) and the short portfolio (S) includes the countries that rank worst on this factor (lowest ROE).

Tables 2.A2 and 2.A3 in the appendix show the average country factor values and composite ranks over the research period for the Developed Markets and Emerging Markets samples respectively.

2.4. Descriptive and Summary Statistics of Country ESG

In this section we take a deeper look at the ESG factors that we will use in the analysis.

Tables 2.A4 and 2.A5 in the appendix show the average country scores and ranks for the ESG, Environmental, Social, and Governance factors for the developed markets sample and for the emerging markets sample respectively. On average over the research period, the ESG score in the Developed Markets sample ranges from 5.7 in Israel with the lowest (worst) score to 8 in Norway having the highest (best) ESG score. In the Emerging Markets

sample, the ESG score ranges from 4.2 in India with the lowest score to 6.6 in Czech Republic with the highest score.

Figure 2.1 graphs the ESG, Environmental, Social and Governance scores through time averaged for countries in the Developed Markets samples and countries in the Emerging Markets sample. These graphs make two things evident. Firstly, and most clearly, Developed Markets score consistently higher on ESG factors than do Emerging Markets. Secondly, the ESG scores have in general improved with time. It is worth highlighting that in some cases the jumps in the data-series are due to new indices being incorporated in the relevant ESG component. The full list of indices for each component and the start date is presented in Table 2.A6 in the appendix.

Figures 2.2 and 2.3 show the ranks through time for the ESG factor for Developed Markets and Emerging Markets respectively. The charts for the Environmental, Social and Governance factor ranks through time are presented in the appendix in Figures 2.A1- 2.A8. For some countries, ranks are quite static through time. For example, Israel is quite consistently at the bottom of the ranks for the overall ESG factor, as is the USA while the Nordic countries (Norway, Denmark, and Sweden) are fairly consistently at the top of the ranks throughout the period. Likewise in Emerging Markets, India and China are fairly consistently at the bottom of the ranks while Chile and Czech Republic are consistently at the top. That said, certain countries exhibit an upwards or downwards trend over the period, such as the improvement of Ireland and Taiwan, and the deterioration of Brazil and Colombia.

2.5 Empirical analysis of Country ESG factors in country equity selection

2.5.1 Portfolio sorts on country equity factor portfolios

In this section we conduct portfolio sorts on ESG factors to examine their effectiveness in explaining cross-country equity index returns. We do this by creating long-short portfolios for each factor and calculating the annualized return and standard deviation from 2000 till 2020. As described in Section 3, the long-short portfolios are created for each factor by ranking country indexes at the beginning of each year (month for Momentum) on the relevant factor and segmenting the countries into tertiles to form three equally weighted portfolios: a short portfolio, a neutral portfolio and a long portfolio. Then, for each factor, long-short portfolios are formed by going long the high-ranked portfolio and short the low-ranked portfolio. This is repeated for three samples: one including Developed Markets only, one including Emerging Markets only and one on the full sample, combining both Developed and Emerging Markets. Finally, we calculate the investment returns, standard deviations and Sharpe ratios of the long-short portfolio returns over the period 2000 till 2020.

We begin with a brief analysis on the performance of equity country factors in cross-sectional equity selection over the sample period which starts begins in January 2000 and ends in January 2020.

Table 2.1 presents the annualized monthly returns and standard deviations for the Developed Markets sample over the research period from 2000 till 2020 for the Developed Markets sample. In Developed Markets, momentum is by far the winning factor, with high

momentum countries outperforming low momentum countries by 4.3% per year with statistically significant performance and a Sharpe ratio of 0.43. Contrary to common belief, the Size factor demonstrates negative and statistically insignificant performance. This is line with a recent finding by Zaremba and Umutlu (2018) which finds that the size factor has largely lost its strength when updated to more recent periods. Value and Quality also have statistically insignificant and near zero returns in the Developed Markets sample. These findings echo a recent study by Zaremba et al. (2020) which highlights the phenomenon of country-level factors seeing deteriorated performance in recent years.

Table 2.2 shows the results in the Emerging Markets sample. Value is the strongest performing factor in Emerging Markets, where cheap countries outperformed expensive ones by 5.7% annually, yielding a Sharpe Ratio of 0.52. In contrast to the findings in Developed Markets, Momentum is a weak and statistically insignificant factor in Emerging Markets. Similar to Developed Markets, the Size and Value factors are weak and insignificant in the Emerging Markets sample.

Table 2.3 refers to the results in the full sample, combining both Developed and Emerging Markets. Value is the strongest performing factor for the full sample, with the long-short portfolio returning on average 4.3% per year with statistical significance and a Sharpe ratio of 0.42. The strength of the performance stems from Emerging Markets as is evident in the results of the sub samples. The performance of the momentum factor is strong and significant in the full sample gaining its strength from the Developed Markets sample. The Quality and Size factors are weak and statistically insignificant in the full sample, as found in the Developed Markets sample and the Emerging Markets samples individually.

What emerges from these results is that common fundamental factors may have limited explanatory power when examining a cross-section of country-level returns, thus providing further reason to turn to the analysis of ESG factors in the country space, which brings us to the next section.

2.5.2 Portfolio sorts on country ESG factor portfolios

In this section we conduct portfolio sorts on ESG factors to examine their effectiveness in explaining cross-sectional country equity index returns. Long-short portfolios are constructed for the following ESG factors:

- *ESG: Average of scores of Environmental, Social and Governance Components*
- *Environment: Average of scores for individual indicators related to Environment component*
- *Social: Average of scores for individual indicators related to Social component*
- *Governance: Average of scores for individual indicators related to Governance component*
- *ESG_Chg: One year change in ESG score*
- *ESG_Comb: Average of ESG score and ESG_Chg score*

We begin by analyzing the performance of the long-short portfolios of the ESG factors and turn to ESG momentum factors in the next section. We do this for the Developed Markets sample and the Emerging Markets sample separately and finally for the combined, full sample. As explained in Section 3, for the full sample, the ESG factors are ranked separately within Developed Markets and Emerging Markets to ensure equal representation from both samples.

Table 2.4 shows the results in the Developed Markets sample. In Developed Markets, the ESG factor portfolio demonstrates strong performance with an annualized return of 4.2% which is statistically significant and represents a Sharpe ratio of 0.58. This means that countries with the best ESG scores outperform countries with the worst ESG scores by an average of 4.2% per year. Breaking down the ESG factor amongst the three components shows that each of the three components demonstrate positive and statistically significant performance with attractive Sharpe ratios, indicating that it is not one aspect but each aspect of ESG components that drive performance. Comparing amongst the components we find that the Social factor demonstrates the strongest performance with an annualized return of 4.1% and the highest Sharpe ratio at 0.58 and the Environmental factor demonstrates the weakest, though still positive, performance with an annualized return of 2.5% and a Sharpe ratio of 0.39.

2.5.3 Time-series returns of ESG factor portfolios

Figure 2.4 shows the time series of the compound returns of the long-short portfolios (L-S) of the ESG factors in Developed Markets over the twenty-year period history. Impressively, the financial returns for all the factors seem to be spread out through time rather than concentrated in one period, instilling further confidence in the efficacy of these factors in explaining cross-section equity return over the long run.

Table 2.5 presents the results in the Emerging Markets sample. In Emerging Markets, the ESG factor demonstrates positive performance with an annualized return of 2.6%, however

the return is not statistically significant. Breaking down the ESG factor amongst the three components shows discrepancy in the performance by component. The Environment factor is the only factor that demonstrates a statistically significant return of 3.3%, with a Shape ratio of 0.39. The Social factor has a near zero return while the Governance factor has a negative return, although both of these are statistically insignificant.

Figure 2.5 shows the time series of the compound returns of the long-short portfolios (L-S) of the ESG factors in Emerging Markets over the twenty-year time period. The picture is visibly different to the results we see for Developed Markets. The Governance factor has negative performance throughout the period although most starkly in the 2006/2007 period. The Social factor has fairly neutral returns and the Environmental factor, whilst positive on the whole, is not very consistent.

Table 2.6 refers to the results in the full sample, combining both Developed and Emerging Markets. In the full sample, the ESG factor demonstrates positive performance with an annualized return of 2.3% and a Sharpe ratio of 0.37. Breaking down the ESG factor amongst the three components shows that each of the three components demonstrate positive and significant performance with Sharpe ratios hovering around 0.4. We know from the sub-sample analysis that it is Developed Markets driving these returns, particularly in the Social and Governance components.

Finally, we look at long-short portfolios formed using the change in ESG scores, 'ESG Momentum'. ESG_Chg is formed based on the one-year change in the ESG score for each country. *ESG_Comb* is formed by equally combining the ranks of the ESG factor, the level

and *ESG_Chg*, the change. The results are presented in Table 2.7 for the developed markets sample, the emerging markets sample and the full sample.

The *ESG_Chg* factor yields modest returns in Emerging Markets, but is flat to slightly negative in Developed Markets and the full sample. The ESG_Comb factor delivers better returns across the three regions, but still inferior to the returns of portfolios formed on the ESG level alone. The lack of momentum effect in the ESG scores can be explained by the scores being fairly sticky with little change from year to year. Given these preliminary results do not indicate interesting returns from an ESG Momentum strategy, we do not explore this factor further in this research.

The preceding preliminary results indicate that ESG factors may explain differences in cross-sectional country equity returns in developed markets, with each of the three components demonstrating positive performance. These results hold up for the full sample. However, in Emerging Markets, returns are weaker and standard deviations are significantly higher, with only the Environmental factor demonstrating positive and statistically significant returns.

2.5.4 Factor Correlation

A requirement for an equity factor to be regarded as such is that it should be distinct from other equity factors. We conduct a correlation analysis to measure correlations of the ESG, Environmental (E), Social (S) and Governance (G) factors against country equity factors and the Economics factor. The correlations are calculated as average annual spearman

correlation of the ranks for the full time period. The correlation matrices are presented in Table 2.8 for Developed Markets and Table 2.9 for Emerging Markets.

Starting with how the E, S and G factors correlate amongst themselves, it is apparent that they are highly correlated to each other. In Developed Markets, the E and S factors are most correlated to one another at 60% while in Emerging Markets the S and G factor are most correlated to one another at 68%. In both samples, the individual components are highly correlated to the overall ESG factor.

Turning to the correlations between the ESG factors and the Economics factor, it is apparent that the correlations are high, and more so in Developed Markets, where the Economics factor has a 62% correlation with the overall ESG factor. In Emerging Markets, the Economics factor is 33% correlated with the overall factor, while only 12% correlated with the Environmental factor. The high correlation between the Economics factor and the ESG factors particularly in the Developed Markets make it imperative to isolate the ESG impact which is why we include Economics as a control variable in the regression analysis in the next section.

Finally, looking at the correlations between the ESG factors and the country equity factors, it is worth noting that they are different between the developed markets sample and the emerging markets sample. In developed markets, the correlations are generally more muted with the ESG factors displaying a slight negative correlation to Value and a slight positive correlation to Quality and Size. In emerging markets, the correlations are slightly higher, and mostly in the opposite direction, with a positive correlation to Value and Size and a negative correlation to Quality. The correlations perceived in the developed markets are

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more in line with expectation as ESG on the stock level has been documented to have a positive correlation to Quality and a negative correlation to Value (Bruno et. al 2021). It is interesting that this relationship is reversed in the emerging markets. A standout example where this relationship does not align in emerging markets is India, where companies deliver some of the highest return on equity (ROE) ratios in Emerging markets, and thus trade at higher premiums, reflecting the high quality and low value ranks, yet the country scores poorly on ESG factors.

Interestingly, the ESG factors do not have particularly high correlations with standard country equity factors, suggesting that they may offer diversification benefits when considered in a standard country equity selection strategy. This will be investigated thoroughly in the remainder of the paper.

The portfolio sorts analysis provides evidence that a long-short strategy based on ESG factors has been profitable over the twenty-year sample period in this study and the correlation analysis suggests that the ESG factors are distinct form other equity return factors. The next step is to thoroughly evaluate whether the ESG factor returns could be explained by country equity factors and whether there is alpha remaining once these effects are accounted for. We address this in Section 5.3 where we turn to regression analysis.

2.5.5 Multi-factor Regression Analysis on country factor portfolios

While the preceding results suggest that ESG factors may explain differences in cross-country equity market returns, the next step is to evaluate this supposition whilst accounting for country selection factor returns. In this section we regress the monthly

returns of the long-short ESG portfolios on the market portfolio and the known country selection factors introduced in Section 3. This is conducted for the overall ESG factor and repeated for each of the components separately: Environmental (E), Social (S) and Governance (G). The following four regressions are carried out in three samples: Developed Markets, Emerging Markets and the combined full sample.

$$ESG_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SIZE}SIZE_t + \beta_{VAL}VAL_t + \beta_{MOM}MOM_t + \beta_{QUAL}QUAL_t + \varepsilon_t \tag{1}$$

$$E_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SIZE}SIZE_t + \beta_{VAL}VAL_t + \beta_{MOM}MOM_t + \beta_{QUAL}QUAL_t + \varepsilon_t \tag{2}$$

$$S_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SIZE}SIZE_t + \beta_{VAL}VAL_t + \beta_{MOM}MOM_t + \beta_{QUAL}QUAL_t + \varepsilon_t \tag{3}$$

$$G_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SIZE}SIZE_t + \beta_{VAL}VAL_t + \beta_{MOM}MOM_t + \beta_{QUAL}QUAL_t + \varepsilon_t \tag{4}$$

A positive alpha means that the ESG factor portfolios capture abnormal returns not explained by exposure to the factors. If the alpha is zero, the return of the factor portfolio can be replicated as a linear combination of its exposure to the remaining factors.

Table 2.10 represents the results in the Developed Markets sample. Panel A shows the results for the ESG factor - the intercept is high and statistically significant with an annualized value of 5.4%. Panels B, C and D show the results for the E, S and G factors respectively. In each case the intercept is high ranging from 3.5-5.2% and statistically significant. This confirms that the returns of the long-short portfolios of ESG, E, S and G cannot be explained by the known factors of Market, Size, Value, Momentum or Quality. Interestingly the ESG factors across the board have a high and statistically significant relationship with Market and Quality, and hence may partly contribute to the

outperformance of the ESG factors, although with a positive intercept the effect is not entirely explained by these factors. These results suggest that the ESG factor portfolio captures abnormal returns that are not explained by exposure to the country selection factors. Note that the intercept is highest for the Governance factor and lowest for the Environmental factor, confirming the relationship found in the previous section.

Table 2.11 represents the results in Emerging Markets. Panel A shows the results for the ESG factor while Panels B, C and D show the results for the Environmental, Social and Governance factors respectively. Only the intercept in the Environmental regression is positive and statistically significant. Interestingly, the intercept on the Governance factor is negative and statistically significant. The overall ESG factor is muted, probably due to netting out the opposite effect on returns of the Environmental and Governance factors.

Table 2.12 represents the results for the full sample, combining Developed Markets and Emerging Markets. Panel A shows the results for the ESG while Panels B, C and D show the results for the E, S and G factors respectively. For the full sample, the ESG factor demonstrates positive alpha and is weakly statistically significant. Breaking it down to the individual components clarifies that the strength is coming from the Environmental factor, with Social and Governance are not statistically significant. We would expect these results to be a mid-way point between the Developed Markets results and Emerging Markets results, as is seemingly the case. Given the E factor is the only significant factor in Emerging Markets, the returns hold in the full sample. While the negative returns from the S and G results are diluted in the full sample.

The preceding results confirm that in Developed Markets, the ESG factors explain differences in cross-country equity market returns, even after accounting for the known country. In Emerging Markets, the ESG effect appears to be already priced, mainly by the Value factor. In the combined full sample, the ESG factor shows weakly statistically significant performance, with the strength stemming from the Environmental factor. Besides accounting for common factors, we are interested in clarifying whether the ESG factor is explained by Economic conditions. For this reason, in the next step we run the same regressions as in this section whilst adding the Economics factor as described in Section 3 which is a comprehensive capture of all Economic-related country factors.

2.5.6 Robustness test: Multi-factor Regression Analysis including the Economics control variable

In Section 5.2 we find that the ESG factors correlate positively and strongly to the Economics factor in both developed and emerging markets. Is it possible that the estimated alpha perceived in the previous section is compensation for exposure to macroeconomic conditions? In the next set of results, we include the Economics variable from Verisk-Maplecroft in the multi-factor regression to understand the role of macroeconomic conditions in explaining ESG factor returns. This will clarify to what extent ESG data is already represented by a country's economic condition and to what extent it is distinct. As before, we regress the monthly returns of the long-short ESG portfolios on the market portfolio and the returns of the long-short portfolios of the common factors, this time with the addition of the Economics factor. This is done for the overall ESG factor and repeated

for each of the components separately: Environmental (E), Social (S) and Governance (G). The following four regressions are carried out in three samples: Developed Markets, Emerging Markets and the combined full sample.

$$ESG_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SIZE}SIZE_t + \beta_{VAL}VAL_t + \beta_{MOM}MOM_t + \beta_{QUAL}QUAL_t + \beta_{ECON}ECON_t + \varepsilon_t \tag{4}$$

$$E_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SIZE}SIZE_t + \beta_{VAL}VAL_t + \beta_{MOM}MOM_t + \beta_{QUAL}QUAL_t + \beta_{ECON}ECON_t + \varepsilon_t \tag{5}$$

$$S_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SIZE}SIZE_t + \beta_{VAL}VAL_t + \beta_{MOM}MOM_t + \beta_{QUAL}QUAL_t + \beta_{ECON}ECON_t + \varepsilon_t \tag{6}$$

$$G_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SIZE}SIZE_t + \beta_{VAL}VAL_t + \beta_{MOM}MOM_t + \beta_{QUAL}QUAL_t + \beta_{ECON}ECON_t + \varepsilon_t \tag{7}$$

A positive alpha means that the ESG factor portfolios capture abnormal returns not explained by exposure to the five factors and the Economics factor. If the alpha is zero, the return of the factor portfolio can be replicated as a linear combination of its exposure to the five factors and the Economics factor.

Table 2.13 represents the results in Developed Markets. As expected from the correlation analysis, the Economics factor is strongly linked to the ESG factors, with very high and statistically significant coefficients across the four regressions. This suggests a strong relationship between country ESG performance and macroeconomic performance. That said, it does not fully explain the alpha of the ESG factors. The intercept remains high and statistically significant for the ESG factor as well as the Environmental, Social and Governance components in each of the regressions. This confirms that the returns of the long-short portfolios of ESG, E, S and G cannot be explained by the common factors of

Market, Size, Value, Momentum, Quality or the Economics factor. The coefficient on the intercept of the ESG factor is 3.8% with a t-statistic of 3.1. While in the previous regression results without the Economics factor, the Governance factor demonstrated the highest coefficient on the intercept, in this set of results including the Economics factor, the Social factor has the highest coefficient at 4%. This indicates that part of the alpha that was captured by the Governance factor is attributable to the Economics factor. This is confirmed by the intercept on the Economics factor within the Governance regression, which is high and statistically significant. Intuitively, it makes sense that there is a strong relationship between the Governance factor in particular and the macroeconomic conditions of a country. The Governance factor is made up of variables such as corruption, corporate governance, and regulatory framework which understandably correlate to economic conditions as encompassed by the Economics factor which incorporates variables such as economic growth, inflation and business access to finance. Nonetheless we can conclude from these results that there is residual alpha in the ESG signal that is not captured by the Economics factor.

Table 2.14 represents the results in Emerging Markets. As in Developed Markets the Economics factor is strongly linked to the ESG factors, with very high and statistically significant coefficients across the four regressions. This suggests a strong relationship between country ESG performance and macroeconomic performance. Only the intercept in the Environmental regression is positive and statistically significant. The intercept on the Governance factor continues to be negative and statistically significant. Interestingly, the inclusion of the Economics factor has made the intercept on the Social factor negative and statistically significant. Here the Economics factor explains most of the returns in the

Social factor rather than the Governance factor as in the Developed Markets. These results indicate that Economic-related factors were to some extent masking the negative effect of the Social and Governance factors, and that once the economic conditions are controlled for, the Social and Governance factors generate statistically significant negative returns. This would support the theory that these elements of ESG are perceived as risk that must be compensated for by return. Intuitively, it would make sense that in Emerging Markets, risks that could be related to Social and Governance concerns, such as political instability, civil unrest, investor protection, political violence, all of which are variables in the Social and Governance components, are at the forefront of investors' minds and therefore would demand a premium in return. Risks relating to the Environmental component tend to be less related to the social, political and economic risks commonly considered by investors. This provides a potential explanation for why the Environmental factor generates positive returns, supporting the idea that these risks may be overlooked by the market. In Developed Markets, risks such as political instability, civil unrest, investor protection, political violence are less relevant or prominent, with more comparable conditions across the countries hence investors may not necessarily demand a return premium. In summary this would indicate that for the group of countries where these risks are material, investors demand higher returns and this effect dominates the ESG-related performance in Emerging Markets. However, in groups of countries where these risks are irrelevant or immaterial, they are not associated with higher returns, and ESG-related risks are more likely to be overlooked by investors, thus demonstrating positive factor performance.

Table 2.15 represents the results for the full sample, combining Developed Markets and Emerging Markets when including the Economics factor. For the full sample, the results

are effectively a combination of the results for the Developed Markets and the Emerging Markets samples. The combination leaves only the Environmental factor with significant alpha. The Social, Governance and overall ESG factors demonstrate near zero alphas with insignificant t-statistics. This is a result of the opposite effects in the Developed Markets spaces and the Emerging Markets space netting out.

The preceding results confirm that in Developed Markets, the ESG factors explain differences in cross-country equity market returns, even after accounting for common country selection factors and an all-encompassing Economics factor. In Emerging Markets, adding the Economics factor renders the Social and Governance factors as negative and statistically significant while the Environmental factor remains positive and statistically significant. The opposing results from the components would explain why the overall ESG factor is rendered statistically insignificant.

2.5.7 Robustness tests: Multi-factor Regression Analysis on stock based Fama and French factors

In Developed Markets, ESG portfolios achieve positive and statistically significant alphas, after controlling for common country factors and macroeconomic conditions. However, while country factor portfolios could be viewed as proxies for Fama and French stock-based factors, they may not fully capture the factor effects. As an extra robustness check, we conduct regressions of the ESG factor returns against Fama and French stock-based factors. In an effort to be thorough and complete, we choose the Fama and French five factor model. In addition to Market (Mkt − Rf), Size (Size Minus Big, SMB) and Value (High Min Low, HML), the five factor model includes a Profitability factor (Robust Minus

Weak, RMW) and an Investment factor (Conservative Minus Aggressive). Monthly returns of the factors for Developed Markets and Emerging Markets are obtained from the Kenneth French Data Library and further detail factor construction descriptions are available on the website.

We regress monthly returns of the ESG, E, S and G portfolios are on the monthly returns of the five factors for the relevant region sample as follows:

$$ESG_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{RMW}RMW_t + \beta_{CMA}CMA_t + \varepsilon_t \qquad (9)$$

$$E_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{RMW}RMW_t + \beta_{CMA}CMA_t + \varepsilon_t \qquad (10)$$

$$S_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{RMW}RMW_t + \beta_{CMA}CMA_t + \varepsilon_t \qquad (11)$$

$$G_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{RMW}RMW_t + \beta_{CMA}CMA_t + \varepsilon_t \qquad (12)$$

Table 2.16 presents the estimation results for Developed Markets. The alpha is positive and statistically significant in all four of the regressions: ESG, Environmental, Social and Governance. This confirms that the ESG factor portfolios capture abnormal returns not explained by exposure to the stock-based five factor model. The intercept is highest for the Governance factor where the coefficient is also positive and significant for the HML factor and negative and significant for the CMA factor.

Table 2.17 presents the estimation results for Emerging Markets. As in the previous regressions, the intercept is positive and weakly statistically significant only in the Environmental regression. This confirms that the Environmental factor portfolio captures

abnormal returns not explained by exposure to the stock-based five factor model. The intercepts are negative but statistically insignificant in both the Social and Governance regressions, whilst being positive but statistically insignificant in the ESG regression.

2.6. Integrating country ESG with factor investing in equity country selection

While the preceding results suggest that ESG factors explain differences in cross-country equity market returns, particularly in developed markets, the next step is to evaluate this supposition within the framework of a standard equity market strategy.

In this section we analyze the impact of ESG-integration in country equity selection by comparing a portfolio strategy that does not integrate ESG considerations in the investment decision-making process, the base strategy portfolio, to a strategy that does integrate ESG considerations by adding ESG as an equally weighted-factor, the ESG-integrated portfolio. There are two key elements to this analysis. In the first section, we analyze the impact of ESG integration on the ESG tilt of the portfolio, to measure the efficacy of this method of ESG integration. In the second section, we analyze the impact of ESG integration on the risk and return of the portfolio, to measure the implied cost or benefit on investment return that is associated with ESG integration.

We start by creating the standard country selection strategy – this is a multi-factor portfolio constructed by equally weighting the four common country-selection factors discussed throughout the paper - the Size factor, the Value factor, the Momentum factor and the Quality factor. For each factor, countries in the relevant sample are ranked in deciles. The sum of the decile ranks of each of the four factors is then re-ranked to generate the final

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rank for the combined multi-factor portfolio which we will refer to as SVMQ (Size, Value, Momentum, Quality). We then construct three portfolios based off of the final rank with the long portfolio (L) including the countries that rank most favorably on the combined SVMQ strategy and the short portfolio (S) including the countries that rank least favorably.

Next, we construct the ESG-integrated version of this portfolio. We do this by adding the ESG factor as an additional equally-weighted factor such that the strategy is now an equally-weighted, five-factor strategy, we refer to this as SVMQ_ESG (Size, Value, Momentum, Quality, ESG). We repeat the same construction methodology for combining the base strategy with each of the three components separately: the base strategy with the addition of the Environmental factor only (SVMQ_E), the base strategy with the addition of the Social factor only (SVMQ_S) and the base strategy with the addition of the Governance factor only (SVMQ_G).

2.6.1 ESG Tilt of multi-factor country-selection strategies

In this section, we analyze the impact of ESG integration on the ESG tilt of the portfolio. Crucially, we would want to see that incorporating the ESG factor as an additional, equally-weighted factor does indeed improve the overall ESG score of the portfolio. We measure this by calculating the average ESG score of the portfolio constructed using the base strategy, SVMQ and comparing it to the average ESG score of the portfolio constructed with the ESG integrated strategy, SVMQ_ESG. We then do this comparison for the inclusion of the individual E, S and G scores. Similarly, we calculate the average E score of the portfolios constructed using the base strategy, SVMQ and compare it to the average

E score of the portfolios constructed with the E integrated strategy, SVMQ_E. We then repeat this for the Social factor and the Governance factor.

The results for Developed Markets are shown in Table 2.18 below, with a graphic illustration in Figure 2.6. Incorporating ESG as an additional factor makes a very meaningful impact on the ESG tilt of the final portfolio. For example, while the base strategy has almost equal ESG tilt amongst all three portfolios all around the median score of 5, the ESG-integrated strategy has a spread of 3.3 points with the long portfolio having an ESG score north of 7 and short portfolio an ESG score less than 4. The increase in the ESG tilt of the ESG-integrated portfolio occurs equally on the long side, with the ESG score for the long portfolio increasing and the short side with the ESG score for the short portfolio decreasing. Similarly, while the base strategy has almost equal exposure to the Environmental score – all hovering around 5, the Environmental-integrated strategy, SVMQ_E, has a spread of 3 points between the long and short portfolios. The same pattern can be seen with the Social integrated strategy, SVMQ_S and the Governance integrated strategy, SVMQ_G. In all cases, the enhancement occurs fairly equally on the long side and the short side.

The results for Emerging Markets are shown in Table 2.19 below, with a graphic illustration in Figure 2.7. As in the case of Developed Markets, incorporating ESG as an additional factor makes a meaningful impact on the ESG tilt of the final portfolio. For example, while the base strategy has almost equal ESG tilt amongst all three portfolios all around the median score of 5, the ESG-integrated strategy has a spread of 3.8 points with the long portfolio having an ESG score north of 7 and the short portfolio having an ESG

score less than 4. The increase in the ESG tilt of the ESG-integrated portfolio occurs equally on the long side, with the ESG score for the long portfolio increasing and the short side with the ESG score for short portfolio decreasing. Similarly, while the base strategy has similar exposures to the Environmental score, the Environmental-integrated strategy, SVMQ_E, has an impressively wide spread of 4.3 points between the long and short portfolios. Interesting to note that the Environmental score was also the best performing element of ESG in the Emerging Markets sample. A similar pattern can be seen with the Social integrated strategy, SVMQ_S with a spread of 3.9 points and the Governance integrated strategy, SVMQ_G where the spread is lower at 2 points. In all cases, the enhancement occurs fairly equally on the long side and the short side.

The results for the Full Sample are shown in Table 2.20 below, with a graphic illustration in Figure 2.8. As in the case for both Developed and Emerging Markets, incorporating ESG as an additional factor makes a meaningful impact on the ESG tilt of the final portfolio. While the base strategy has almost equal ESG tilt amongst all three portfolios all around the median score of 5, the ESG-integrated strategy has a spread of 3.65 points with the long portfolio having an ESG score greater than 7 and the short portfolio an ESG score less than 4. A similar pattern is found with the addition of the Environmental factor, the Social factor and the Governance factor.

In all samples and with all factors the integration of ESG, E, S and G factors by adding them as an additional, equal-weighted factor significantly enhanced the portfolio's exposure to the relevant ESG factor. This enhancement occurs equally on the long side, with the ESG score for the long portfolio increasing and the short side with the ESG

score for short portfolio decreasing. This confirms the effectiveness of this method of ESG integration in achieving the target result of substantially improving the strategies' ESG tilt.

2.6.2 Financial impact of ESG-integration in country-selection strategies

While the results in Sections 5 suggest that ESG factors explain differences in cross-sectional country equity returns, particularly in developed markets, this supposition must be evaluated within the framework of a standard country-selection strategy. In the previous sub-section, we found that the ESG integrated portfolios had meaningfully higher ESG tilts than the base strategy. In this sub-section, we look to measure the financial impact of ESG integration in country-selection strategies.

Table 2.21 provides the performance and risk results for the multifactor portfolios in Developed Markets. Starting with the base strategy, SVMQ, we find that on average, the returns for the long portfolio are slightly higher than for the short portfolio, exceeding by a mean of 90 bps per year, with a fairly low Sharpe ratio of 0.13 and an insignificant t-statistic. This confirms the results from Section 4 that indicated common fundamental factors have limited explanatory power when examining a cross-section of country-level returns in developed markets. Adding the ESG factor to the base strategy, SVMQ_ESG substantially improves on this result, with a statistically significant 2.6% mean return of the long-short portfolio, representing a Sharpe ratio of 0.37. Interestingly, the benefit in the return appears linear, improving both the long side (a higher average return of the long portfolio for SVMQ_ESG vs. SVMQ) and the short side (a lower average return of the

short portfolio for SVMQ_ESG vs SVMQ). Notably, there is no change in the risk statistics of the ESG integrated strategy in comparison to the base strategy.

Repeating the same exercise for SVMQ_E, SVMQ_S and SVMQ_G shows that the addition of each of the three factors individually enhances the base strategy. This provides confidence in the results with all aspects of the ESG factor enhancing returns when integrated into a common country selection strategy. The strongest individual enhancement is found in the Social factor, where the mean return of the long-short portfolio is 3.4%, with a Sharpe ratio of 0.47. This result is higher than the SVMQ_ESG portfolio suggesting that the investment return is greatest when adding the Social factor alone.

Given the ESG-integrated strategies (SVMQ_ESG, SVMQ_E, SVMQ_S, SVMQ_G) outperform the base strategy, this signifies a "double-win" where by incorporating ESG considerations into the investment process, investors can improve the ESG tilt of their portfolio while also enhancing their return. This result is also relevant to investors that are indifferent to the ESG tilt of their portfolios as they stand to benefit by incorporating ESG factors into their country selection strategy in that it will enhance the risk-adjusted returns of the portfolio strategy.

Table 2.22 provides the performance results for the multifactor portfolios in Emerging Markets. Starting with the base strategy, SVMQ, we find that on average the returns for the long portfolio are higher than for the short portfolio, exceeding by a mean of 5.1% per year, which demonstrates statistical significance and results in a Sharpe ratio of 0.5. These performance results are significantly stronger than the base case in Developed Markets. Adding the ESG factor to the base strategy, SVMQ_ESG marginally improves on the

performance result, with a statistically significant mean return of 5.4% for the long-short portfolio, representing a Sharpe ratio of 0.55. The risk is not meaningfully impacted by ESG integration with the standard deviation slightly reduced for the ESG integrated portfolio relative to the base.

Interestingly, the performance enhancement comes solely from the long portfolio outperforming. In fact, the short side is detractive as the short portfolio returns for SVMQ_ESG are higher than they are for SVMQ. This would mean that a long-only investor, or a positive-screening approach where the ESG factor is only used on the "long-side" would gain more return enhancement from ESG-integration than an approach using the "short-side" or negative screening. Equally an approach that only uses the "short-side" would not experience a return enhancement but rather a detraction.

Repeating the same exercise for SVMQ_E, SVMQ_S, SVMQ_G shows that the addition of both the Environmental factor and the Social factor enhances the performance and Sharpe ratios of the base strategy whereas the Governance factor detracts from the performance of the base strategy.

These results echo the preceding findings in this paper which showed that in Emerging Markets, the Environmental factor is associated with the strongest performance while the Governance factor is associated with negative performance. We know from Section 5 that the negative opportunity cost associated with the Social and Governance factors is masked to some extent by macroeconomic conditions as encompassed by the Economics factor. Therefore, some of the return enhancement that is showing up in the inclusion of the Social

factor in SVMG_S and to some extent the ESG factor in SVMQ_ESG would be attributed to economic conditions rather than ESG.

While the performance enhancement from integrating ESG factors is more moderate in Emerging Markets than it is in Developed markets, this still signifies a positive outcome. In the case of the integration of the overall ESG factor as well as the integration of the Environmental factor and Social factor separately, the performance is slightly improved. Most importantly, investors can conclude that the integration of ESG considerations into country selection meaningfully increasing the ESG tilt of their portfolio whilst not impeding on the performance, with the exception of the standalone Governance factor.

Table 2.23 provides the performance and risk results for the multifactor portfolios in the full sample which combines Developed and Emerging Markets. Starting with the base strategy, SVMQ, we find that on average the returns for the long portfolio are higher than for the short portfolio, exceeding by a mean of 5.6% per year, which demonstrates statistical significance and results in a Sharpe ratio of 0.74. These performance results are stronger than the base case in Emerging Markets which was already substantially stronger than the base case in Developed Markets. Most of the benefit in the Sharpe ratio stems from a reduced standard deviation. Adding the ESG factor to the base strategy, SVMQ_ESG further improves on the performance result, with a statistically significant mean return of 6.1% for the long-short portfolio, representing a Sharpe ratio of 0.86. Interestingly, the performance enhancement comes solely from the short side underperforming. The standard deviation is slightly reduced for the ESG integrated portfolio relative to the base, further enhancing the Sharpe ratio. Repeating the same

exercise for SVMQ_E, SVMQS, SVMQ_G shows that the addition of both the Environmental factor and the Social factor enhance the performance and Sharpe ratios of the base strategy whereas the Governance factor detracts from the performance of the base strategy. This is probably due to the relationship we found in the Emerging Markets sample where the inclusion of the Governance factor detracts from returns.

In the full sample, in almost all cases of ESG integration, with the exception of the standalone Governance factor, the integration of ESG factors enhanced the returns of the base equity country selection strategy. We can conclude that ESG integration does not present a cost to financial returns, with evidence that it has enhanced returns in most approaches.

2.7 A combined approach of country-level (Macro) ESG and firm-level (Micro) ESG

In this section we explore the relationship between country ESG scores assigned at the sovereign level, as used thus far in the analysis and firm-level ESG scores assigned to the company and aggregated to the country-level. We seek to examine the relative performance of the two approaches in the predictability of cross-sectional country returns as well as the role of using a combined approach, including both measures. Country ESG, what we will also refer to as Macro ESG in this section refers to the ESG scores used in this study thus far, scores assigned on the country-level from the Verisk Maplecroft database. Firm (company) ESG, what we will also refer to as Micro ESG in this section refer to firm-level ESG scores assigned to the company by MSCI. Firm (Micro) ESG scores are aggregated up to the country level by taking the mean of the company ESG scores in each country, as

constructed and used in Nassar (2021). Firm ESG scores are only widely available starting in 2012 therefore all the analysis in this section is conducted over the period 2012-2020. Firm ESG scores are only calculated for a country where there is data for a minimum of 10 stocks within the country; there are a few countries in the Emerging Markets sample that do not meet this criterion and are therefore excluded from this section of the analysis. The full list of countries used in this section of the analysis is presented in the Appendix in Table 2.A9.

2.7.1 Descriptive Statistics of the relation between country (Macro) and firm (Micro) ESG

Figures 2.9 and 2.10 presents the average firm (Micro) and country (Macro) ESG decile ranks over the full period for developed markets and emerging markets respectively. The charts for the Environmental, Social and Governance ranks are presented in the appendix in Figures 2.A15-2.A22.

In developed markets, there is strong similarity between the firm level and country ESG ranks. In both cases, the United States and Israel score at the bottom-end of the ranks (bad ESG profiles) while the Scandinavian countries and New Zealand score at the top end of the ranks (good ESG profiles). There are a few cases of disagreement, notably France and Austria that rank highly on the firm ESG score but towards the middle on the country ESG scores.

Similarly in emerging markets, there is a clear agreement between the firm-level and country-level ESG ranks. In both cases, China ranks towards the bottom end (bad ESG

profile) while Taiwan ranks towards the top (good ESG profile). There are more cases of disagreement in the emerging markets sample than in the developed markets sample. Notably, Thailand and South Africa rank towards the top of the ranks on the firm ESG scores but towards the middle in the country ESG scores. In the other direction, Korea ranks highly on the country ESG scores but towards the middle on the firm ESG scores.

To gain further insight into the relationship between firm-level and country-level ESG scores, we look at the average annual correlation of the ranks. Tables 2.24 and 2.25 present the correlation matrices for developed markets and emerging markets respectively.

The correlations are generally higher in developed markets than they are in emerging markets. In developed markets, the correlation between Macro ESG and Micro ESG ranks is 65% while in emerging markets it is 36%. There is generally a lower correlation for the E, S and G components between Micro and Macro ranks. Within developed markets, the highest correlation is that of the Social component with a correlation of 54% and the least correlated component is Environmental with a correlation of 36%. Within emerging markets, the correlations amongst Macro and Micro ESG factors are markedly lower with the highest correlation of the individual components being Governance with a correlation of 29% and the lowest being Environmental with a correlation of -10%.

2.7.2 Portfolio sorts on combined country (Macro) and firm (Micro) ESG Factor Portfolios

In this section we examine the relative effectiveness of Country (Macro) ESG and Firm (Micro) ESG in explaining cross-country equity returns as well as the effectiveness of the combined approach, including both measures. We begin y conducting portfolio sorts over the period 2012-2020 for the relevant samples. Portfolio sorts are conducted for Country (Macro) ESG factors as in the Section 5 of this paper, Firm (Micro) ESG factors and a combined factor of Micro ESG and Micro ESG Momentum (Comb), which is a combined firm ESG level and change factor as in Nassar (2021). Additionally, we conduct portfolio sorts for two versions of firm and country combinations: Macro and Micro ESG level (MacroMicro) and a three-way combination of Macro ESG, Micro ESG and Micro ESG momentum (MacroMicroMom).

Table 2.26 shows the results in the Developed Markets sample. In Developed Markets, Macro ESG and Micro ESG factors generally demonstrate positive and statistically significant performance. Micro ESG and Micro E outperform their Macro counterparts, while for the S and G factors, the Macro versions are stronger, with the Micro S factor being statistically insignificant. Interestingly, the Macro factors demonstrate lower volatility across the board than the Micro factors.

For the combined Micro factors, which include Micro ESG level and Micro ESG momentum, the ESG and E factors outperform their Macro counterparts while the S factor underperforms it and the G factor has comparable performance.

Next, we look at combining Macro and Micro ESG factors. We do two versions of this – firstly, we construct a two-way, equal-weighted combination of Macro and Micro ESG levels, we refer to this as ESG_Micro_Macro, we repeat this for each of the components, E, S and G. Secondly, we construct a three-way, equal-weighted combination of Macro ESG level, Micro ESG level and Micro ESG momentum, we refer to this as ESG_MacroMicroMom, and repeat it for the individual components. Both versions of the combinations demonstrate positive and statistically significant performance. The versions that include the ESG Momentum factor demonstrate better performance. Comparing the MicroComb and the MacroMicroMom performance, the former outperforms for both the overall ESG factor as well as the Social factor, while performance is comparable for both the Environmental factor and the Governance factor.

Table 2.27 shows the results in the Emerging Markets sample. The Macro ESG factors are statistically insignificant, as witness in the results in Section 5 with the Environmental factor, whilst positive also statistically insignificant for this shortened time period and sample of countries, which is also reduced in comparison to the Emerging Markets sample earlier in the study due to data availability of Micro ESG. As demonstrated in Nassar (2021), the Micro ESG factors are positive although statistically insignificant while the combined Micro factors, which include Micro ESG level and Micro ESG momentum are positive and statistically significant.

Next, we look at combining country (Macro) and firm (Micro) ESG factors. We conduct two versions of this – firstly, we construct a two-way, equal-weighted combination of Macro and Micro ESG levels, we refer to this as ESG_Micro_Macro, we repeat this for

each of the components, E, S and G. Secondly, we construct a three-way, equal-weighted combination of Macro ESG level, Micro ESG level and Micro ESG momentum, we refer to this as ESG_MacroMicroMom, and repeat it for the individual components. In most cases the long-short returns are statistically insignificant with the two exceptions being the Environmental factor and the Social factor in the portfolio sorts formed on the three-way combination of Macro ESG, Micro ESG and Micro ESG momentum. This is expected given the standalone Macro and Micro ESG factors do not demonstrate statistically significant returns. Comparing to the results in Nassar (2021), adding Macro ESG to the combined Micro ESG and Micro ESG Momentum factors, reduces returns for the ESG factor as well the component factors.

2.7.3 Multi-factor Regression Analysis of combined country (Macro) and firm (Micro) ESG on country factor portfolios

While the preceding results suggest that the combined Macro ESG, Micro ESG and Micro ESG Momentum factors may explain differences in cross-country equity market returns, the next step is to evaluate if they are explained by known country selection factor returns as we did in Section 5. In this section we regress the monthly returns of the long-short ESG portfolios on the market portfolio and the common factors- Size, Value, Momentum and Quality. This is done for the combined ESG factor and repeated for each of the components separately: Environmental (E), Social (S) and Governance (G). The following four regressions are carried out in both the developed markets and emerging markets samples, where MacroMicroMom refers to the three-way, equal-weighted combinations of Macro ESG level, Micro ESG level and Micro ESG momentum.

$$ESG\_MacroMicroMom_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SIZE}SIZE_t + \beta_{VAL}VAL_t +$$
$$\beta_{MOM}MOM_t + \beta_{QUAL}QUAL_t + \varepsilon_t \qquad (13)$$

$$E\_MacroMicroMom_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SIZE}SIZE_t + \beta_{VAL}VAL_t +$$
$$\beta_{MOM}MOM_t + \beta_{QUAL}QUAL_t + \varepsilon_t \qquad (14)$$

$$S\_MacroMicroMom_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SIZE}SIZE_t + \beta_{VAL}VAL_t +$$
$$\beta_{MOM}MOM_t + \beta_{QUAL}QUAL_t + \varepsilon_t \qquad (15)$$

$$G\_MacroMicroMom_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SIZE}SIZE_t + \beta_{VAL}VAL_t +$$
$$\beta_{MOM}MOM_t + \beta_{QUAL}QUAL_t + \varepsilon_t \qquad (16)$$

Table 2.28 represents the results in the Developed Markets sample. Panel A shows the results for the ESG_MacroMicroMom factor - the intercept is high and statistically significant with an annualized value of 5.6%. This confirms that the returns of the long-short portfolios of the combined ESG factor cannot be explained by known country factors. Panels B, C and D show the results for the combined E, S and G factors respectively. In each case the intercept is positive and statistically significant and hence captures abnormal returns that are not explained by exposure to standard country selection factors.

Comparing these results to the regression results that include only the combined Micro ESG and Micro ESG Momentum factor in Nassar (2021), we find that the addition of Macro ESG improves on the results specifically for the ESG factor and the Social factor, while slightly reducing returns on the Governance factor and resulting in similar returns for the Environmental factor. These results would indicate that in developed markets investors stand to enhance returns by incorporating Macro ESG attributes alongside Micro ESG attributes of level and momentum.

Table 2.29 represents the results in the Emerging Markets sample. Panel A shows the results for the ESG_MacroMicroMom factor while Panels B, C and D show the results for the Environmental, Social and Governance combined factors respectively. The intercept is statistically insignificant in all regressions. This suggests that the returns of the long-short portfolios of the combined ESG factors presented in Table 2.26 is not robust to country factors.

Comparing these results to the regression results that include only the combined Micro ESG and Micro ESG Momentum factor in Nassar (2021), we find that the addition of Macro ESG reduces returns and renders the intercept statistically insignificant. These results would indicate that in emerging markets investors are better off only incorporating Micro ESG and Micro ESG Momentum attributes in their strategies rather than including Macro ESG scores.

2.7.4 Robustness check: Multi-factor Regression Analysis on stock based Fama and French factors

While global factor portfolios based on countries could be viewed as proxies for Fama and French stock-based factors, they do not necessarily fully capture these factor effects. As a robustness check, we regress the monthly returns of the long-short combined ESG portfolios on the Fama and French stock-based factors to be able to confirm whether ESG portfolios contribute alpha beyond the Fama and French factors. We conduct these regressions with the same specifications and definitions as in Section 6 of this paper where MacroMicroMom refers to the three-way, equal-weighted combinations of Macro ESG level, Micro ESG level and Micro ESG momentum.

Specifically, we estimate the following regressions for the ESG factor portfolios:

$$ESG\_MicroMacroMom_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{RMW}RMW_t + \beta_{CMA}CMA_t + \varepsilon_t \qquad (17)$$

$$E\_MicroMacroMom_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{RMW}RMW_t + \beta_{CMA}CMA_t + \varepsilon_t \qquad (18)$$

$$S\_MicroMacroMom_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{RMW}RMW_t + \beta_{CMA}CMA_t + \varepsilon_t \qquad (19)$$

$$G\_MicroMacroMom_t = \alpha + \beta_{MKT}(MKT_t - RF_t) + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{RMW}RMW_t + \beta_{CMA}CMA_t + \varepsilon_t \qquad (20)$$

Table 2.30 represents the results in the Developed Markets sample. Panel A shows the results for the ESG_MacroMicroMom factor - the intercept is high and statistically significant with an annualized value of 5.2%. This confirms that the returns of the long-short portfolios of the combined ESG factor cannot be explained by the Fama French five factor model. Panels B, C and D show the results for the combined E, S and G factors respectively. In each case the intercept is positive and statistically significant.

Comparing these results to the regression results that include only the combined Micro ESG and Micro ESG Momentum factor in Nassar (2021), we find that the addition of Macro ESG improves on the results for the ESG factor while the results for the E, S and G factors are comparable. These results would confirm that in developed markets investors stand to enhance returns by incorporating Macro ESG attributes alongside Micro ESG attributes of level and momentum.

Table 2.31 represents the results in the Emerging Markets sample. Panel A shows the results for the ESG_MacroMicroMom factor while Panels B, C and D show the results for the Environmental, Social and Governance combined factors respectively. The intercept is

statistically insignificant in all regressions except for the Environmental regression, where it is weakly significant. This suggests that the returns of the long-short portfolios of the combined ESG factors presented in Table 2.25 can be mostly explained by the Fama and French five factor model for all but the combined Environmental factor.

Comparing these results to those that include only the combined Micro ESG and Micro ESG Momentum factor in Nassar (2021), we find that the addition of Macro ESG reduces returns in all regressions. This confirms the earlier finding that in emerging markets, combined micro ESG factors of level and momentum exhibit better performance than macro ESG.

2.8 Integrating country and firm ESG with factor investing in equity country selection

In this section we analyze the impact of ESG-integration in country equity selection by comparing a portfolio strategy that does not integrate ESG considerations in the investment decision-making process, the base strategy portfolio, to strategies that integrate ESG considerations by adding ESG as an equally weighted-factor. There are two key elements to this analysis. We begin by analyzing the impact of ESG integration on the ESG tilts of the portfolio in order to measure the efficacy of this method of ESG integration. Next, we analyze the impact of ESG integration on the risk and return of the portfolios, to measure the implied positive or negative impact on investment return that is associated with ESG integration.

2.8.1 ESG tilt of multi-factor country-selection strategies

In this sub-section, we analyze the impact of ESG integration on the ESG tilt of the portfolio. We take the same approach as in Section 6 of this paper but instead of measuring exposure to Macro ESG only, in this section we define and measure ESG tilt as an equally weighted combination of Macro and Micro ESG. By doing so, we are not taking a view as to which version of ESG tilt matters more. As before, SVMQ refers to the base strategy that does not integrate ESG considerations. SVMQ_MacroMicro refers to the addition of the equally-weighted combination of Macro ESG and Micro ESG factor while SVMQ_MacoMicroMom refers to the addition of the three-way equally-weighted combination of Macro ESG, Micro ESG and Micro ESG Momentum.

The results for Developed Markets are shown in Table 2.32 below, with a graphical illustration in Figure 2.11. Incorporating the combined Macro and Micro ESG factor as an additional factor makes a meaningful impact on the ESG tilt of the final portfolio. The base strategy has almost comparable ESG tilts amongst all three portfolios with the long portfolio having a slightly lower ESG tilt than the short portfolio. As expected, SVMQ_MacroMicro reverses this characteristic with a meaningful spread of 2.77 points between the long portfolio (L) and the short portfolio (L). The enhancement in the ESG tilt of the ESG-integrated portfolio occurs equally on the long side, with the ESG score for the long portfolio increasing and the short side with the ESG score for the short portfolio decreasing. Similarly, MacroMicroMom also exhibits a meaningful spread of 2.29 – slightly less than the version without Micro ESG Momentum.

The results for Emerging Markets are shown in Table 2.33 below, with a graphical illustration in Figure 2.12. Incorporating the combined Macro and Micro ESG factor as an additional factor makes a very meaningful impact on the ESG tilt of the final portfolio. The base strategy has almost comparable ESG tilts amongst all three portfolios with the long portfolio having a slightly lower ESG tilt than the short portfolio. Again, SVMQ_MacroMicro reverses this characteristic with a meaningful spread of 2.94 points between the long portfolio (L) and the short portfolio (S). The enhancement in the ESG tilt of the ESG-integrated portfolio occurs equally on the long side, with the ESG score for the long portfolio increasing and the short side with the ESG score for the short portfolio decreasing. Similarly, MacroMicroMom also exhibits a meaningful spread of 2.55 – slightly less than the version without ESG Momentum.

2.8.2 Financial impact of ESG-integration in country-selection strategies

While the preceding results suggest that the combined ESG factors explains differences in cross-sectional country equity returns, the next step is to evaluate this supposition within the framework of a standard equity country selection strategy.

In the previous sub-section, we found that the ESG integrated portfolios had a meaningfully higher tilt to ESG than the base strategy. In this sub-section, we look to measure the impact of ESG integration using the combined country and firm ESG factors on the investment return and risk of the portfolios. We do this by conducting portfolio sorts for the base strategy, SVMQ as well as a series of ESG-integrated portfolios which add a version of the ESG factor as an equally weighted factor to SVMQ - SVMQ_Macro adds Macro ESG;

SVMQ_Micro adds Micro ESG; SVMQ_MicroMom adds combined Micro ESG and Micro ESG Momentum; SVMQ_MacroMicro adds combined Macro ESG and Micro ESG; SVMQ_MacroMicroMom adds combined Macro ESG, Micro ESG and Micro ESG Momentum. Specifically, we are interested in measuring the impact on returns from incorporating the combined ESG factors, SVMQ_MacroMicro and SVMQ_MacroMicroMom relative to an approach that uses Micro ESG only as in Nassar (2021) or Macro ESG only as in Section 6 of this paper.

Table 2.34 provides the results for the multifactor portfolios in Developed Markets. All versions of the ESG-integrated strategies outperform the base strategy by 2-2.5% on an annualized basis, while the volatility of the portfolios remains comparable. Amongst the different ESG-integrated strategies, risk and return results are similar with Sharpe ratios ranging from 0.51 for SVMQ_Micro to 0.59 for SVMQ_MacroMicroMom. These results would suggest that performance is enhanced when Macro ESG is added to either strategy based on Micro ESG.

Table 2.35 provides the results for the country selection strategies in emerging markets. As found in Nassar (2021) the returns for the base strategy are negative over this period due to weak performance of country equity factors, namely the Size and Momentum factors. In terms of the impact of ESG-integration on performance, only the strategies that integrate Micro ESG improve on the performance of the standard strategy. This confirms the preceding results that found Micro ESG factors have stronger and statistically significant performance in emerging markets while Macro ESG factors were mostly

insignificant. Specifically, the strategy integrating Micro ESG momentum, SVMQ_MicroMom has the highest impact on return as found in Nassar (2021).

2.9 Conclusion

This paper delivers the most comprehensive link to date between country ESG efforts and national stock market performance and presents a framework for integrating country ESG factors in a global equity country selection strategy. The findings are particularly useful to country equity allocators and global macro investors looking to integrate ESG considerations into their strategies.

The research finds that in developed markets, ESG attributes are associated with positive performance, with this being the case in each of the three components, environmental, social and governance. The overall ESG factor exhibits Sharpe ratios greater than that of value, momentum, size and quality country factors. Further robustness checks confirm that the returns of the ESG factors cannot be explained by stock-based Fama-French factors nor economic conditions used as a control variable. The results of this analysis are consistent with the growing empirical literature that documents a positive association between ESG attributes and financial performance. Lei and Wisniewski (2018), Perotti and van Oijen (2001) and Diamonte et al. (1996) all find a positive link between social and governance attributes such as Rule of Law, investor protection and political risk and financial performance, where they argue that weak institutional settings harm minority shareholders and that these risks are not priced. We do not find evidence of statistically significant performance of country-level ESG momentum, possibly attributable to the time-series

persistency in the scores. Finally, and importantly for practical applicability we show that integrating ESG considerations into a country equity selection strategy by adding ESG as an additional equally-weighted factor, improves investment returns compared to a standard multi-factor country selection strategy whilst substantially increasing the ESG tilt of the portfolio.

The findings are more mixed in the emerging markets sample. While the Environmental factor shows a positive relationship with cross-sectional country returns, the Social and Governance factors exhibit negative returns, most pronounced in the robustness tests where country-selection factors and an Economics control variable are included in the regressions. The excess return lost from not investing in countries ranking lowest on Social and Governance attributes is perceived to be the cost of ESG investing. This finding would align with arguments suggesting that investors require compensation for investing in countries with poor governance attributes and weaker social conditions as found in Zaremba (2018) and Stocker (2016). This effect translates into a cost to financial performance, largest when the country selection strategy is tilted to Governance attributes. However, the analysis finds that a more balanced ESG-integration using the overall ESG factor exhibits a substantial enhancement in the ESG tilt of the portfolio without an impediment to performance.

Lastly, in exploring the link between country-level ESG attributes and firm-level ESG attributes we   find a positive correlation between the two approaches, with correlations highest in developed markets. The findings conclude that in developed markets, a combined ESG approach of country-level ESG, firm-level ESG and firm-level ESG

momentum exhibits positive and statistically significant returns, robust to country-level factors and stock-based Fama and French factors. Moreover, we find that incorporating country-level ESG factors alongside firm-level ESG attributes of level and momentum enhances returns, thus improving on the firm-level ESG factors presented in Nassar (2021). In emerging markets, we find that a combined ESG approach of country-level ESG, firm-level ESG and firm-level ESG Momentum only exhibits positive and statistically significant returns for the Environmental factor, and while these returns are robust to the Fama and French five factor model, they are not robust to a multi-factor regression including known country factors. Thus the findings conclude that in emerging markets, investment returns are strongest using firm-level ESG attributes.

The main contribution of this paper is in the insight it provides on the performance and integration of country ESG considerations in the country equity space, an area that has been mostly unexplored in the existing literature on ESG investing. Furthermore, by using country ESG data, which is available from 2000-2020, this paper is able to meaningfully extend the sample period studied in Nassar (2021) and typical ESG studies in the equities space due to a longer history of country ESG data compared to corporate ESG data. The paper identifies conclusive results on the relationship between country-level ESG factors and cross-sectional country equity performance as well as their integration with firm-level ESG factors and presents a framework for integrating country ESG attributes in a global equity country selection strategy which effectively increases the ESG tilt of the long-short portfolio without compromising investment performance.

The findings of this research will be of particular interest to global macro investors and country equity allocators seeking to integrate ESG considerations in their investment approaches. The results may also be of interest to policymakers in so far that country ESG practices and policies are associated with national equity performance.

It is worth cautioning that despite the extended sample period compared to what is common of ESG studies, it remains the case that the sample period of this analysis covers a period during which the demand for ESG assets rose substantially. As demonstrated by Pastor, Stambaugh and Taylor (2022), the documented positive performance of ESG may be attributed to a shift in demand for ESG assets in which case we should not expect it to continue beyond periods of a demand shift.

While this paper delivers a comprehensive overview of the relationship between country-level ESG attributes and national equity market performance from a country selectors' perspective, there is further research to be done to provide investment guidance on how country ESG-integration should be applied by stock selectors. An analysis measuring the added benefit of incorporating country ESG information in stock selection may provide interesting results. Furthermore, whilst this analysis provides implications from an investors' perspective, further research can be conducted to explore the relevance of country ESG to policy makers. The results in this paper find a strong relationship between ESG performance and economic performance. It would be interesting to further explore this relationship and untangle the causation link between ESG performance, economic performance and national stock market performance. Are the outcomes of better ESG practices on the country-level the drivers of better macroeconomic performance that

knocks on to better firm performance or are countries with more favorable macroeconomics better positioned to promote better ESG practices and how does firm performance fit in?

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Appendix

Table 2.A1. Countries in the Developed Markets (DM) and Emerging Markets (EM Samples

List of all countries included in the analysis in respective sample including start years. The analysis was also run excluding countries with an apteryx where data was only available in later years in order to keep the sample constant.

Developed Markets			Emerging Markets		
Country	Country Code	Start Year	Country	Country Code	Start Year
Australia	AUS	2000	United Arab Emirates*	ARE	2014
Austria	AUT	2000	Brazil	BRA	2000
Belgium	BEL	2000	Chile	CHL	2000
Canada	CAN	2000	China	CHN	2000
Switzerland	CHE	2000	Colombia	COL	2000
Germany	DEU	2000	Czech Republic	CZE	2000
Denmark	DNK	2000	Egypt	EGY	2000
Spain	ESP	2000	Hungary	HUN	2000
Finland	FIN	2000	Indonesia	IDN	2000
France	FRA	2000	India	IND	2000
United Kingdom	GBR	2000	Korea	KOR	2000
Hong Kong	HKG	2000	Mexico	MEX	2000
Ireland	IRL	2000	Malaysia	MYS	2000
Israel	ISR	2000	Peru	PER	2000
Italy	ITA	2000	Qatar*	QAT	2014
Japan	JPN	2000	Russia	RUS	2000
Netherlands	NLD	2000	Thailand	THA	2000
Norway	NOR	2000	Turkey	TUR	2000
New Zealand	NZL	2000	Taiwan	TWN	2000
Portugal	PRT	2000	South Africa	ZAF	2000
Singapore	SGP	2000			
Sweden	SWE	2000			
USA	USA	2000			

Table 2.A2. Developed Markets Sample: Average value and rank by factor and composite

Average values and ranks for each country factor and composite in developed markets over the period 2000-2020. The Value composite rank is constructed as an equal combination of P/B and P/E. The Momentum composite rank is constructed as an equal combination of Momentum 12-1 and Momentum 9-1(12 months and 9month price performance respectively excluding most recent month). The Quality composite rank is ROE and the Size composite rank is market capitalization. Further details on factor construction are provided in Section 3 of this paper.

Country	Start Year	Annual Return	P/B	P/E	Mom 121	Mom 31	Mkt Cap (1bn USD)	ROE	Value Cmpst Rank	Momentum Cmpst Rank	Quality Cmpst Rank	Size Cmpst Rank
AUS	2000	10%	2.16	17.5	11%	2%	1,052	12.7	4.5	6.4	6.8	5.1
AUT	2000	8%	1.39	19.6	7%	0%	106	8.6	8.5	5.6	3.5	9.2
BEL	2000	6%	1.94	18.3	5%	-1%	291	12.0	6.5	5.1	6.1	6.9
CAN	2000	8%	2.10	19.3	10%	1%	1,615	11.2	3.9	5.6	5.0	3.4
CHE	2000	6%	2.80	21.3	7%	2%	1,167	13.7	2.3	5.6	7.7	4.8
DEU	2000	5%	1.84	19.2	6%	4%	1,499	10.5	7.1	6.6	5.0	3.8
DNK	2000	11%	2.96	21.0	10%	0%	109	14.3	2.7	5.7	7.0	5.8
ESP	2000	5%	1.92	15.8	5%	2%	939	12.8	7.0	6.1	6.3	5.4
FIN	2000	3%	3.37	21.5	8%	7%	195	15.3	3.4	6.1	7.9	5.4
FRA	2000	5%	1.95	20.6	6%	2%	1,888	10.2	6.1	5.7	4.0	2.9
GBR	2000	3%	2.09	16.0	5%	2%	2,709	13.8	6.7	5.4	7.4	3.7
HKG	2000	8%	1.49	16.8	10%	3%	2,290	9.5	7.8	6.5	3.5	3.0
IRL	2000	1%	2.06	15.2	1%	1%	108	11.0	6.0	4.9	5.9	8.9
ISR	2000	5%	2.05	25.0	6%	3%	160	10.4	5.6	5.8	5.1	8.5
ITA	2000	3%	1.64	19.6	3%	2%	733	9.1	7.0	4.9	3.4	5.1
JPN	2000	2%	1.49	18.0	5%	0%	4,053	6.1	7.0	4.9	1.9	1.7
NLD	2000	5%	2.21	19.3	6%	2%	106	13.4	5.6	5.9	7.1	5.0
NOR	2000	10%	1.75	15.5	10%	0%	208	12.8	8.0	6.3	6.4	8.1
NZL	2000	10%	2.18	20.3	8%	1%	53	11.5	4.8	5.8	5.3	10.0
PRT	2000	2%	1.98	17.0	1%	0%	71	12.1	6.6	4.1	6.2	9.6
SGP	2000	6%	1.62	16.3	10%	2%	481	10.5	8.0	5.6	4.4	6.5
SWE	2000	7%	2.40	19.4	10%	3%	258	13.5	4.4	5.8	7.6	5.2
USA	2000	7%	2.99	21.1	7%	3%	19,517	14.3	2.0	6.5	8.1	1.2

Table 2.A3. Emerging Markets Sample: Average value and rank by factor and composite

Average values and ranks for each country factor and composite in emerging markets over the period 2000-2020. The Value composite rank is constructed as an equal combination of P/B and P/E. The Momentum composite rank is constructed as an equal combination of Momentum 12-1 and Momentum 9-1(12 months and 9month price performance respectively excluding most recent month). The Quality composite rank is ROE and the Size composite rank is market capitalization. Further details on factor construction are provided in Section 3 of this paper.

Country	Start Year	Annual Return	P/B	P/E	Mom121	Mom31	Mkt Cap (1bn USD)	ROE	Value Cmpst Rank	Momentum Cmpst Rank	Quality Cmpst Rank	Size Cmpst Rank
ARE	2014	-2%	1.47	11.6	2%	-7%	224	12.8	8.6	4.4	7.6	6.4
BRA	2000	14%	1.72	13.8	17%	5%	788	13.0	7.7	6.1	5.7	3.7
CHL	2000	7%	1.86	22.1	7%	0%	192	9.0	4.1	5.6	3.0	6.6
CHN	2000	11%	2.00	15.5	13%	3%	4,264	13.5	6.4	6.5	6.6	2.1
COL	2000	18%	1.55	14.9	16%	2%	134	8.5	5.9	6.0	2.7	7.3
CZE	2000	13%	1.63	11.4	12%	-1%	29	11.7	7.2	5.3	4.9	7.2
EGY	2000	13%	2.79	15.0	9%	-4%	68	19.4	5.3	4.6	8.0	8.0
HUN	2000	10%	1.80	12.2	9%	1%	26	15.2	8.1	5.5	7.0	9.5
IDN	2000	14%	3.17	12.3	16%	0%	261	20.5	3.8	5.8	9.1	6.5
IND	2000	12%	3.32	19.6	14%	3%	1,299	17.0	2.3	6.5	9.1	3.3
KOR	2000	10%	1.27	12.1	11%	3%	883	10.8	9.5	5.8	4.2	3.8
MEX	2000	8%	2.56	18.5	11%	2%	329	14.3	3.0	5.9	7.0	5.3
MYS	2000	6%	1.91	22.7	8%	2%	308	11.0	5.0	5.6	4.5	5.2
PER	2000	21%	2.79	16.9	18%	2%	59	17.6	4.3	6.6	7.4	9.4
QAT	2014	-4%	1.90	14.1	-1%	-4%	150	13.4	6.4	5.0	8.2	7.4
RUS	2000	17%	1.25	1.9	26%	3%	669	13.9	9.5	6.2	6.3	4.6
THA	2000	14%	2.07	11.7	12%	1%	260	12.3	6.3	6.2	7.3	6.4
TUR	2000	6%	2.16	17.0	14%	6%	171	15.7	7.8	5.5	7.8	6.9
TWN	2000	5%	1.96	20.0	6%	1%	1,563	11.0	5.6	4.9	4.8	3.1
ZAF	2000	7%	2.47	16.4	10%	3%	697	15.4	4.0	6.5	8.0	4.0

Table 2.A4. Developed Markets Sample: Average value and rank by factor and composite

Average scores and ranks for each ESG factor (ESG: overall ESG, E: Environmental; S: Social; G: Governance) as well as the Economics factor (Econ) for developed markets over the period 2000-2020. A higher score/rank indicates better ESG performance.

Country	Start Year	ESG Score	E Score	S Score	G Score	ESG Rank	E Rank	S Rank	G Rank	Econ Score	Econ Rank
AUS	2000	7.0	5.1	7.2	8.6	4.6	2.0	5.0	8.6	7.1	3.5
AUT	2000	7.6	7.0	7.5	8.2	8.3	8.7	7.4	6.8	7.7	7.8
BEL	2000	7.1	6.2	7.4	7.7	5.5	6.1	6.5	4.2	7.4	5.0
CAN	2000	7.1	5.3	7.2	8.9	5.2	2.6	4.6	9.4	7.5	5.2
CHE	2000	7.8	7.6	7.5	8.3	9.5	10.0	6.9	7.6	8.4	9.9
DEU	2000	7.2	6.3	7.4	7.9	6.3	6.6	6.0	5.1	7.8	8.3
DNK	2000	7.8	6.9	7.8	8.8	9.4	8.8	9.7	9.6	8.1	8.6
ESP	2000	6.7	5.9	6.9	7.3	3.1	4.7	3.4	2.7	7.2	3.5
FIN	2000	7.4	6.5	7.6	8.2	7.6	7.5	7.9	6.8	7.7	7.4
FRA	2000	7.2	6.7	7.2	7.6	5.9	7.8	5.2	3.7	7.6	6.0
GBR	2000	7.2	6.3	7.0	8.1	5.5	6.6	3.6	5.3	7.5	5.4
HKG	2000	6.7	5.4	7.2	7.5	3.6	2.6	5.5	4.1	7.4	5.0
IRL	2000	7.2	6.2	7.3	8.1	6.1	6.3	5.1	6.4	7.5	6.5
ISR	2000	5.7	5.2	6.0	5.9	1.0	2.6	1.5	1.1	6.9	2.8
ITA	2000	6.5	5.8	6.8	7.0	2.6	4.5	3.7	1.9	7.1	3.4
JPN	2000	7.0	5.5	7.8	7.8	5.2	4.0	7.0	5.5	7.5	6.2
NLD	2000	7.2	5.9	7.6	8.2	6.7	4.8	8.8	6.6	7.5	6.1
NOR	2000	8.0	7.2	7.9	9.0	10.0	8.9	9.1	9.5	7.2	5.3
NZL	2000	7.5	6.6	7.3	8.6	7.9	6.7	5.4	8.8	7.5	6.2
PRT	2000	6.7	5.8	7.0	7.4	3.2	4.4	3.7	3.3	6.9	2.4
SGP	2000	6.5	5.2	6.9	7.5	2.6	2.7	4.6	3.4	6.9	2.5
SWE	2000	7.8	7.2	7.7	8.4	9.8	9.6	9.0	8.2	8.2	9.9
USA	2000	6.2	5.1	6.3	7.1	1.4	2.5	1.3	2.3	7.3	4.1

Table 2.A5. Emerging Markets Sample: Average value and rank by factor and composite

Average scores and ranks for each ESG factor (ESG: overall ESG, E: Environmental; S: Social; G: Governance) as well as the Economics factor (Econ) for emerging markets over the period 2000-2020. A higher score/rank indicates better ESG performance.

Country	Start Year	ESG Score	E Score	S Score	G Score	ESG Rank	E Rank	S Rank	G Rank	Econ Score	Econ Rank
ARE	2014	5.6	4.9	5.0	6.9	6.9	6.1	6.0	7.5	5.1	2.8
BRA	2000	5.1	5.3	4.7	5.4	5.3	7.5	4.6	3.8	6.1	5.1
CHL	2000	6.0	5.5	5.7	6.9	8.0	8.2	6.8	7.2	6.4	7.3
CHN	2000	4.7	3.6	4.6	5.9	3.5	1.6	4.4	5.1	6.5	7.4
COL	2000	4.7	5.2	4.5	4.4	3.8	7.1	3.6	3.0	5.3	2.6
CZE	2000	6.6	6.1	6.4	7.4	9.8	9.1	8.8	8.8	7.5	9.8
EGY	2000	4.6	5.1	3.8	4.9	3.1	7.0	1.3	3.3	5.0	2.0
HUN	2000	6.3	5.8	6.0	7.2	8.8	8.7	7.6	8.2	7.1	8.5
IDN	2000	4.8	3.7	4.8	5.8	4.2	2.2	5.3	4.9	5.4	2.9
IND	2000	4.2	3.8	4.4	4.3	1.7	2.9	3.2	1.7	5.5	3.2
KOR	2000	6.4	5.0	7.3	7.2	9.3	6.9	9.9	8.0	7.1	8.0
MEX	2000	5.0	4.4	4.2	6.3	4.5	4.0	2.4	6.0	6.2	5.2
MYS	2000	5.7	4.4	5.3	7.5	7.5	5.0	7.1	8.5	6.5	7.3
PER	2000	5.3	5.3	4.8	5.8	6.1	7.2	5.0	4.7	5.9	4.5
QAT	2014	5.5	4.4	5.3	6.9	5.7	4.9	6.0	7.3	5.2	4.1
RUS	2000	4.6	4.4	4.9	4.3	2.9	4.1	5.3	2.8	5.5	3.6
THA	2000	4.7	4.6	5.1	4.5	3.5	5.1	6.7	2.4	6.2	5.7
TUR	2000	4.7	4.8	4.2	5.0	3.3	6.0	2.1	2.9	6.0	4.6
TWN	2000	6.2	4.0	7.2	7.4	8.0	2.7	9.8	8.2	7.3	9.2
ZAF	2000	5.0	4.1	4.7	6.2	4.3	3.8	4.3	6.0	6.1	6.0

Table 2.A6. Verisk Maplecroft Dataset: Environmental, Social, Governance Indices

List of individual indices that make up the Environmental, Social, and Governance components including start years of data.

Factor Code	Factor Description	ESG Component	Verisk Maplecroft Subgroup	Start Date
E_1	Climate Change Adaptive Capacity	Environment	Climate Change Vulnerability	2013
E_2	Climate Change Exposure	Environment	Climate Change Vulnerability	2013
E_3	Climate Change Sensitivity	Environment	Climate Change Vulnerability	2013
E_4	Climate Change Vulnerability	Environment	Climate Change Vulnerability	2013
E_5	Climate Model Uncertainty	Environment	Climate Change Vulnerability	2013
E_6	Cooling Degree Days (current climate)	Environment	Climate Change Vulnerability	2013
E_7	Cooling Degree Days (future climate)	Environment	Climate Change Vulnerability	2013
E_8	Heat Stress (current climate)	Environment	Climate Change Vulnerability	2013
E_9	Heat Stress (future climate)	Environment	Climate Change Vulnerability	2013
E_10	Heating Degree Days (current climate)	Environment	Climate Change Vulnerability	2013
E_11	Heating Degree Days (future climate)	Environment	Climate Change Vulnerability	2013
E_12	Environmental Pressure	Environment	Ecosystem Services	1995
E_13	Air Quality	Environment	Ecosystem Services	2013
E_14	Deforestation	Environment	Ecosystem Services	2014
E_15	Water Stress	Environment	Ecosystem Services	2000
E_16	Water Quality	Environment	Ecosystem Services	2006
E_17	Total GHG Emissions	Environment	Emissions and Waste	2011
E_18	CO2 Emissions from Land Use Change and Forestry	Environment	Emissions and Waste	2000
E_19	Waste Management	Environment	Emissions and Waste	2000
E_20	CO2 Emissions from Energy Use	Environment	Emissions and Waste	2002
E_21	Drought Hazard	Environment	Hazard Risk	2012
E_22	Extra-tropical Cyclone Hazard	Environment	Hazard Risk	2012
E_23	Flood Hazard	Environment	Hazard Risk	2012
E_24	Seismic Hazard	Environment	Hazard Risk	2012
E_25	Severe Storm Hazard	Environment	Hazard Risk	2012
E_26	Tropical Storm and Cyclone Hazard	Environment	Hazard Risk	2012
E_27	Tsunami Hazard	Environment	Hazard Risk	2012
E_28	Volcanic Hazard	Environment	Hazard Risk	2012
E_29	Wildfire Hazard (historical)	Environment	Hazard Risk	2012
E_30	Environmental Regulatory Framework	Environment	Societal Response	2013
E_31	Low Carbon Economy	Environment	Societal Response	2000
E_32	Natural Hazards - Vulnerability	Environment	Vulnerability to Natural Hazards	2014
S_1	Access to Remedy Risk	Social	Access to Remedy	2015
S_2	Freedom of Opinion and Expression	Social	Civil and Political Rights	2009
S_3	Indigenous Peoples' Rights	Social	Civil and Political Rights	2009
S_4	Minority Rights	Social	Civil and Political Rights	2009
S_5	Women's and Girls' Rights	Social	Civil and Political Rights	2010
S_6	Freedom of Assembly	Social	Civil and Political Rights	2015
S_7	Right to Privacy	Social	Civil and Political Rights	2015
S_8	Sexual Minorities	Social	Civil and Political Rights	2015
S_9	Obesity Risk	Social	Health Threats	2000
S_10	Pandemic Susceptibility	Social	Health Threats	2012
S_11	Pandemic Transmission	Social	Health Threats	2012
S_12	Education	Social	Human Development	2000

S_13	Healthcare Capacity	Social	Human Development	2002
S_14	Arbitrary Arrest and Detention	Social	Human Security	2009
S_15	Extrajudicial or Unlawful Killings	Social	Human Security	2009
S_16	Kidnappings	Social	Human Security	2009
S_17	Security Forces and Human Rights	Social	Human Security	2009
S_18	Torture and other Ill-Treatment	Social	Human Security	2009
S_19	Child Labour	Social	Labour Rights and Protection	2009
S_20	Forced Labour	Social	Labour Rights and Protection	2009
S_21	Freedom of Association and Collective Bargaining	Social	Labour Rights and Protection	2009
S_22	Trafficking in Persons	Social	Labour Rights and Protection	2009
S_23	Decent Wages	Social	Labour Rights and Protection	2012
S_24	Decent Working Time	Social	Labour Rights and Protection	2012
S_25	Discrimination in the Workplace	Social	Labour Rights and Protection	2012
S_26	Occupational Health and Safety	Social	Labour Rights and Protection	2015
S_27	Human Capital	Social	Workforce	2000
G_1	Political Violence	Governance	Conflict and Instability	2012
G_2	Civil Unrest	Governance	Conflict and Instability	2015
G_3	Conflict Intensity	Governance	Conflict and Instability	2015
G_4	Food Security	Governance	Energy, Food and Water Security	2009
G_5	Resource Security	Governance	Energy, Food and Water Security	2013
G_6	Food Import Security	Governance	Energy, Food and Water Security	2015
G_7	Water Import Security	Governance	Energy, Food and Water Security	2015
G_8	Energy Security	Governance	Energy, Food and Water Security	1997
G_9	Water Security	Governance	Energy, Food and Water Security	2000
G_10	Corruption	Governance	Governance Environment	2009
G_11	Democratic Governance	Governance	Governance Environment	2009
G_12	Judicial Effectiveness	Governance	Governance Environment	2009
G_13	Judicial Independence	Governance	Governance Environment	2009
G_14	Governance	Governance	Governance Environment	2012
G_15	Political Risk	Governance	Governance Environment	2012
G_16	Resource Nationalism	Governance	Governance Environment	2012
G_17	Rule of Law	Governance	Governance Environment	2012
G_18	Government Effectiveness	Governance	Governance Environment	1997
G_19	Efficacy of Corporate Boards	Governance	Regulatory Environment	2008
G_20	Ethical Behaviour of Firms	Governance	Regulatory Environment	2008
G_21	Strength of Auditing and Reporting Standards	Governance	Regulatory Environment	2008
G_22	Contract Enforcement Process	Governance	Regulatory Environment	2009
G_23	Corporate Governance	Governance	Regulatory Environment	2009
G_24	Regulatory Framework	Governance	Regulatory Environment	2009
G_25	Efficacy of the Regulatory System	Governance	Regulatory Environment	2010
G_26	Investor Protection	Governance	Regulatory Environment	2010
G_27	Regulatory Burden: Cost	Governance	Regulatory Environment	2010
G_28	Regulatory Burden: Number of Procedures	Governance	Regulatory Environment	2010
G_29	Regulatory Burden: Time	Governance	Regulatory Environment	2010
G_30	Transfer and Convertibility	Governance	Regulatory Environment	2011
G_31	Regulation	Governance	Regulatory Environment	2012
G_32	Respect for Property Rights	Governance	Regulatory Environment	2012
G_33	Trade Sanctions	Governance	Regulatory Environment	2014

Table 2.A7. Verisk Maplecroft Dataset: Economic Indices

List of individual indices that make up the Economics control variable including start years of data.

Factor Code	Factor Description	Composite	Verisk Maplecroft Subgroup	Start Date
N_1	Foreign Direct Investment	Economics	Access to Foreign Capital	2010
N_2	Foreign Portfolio Investment	Economics	Access to Foreign Capital	2010
N_3	International Investment Position	Economics	Access to Foreign Capital	2010
N_4	Dependence on Commodity Exports	Economics	Commodity Exports	2000
N_5	Barriers to Entry	Economics	Costs of Doing Business	2015
N_6	Labour Costs	Economics	Costs of Doing Business	2015
N_7	Tax Burden	Economics	Costs of Doing Business	2015
N_8	Economic Growth	Economics	Domestic Economy	2010
N_9	External Balance	Economics	Domestic Economy	2010
N_10	Inflation	Economics	Domestic Economy	2010
N_11	Investment	Economics	Domestic Economy	2010
N_12	Business Access to Finance	Economics	Domestic Financial Sector	2015
N_13	Foreign Debt	Economics	External Debt Burden	2010
N_14	Import Cover	Economics	External Debt Burden	2010
N_15	Reserve Adequacy	Economics	External Debt Burden	2010
N_16	Borrowing Costs	Economics	Government Finances	2010
N_17	Fiscal Balance	Economics	Government Finances	2010
N_18	Public Debt	Economics	Government Finances	2010
N_19	Transport Infrastructure	Economics	Market Access	2013
N_20	Logistics	Economics	Market Access	2014
N_21	Digital Inclusion	Economics	Market Access	2001
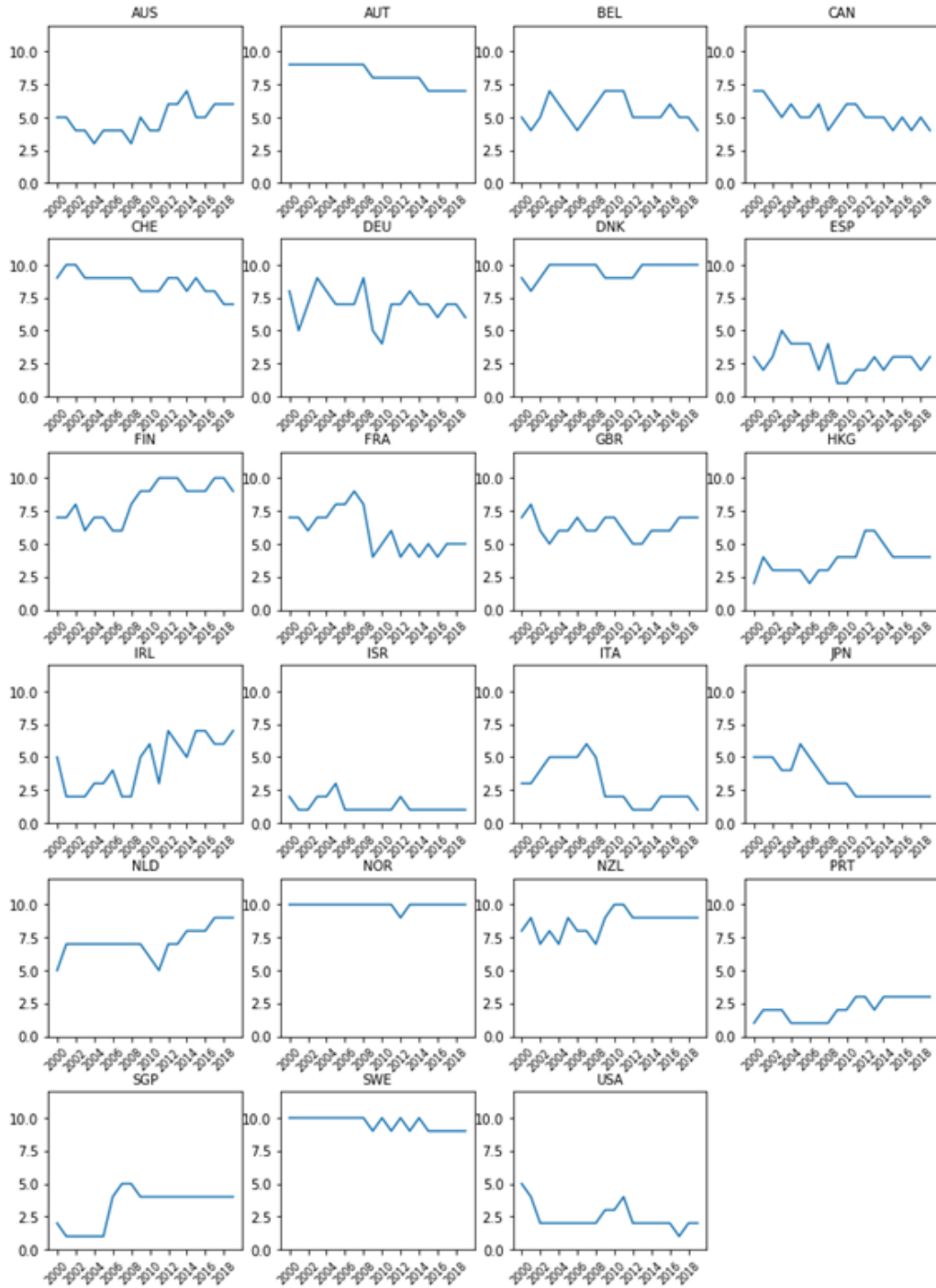
Figure 2.A1. Time-series of ESG factor ranks in Developed Markets (2000-2020)

ESG factor ranks for developed markets countries displayed from 2000-2020. Ranks range from 1-10 with higher ranks representing better ESG performance.
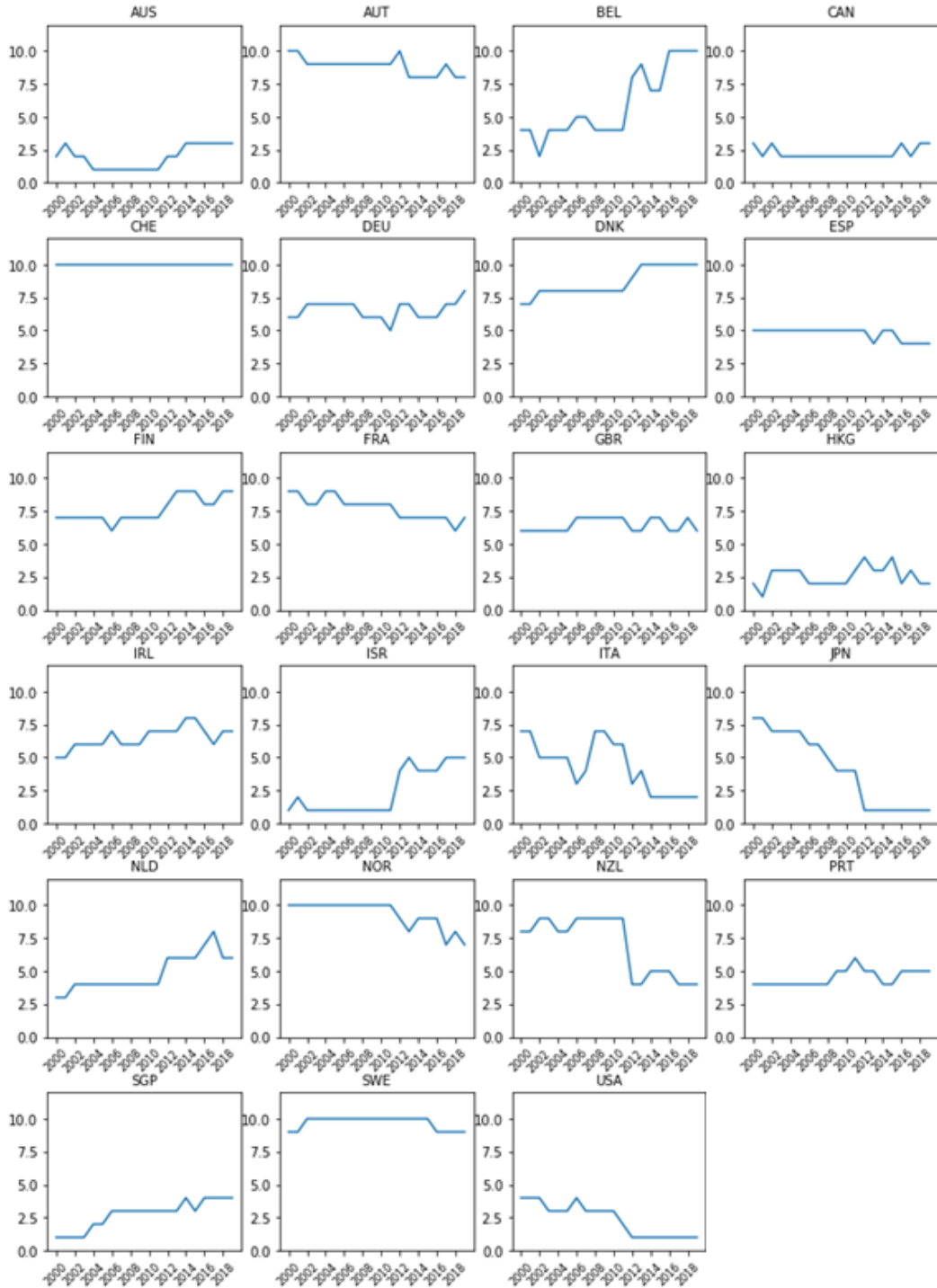
Figure 2.A2. Time-series of Environmental factor ranks in Developed Markets (2000-2020)

Environmental factor ranks for developed markets countries displayed from 2000-2020. Ranks range from 1-10 with higher ranks representing better Environmental performance.
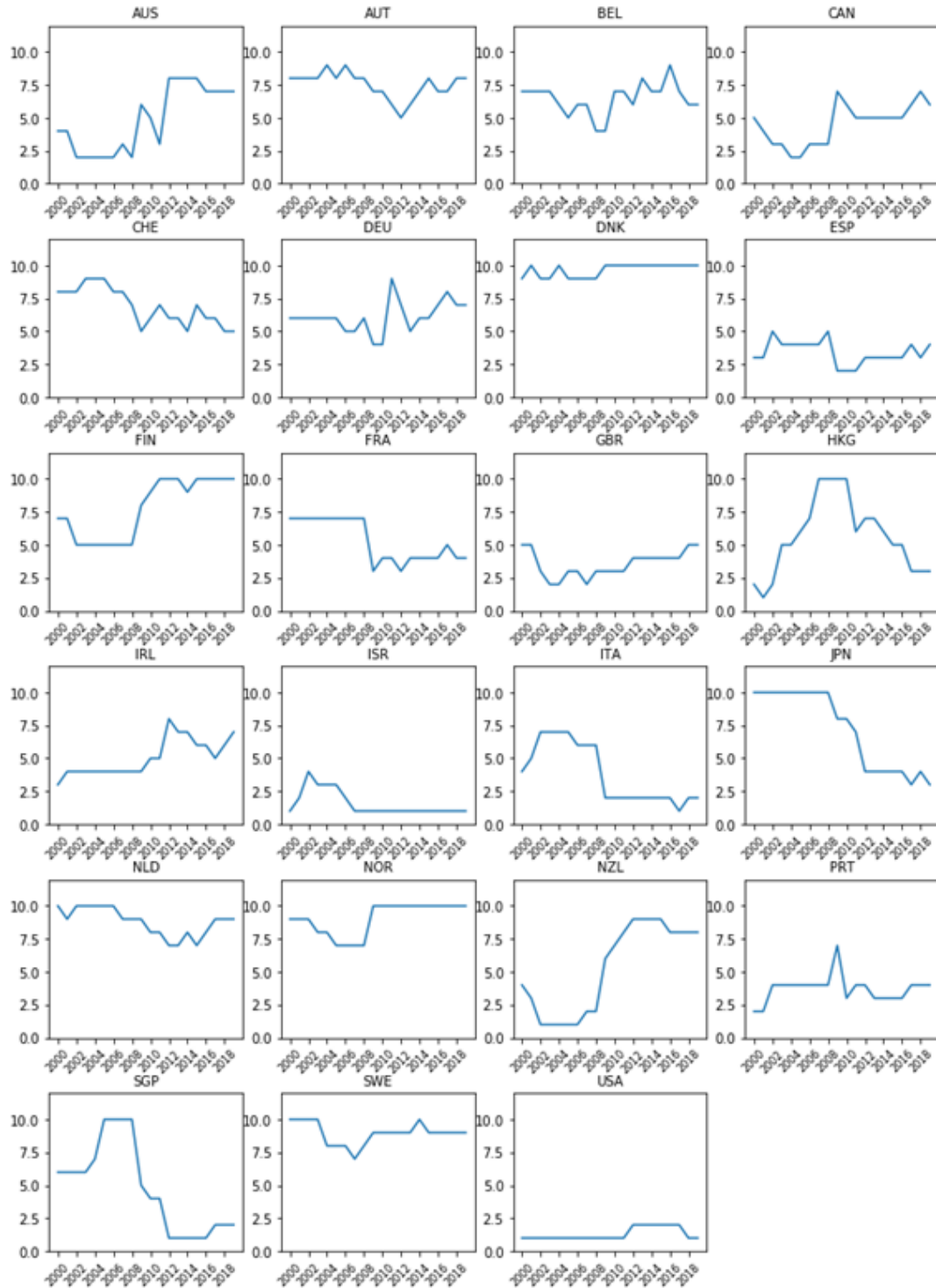
Figure 2.A3. Time-series of Social factor ranks in Developed Markets (2000-2020)

Social factor ranks for developed markets countries displayed from 2000-2020. Ranks range from 1-10 with higher ranks representing better Social performance.
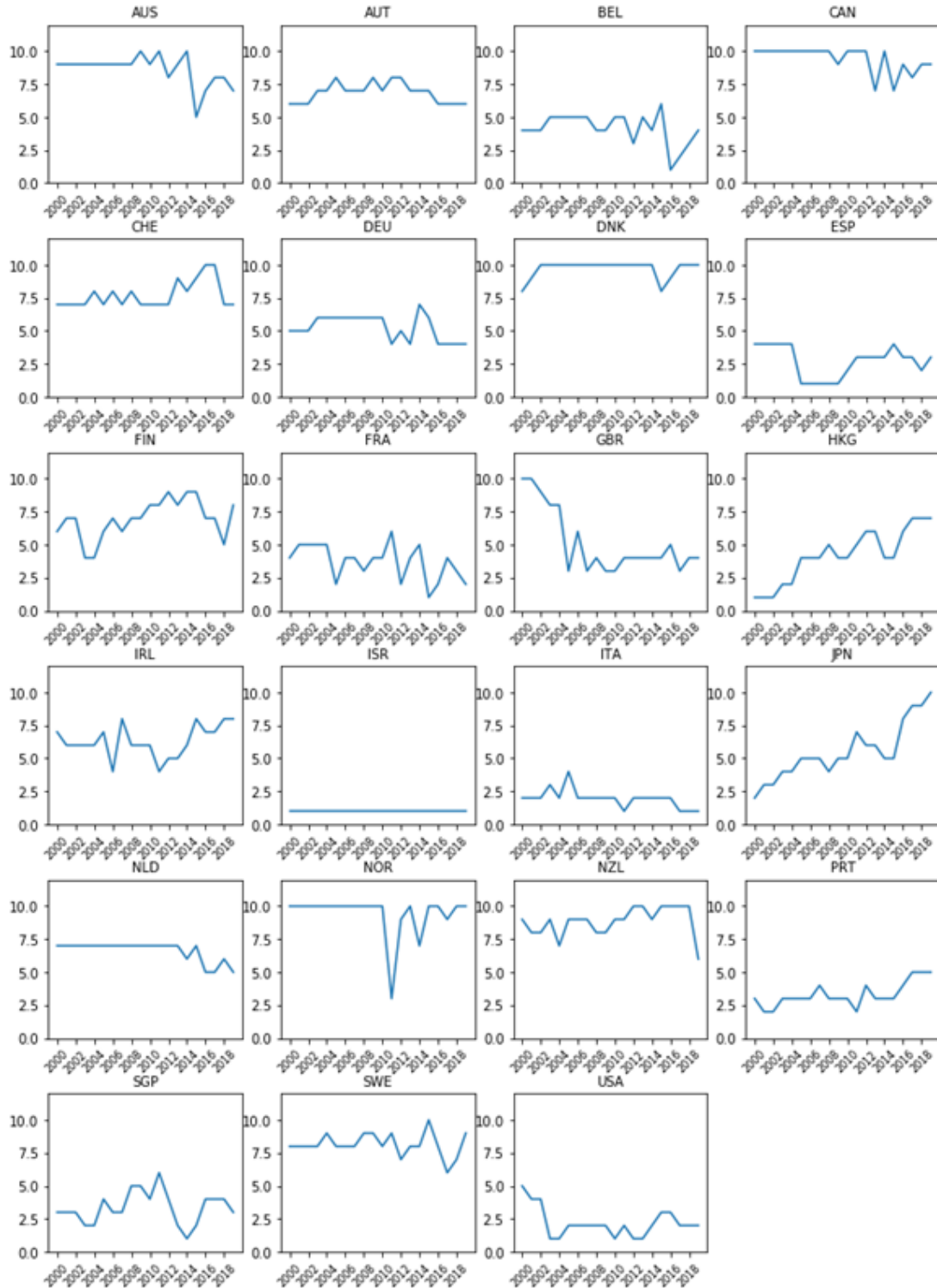
Figure 2.A4. Time-series of Governance factor ranks in Developed Markets (2000-2020)

Governance factor ranks for developed markets countries displayed from 2000-2020. Ranks range from 1-10 with higher ranks representing better Governance performance.
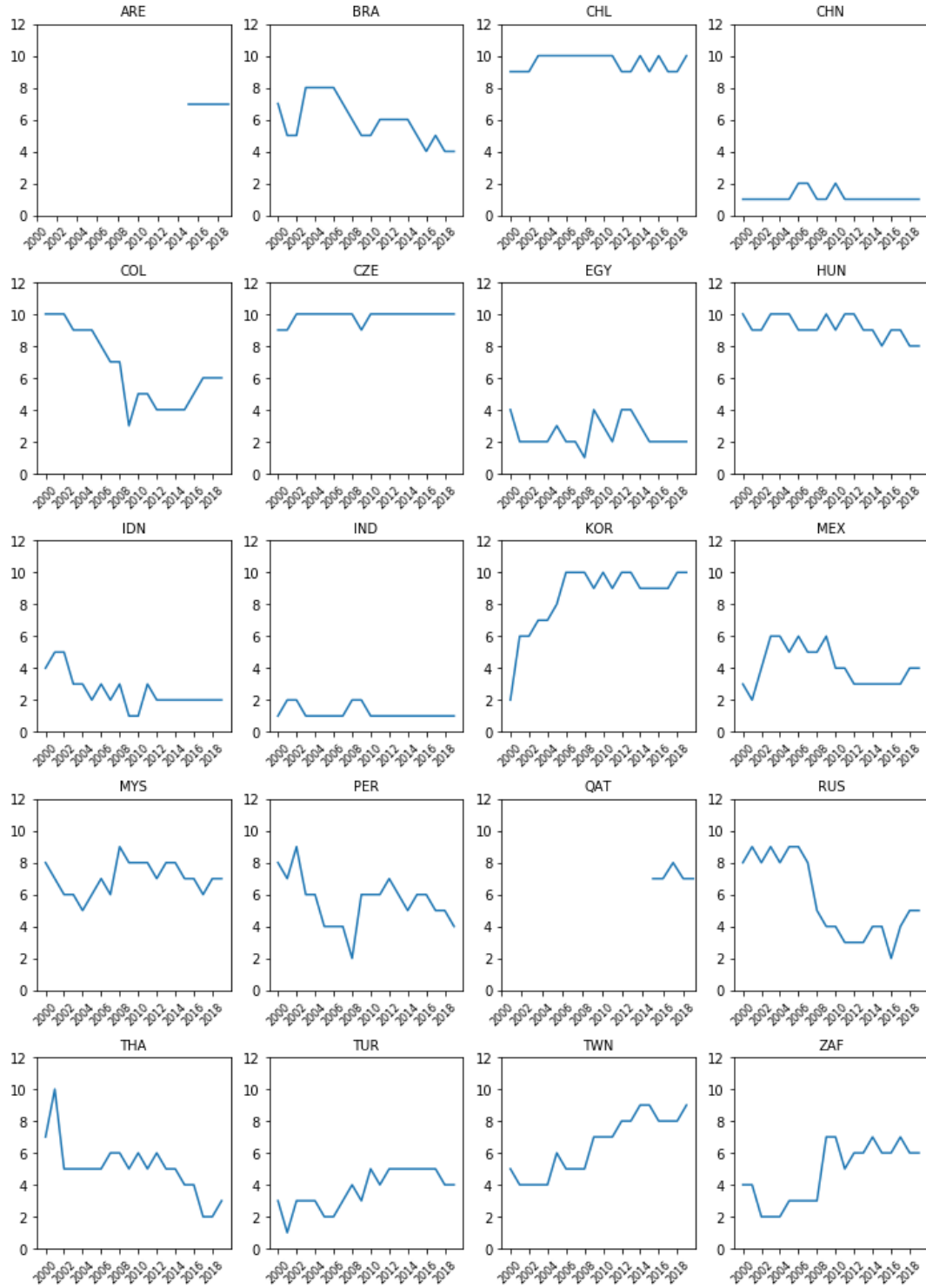
Figure 2.A1. Time-series of ESG factor ranks in Emerging Markets (2000-2020)

ESG factor ranks for emerging markets countries displayed from 2000-2020. Ranks range from 1-10 with higher ranks representing better ESG performance.
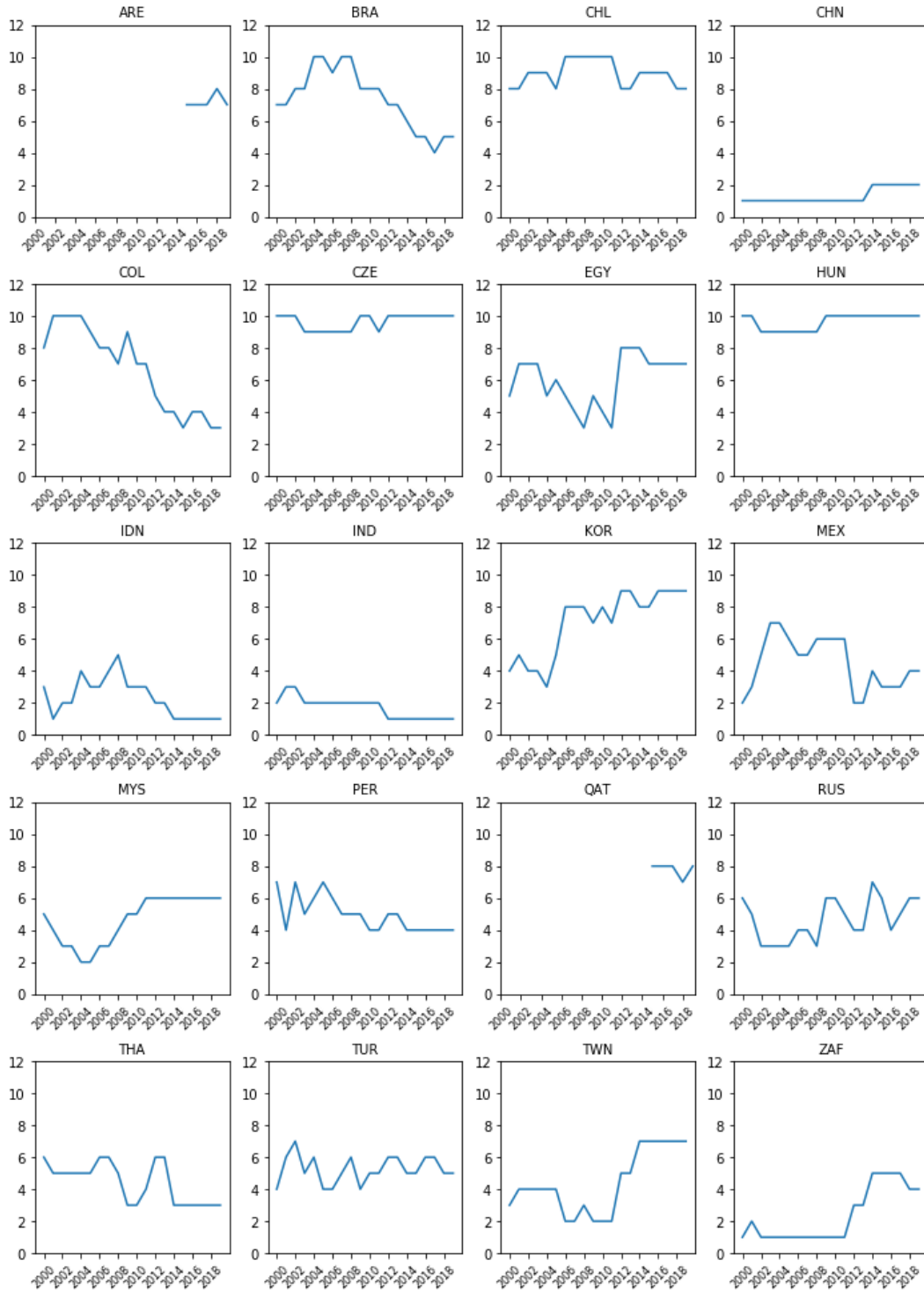
Figure 2.A6. Time-series of Environmental factor ranks in Emerging Markets (2000-2020)

Environmental factor ranks for emerging markets countries displayed from 2000-2020. Ranks range from 1-10 with higher ranks representing better Environmental performance.
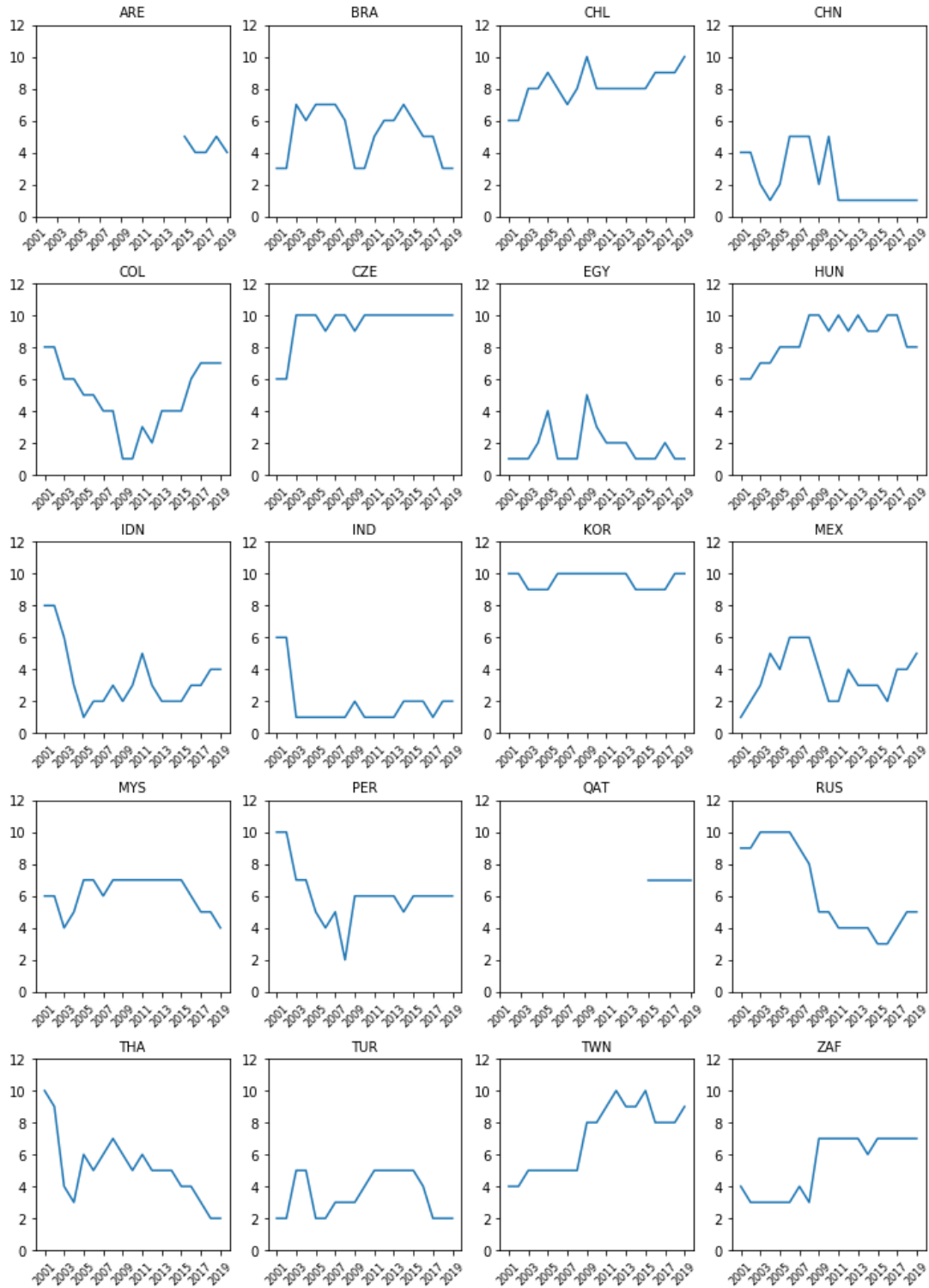
Figure 2.A7. Time-series of Social factor ranks in Emerging Markets (2000-2020)

Social factor ranks for emerging markets countries displayed from 2000-2020. Ranks range from 1-10 with higher ranks representing better Environmental performance.
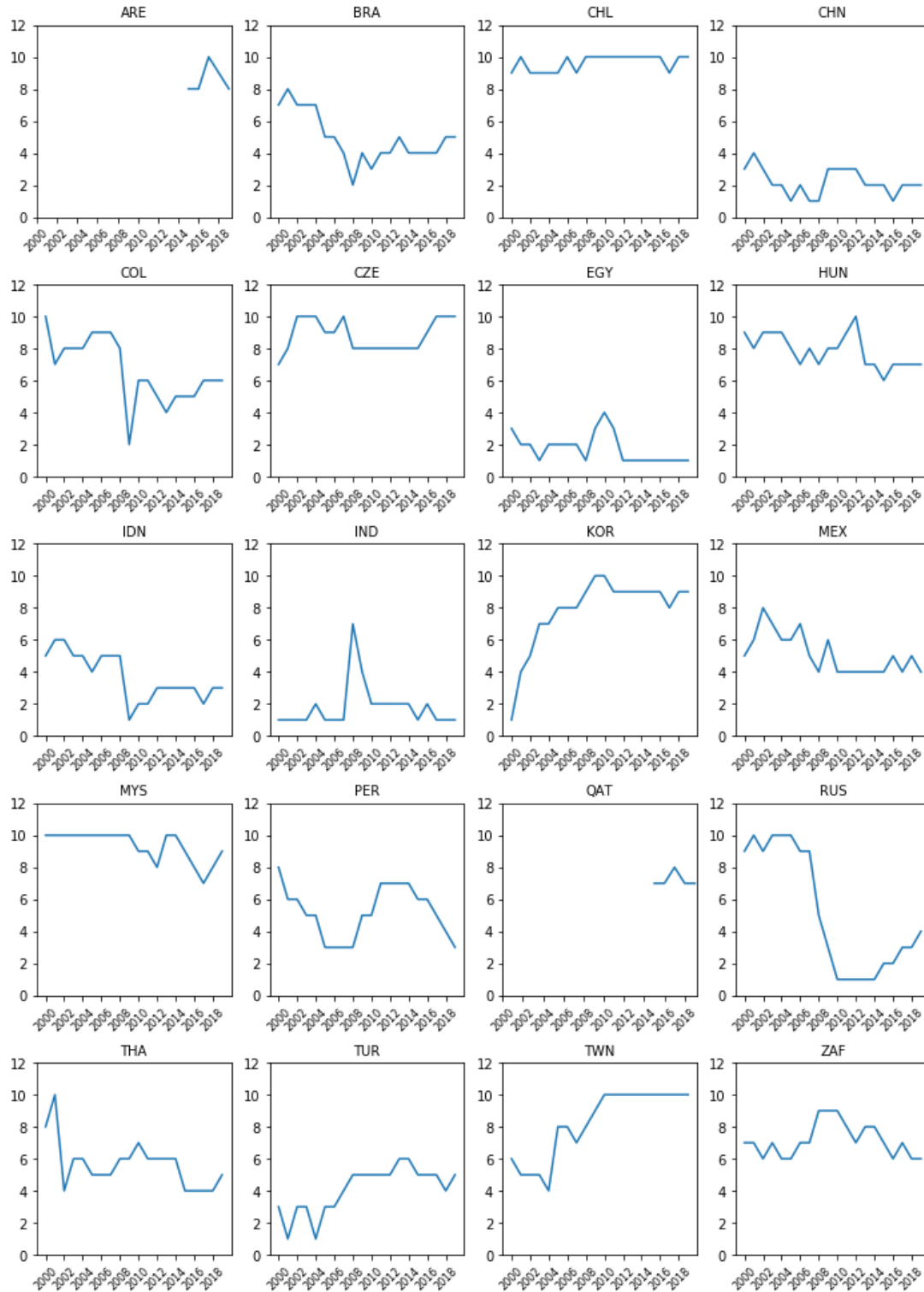
Figure 2.A8. Time-series of Governance factor ranks in Emerging Markets (2000-2020)

Governance factor ranks for emerging markets countries displayed from 2000-2020. Ranks range from 1-10 with higher ranks representing better Environmental performance.
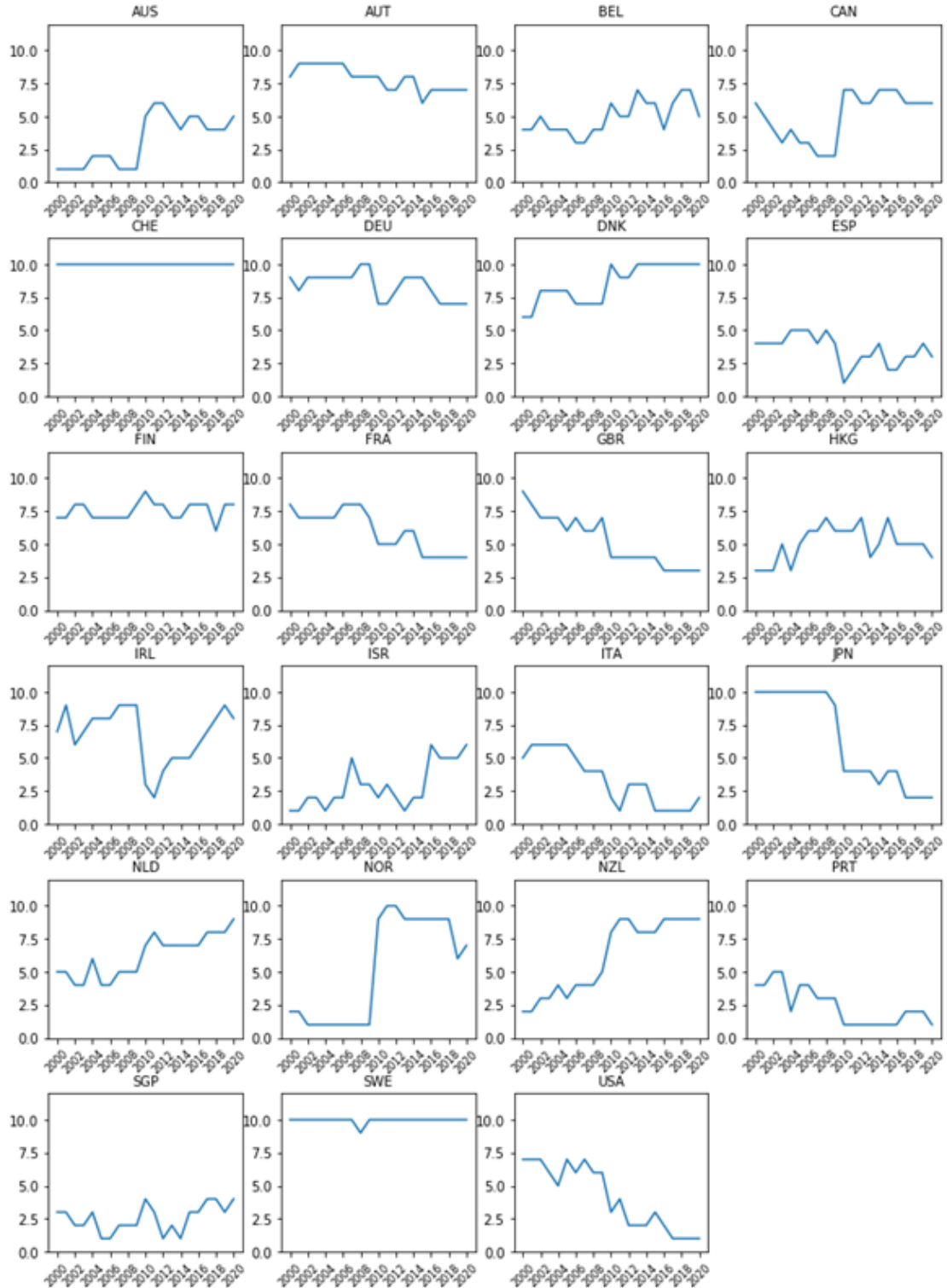
Figure 2.A9. Time-series of Economics factor ranks in Developed Markets (2000-2020)

Economics factor ranks for developed markets countries displayed from 2000-2020. Ranks range from 1-10 with higher ranks representing better economic performance.
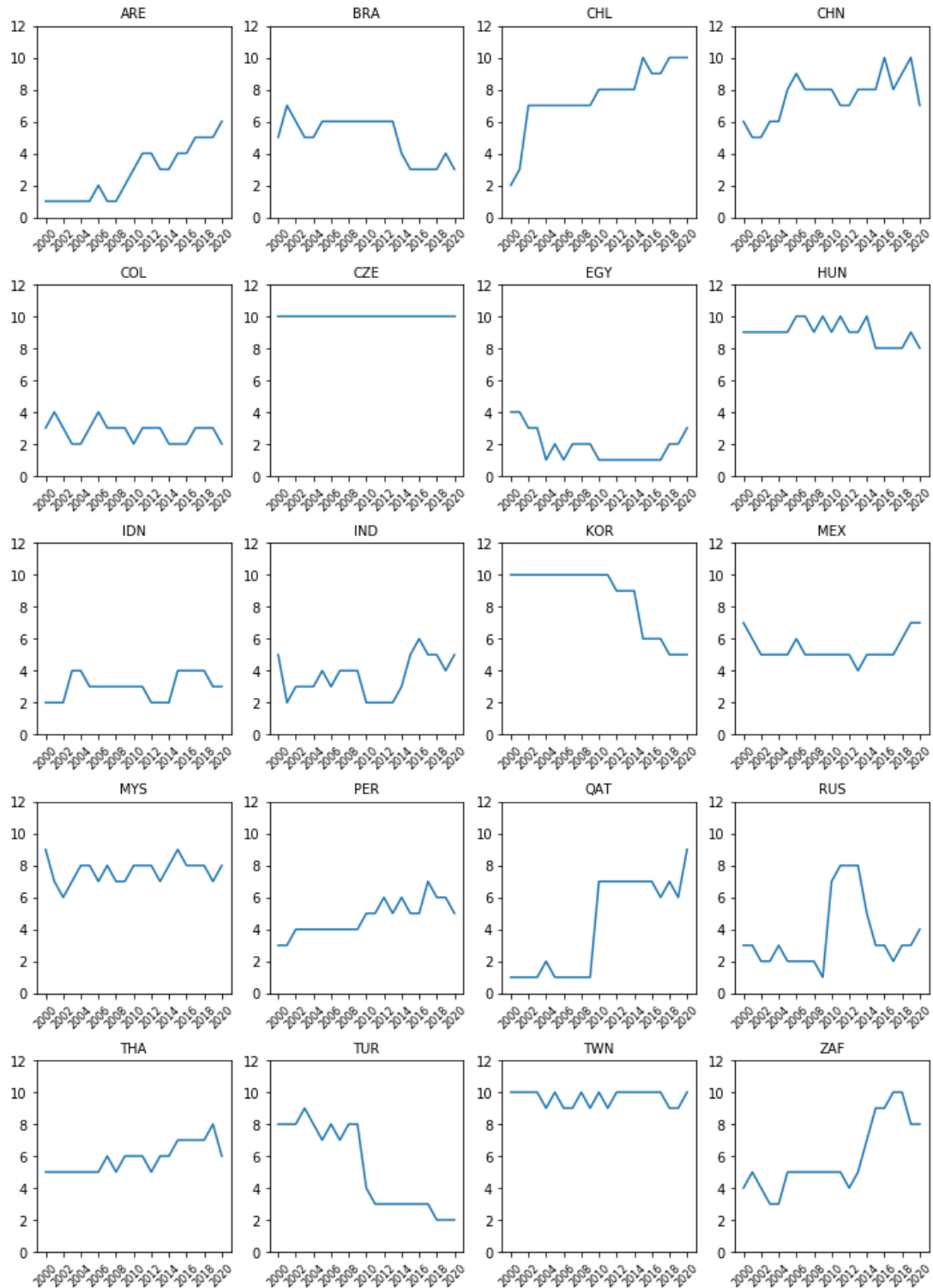
Figure 2.A10. Time-series of Economics factor ranks in Emerging Markets (2000-2020)

Economics factor ranks for emerging markets countries displayed from 2000-2020. Ranks range from 1-10 with higher ranks representing better economic performance.
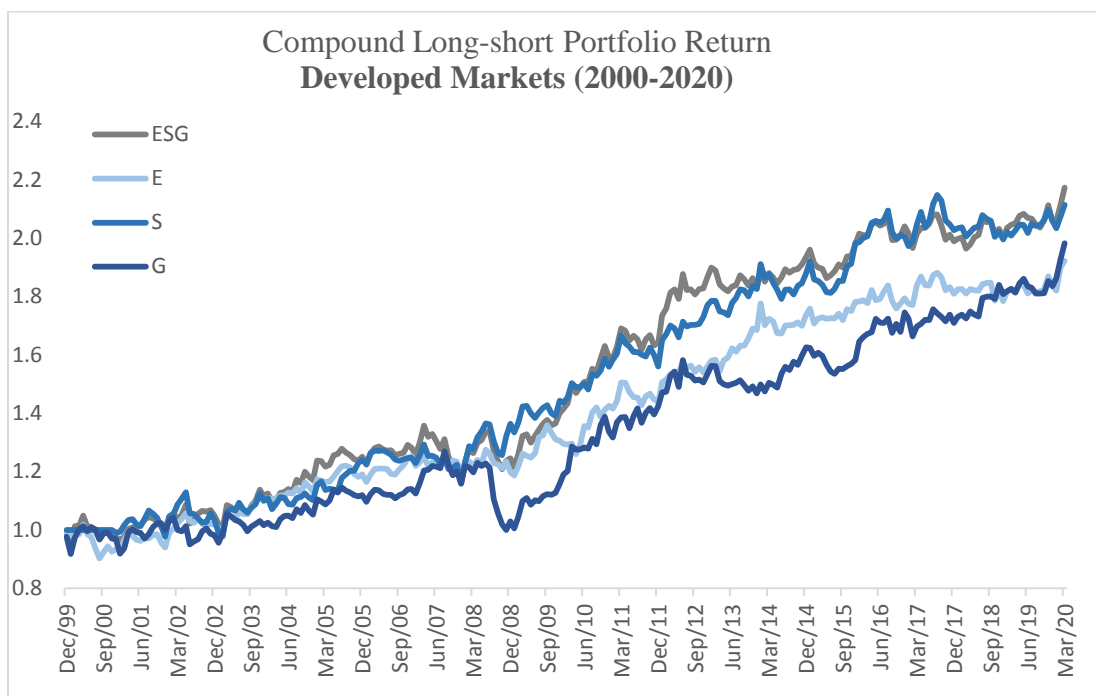
Figure 2.A11. Developed Markets Sample: ESG Factor long-short portfolio compound returns

Developed Markets Sample: Time-series of compound monthly returns of long-short ESG, E, S and G factor portfolios, from 2000-2020.
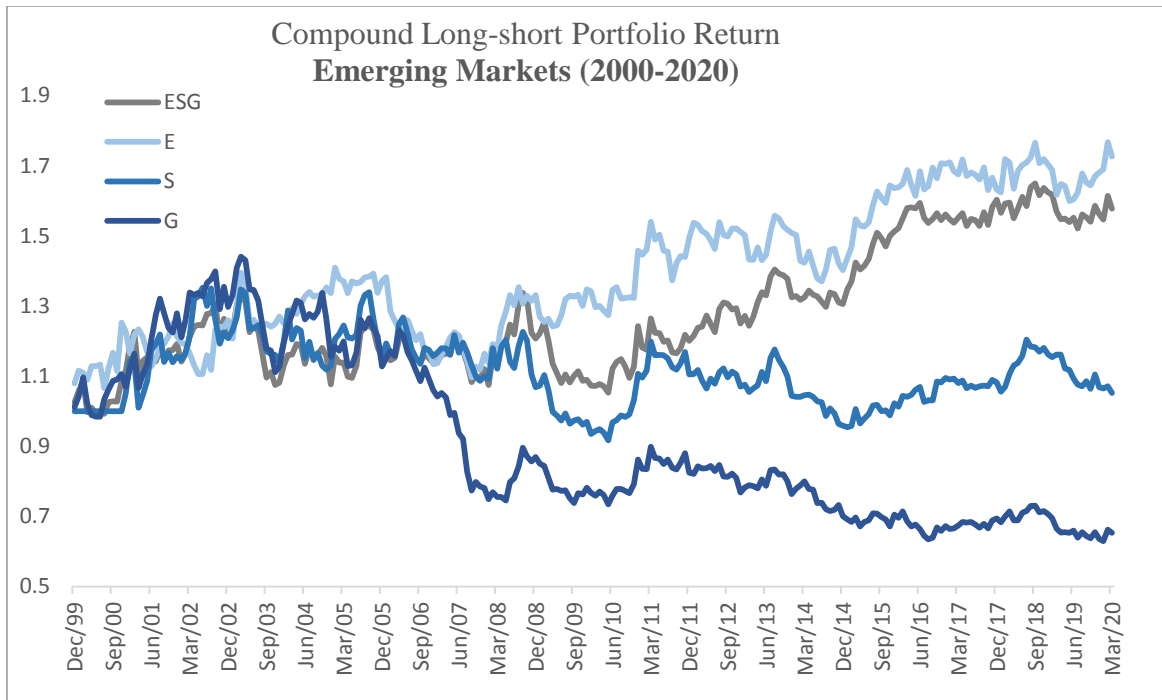
Figure 2.A12. Emerging Markets Sample: ESG Factor long-short portfolio compound returns

Emerging Markets Sample: Time-series of compound monthly returns of long-short ESG, E, S and G factor portfolios, from 2000-2020.
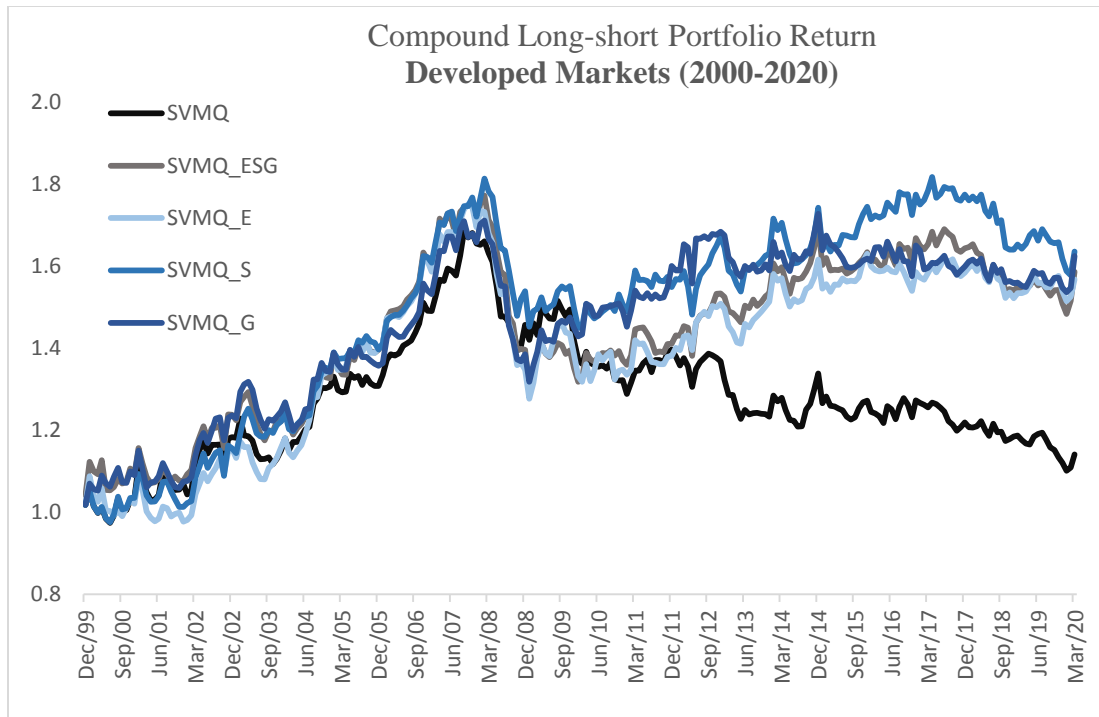
Figure 2.A13. Developed Markets Sample: ESG Factor long-short portfolio compound returns

Developed Markets Sample: Time-series of compound monthly returns of long-short country-selection strategies. SVMQ represents a standard country-selection strategy including Size, Value, Momentum and Quality factors. SVMQ_ESG represents the ESG-integrated country-selection strategy using the overall ESG factor. SVMQ_E, SVMQ_S and SVMQ_G represent the ESG-integrated strategies using the components Environmental, Social and Governance, respectively. Compound returns are shown from 2000-2020.
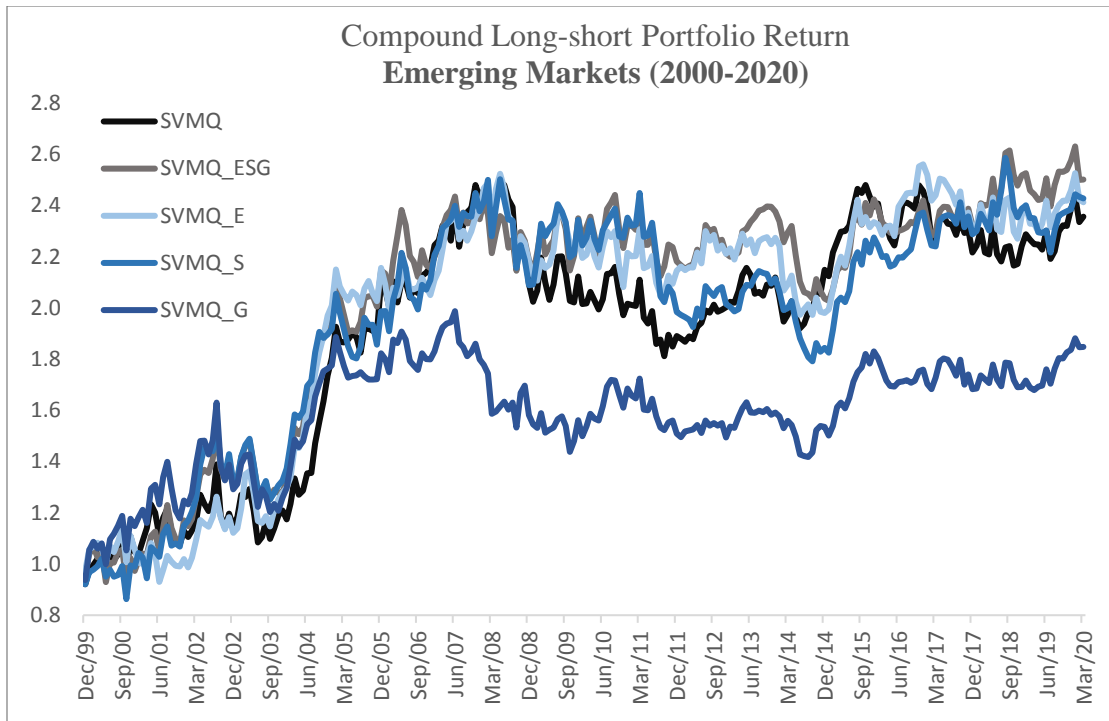
Figure 2.A14. Emerging Markets Sample: ESG Factor long-short portfolio compound returns

Emerging Markets Sample: Time-series of compound monthly returns of long-short country-selection strategies. SVMQ represents a standard country-selection strategy including Size, Value, Momentum and Quality factors. SVMQ_ESG represents the ESG-integrated country-selection strategy using the overall ESG factor. SVMQ_E, SVMQ_S and SVMQ_G represent the ESG-integrated strategies using the components Environmental, Social and Governance, respectively. Compound returns are shown from 2000-2020.

Table 2.A9. Countries in the Developed Markets (DM) and Emerging Markets (EM Sample)

List of all countries included in the analysis in respective sample including start years used for the analysis in Section 7 which includes firm-level ESG data. The shorter history is due to the availability of firm-level ESG data from 2012 onwards.

Developed Markets				Emerging Markets			
Country	Country Code	Start Year	End Year	Country	Country Code	Start Year	End Year
Australia	AUS	2000	2020	United Arab Emirates	ARE	2014	2020
Austria	AUT	2000	2020	Brazil	BRA	2000	2020
Belgium	BEL	2000	2020	Chile	CHL	2000	2020
Canada	CAN	2000	2020	China	CHN	2000	2020
Switzerland	CHE	2000	2020	Indonesia	IDN	2000	2020
Germany	DEU	2000	2020	India	IND	2000	2020
Denmark	DNK	2000	2020	Korea	KOR	2000	2020
Spain	ESP	2000	2020	Mexico	MEX	2000	2020
Finland	FIN	2000	2020	Malaysia	MYS	2000	2020
France	FRA	2000	2020	Qatar	QAT	2014	2020
United Kingdom	GBR	2000	2020	Russia	RUS	2000	2020
Hong Kong	HKG	2000	2020	Thailand	THA	2000	2020
Ireland	IRL	2000	2020	Turkey	TUR	2000	2020
Israel	ISR	2000	2020	Taiwan	TWN	2000	2020
Italy	ITA	2000	2020	South Africa	ZAF	2000	2020
Japan	JPN	2000	2020				
Netherlands	NLD	2000	2020				
Norway	NOR	2000	2020				
New Zealand	NZL	2000	2020				
Portugal	PRT	2000	2020				
Singapore	SGP	2000	2020				
Sweden	SWE	2000	2020				
USA	USA	2000	2020				

Table 2.A10. Developed Markets Sample: Average rank by factor for country and firm-level ESG factors

Average rank for country-level and firm-level ESG factors including firm-level ESG momentum factors in developed markets over the period 2012-2020. Data used for analysts in Section 7.

Country	Macro ESG	Macro E	Macro S	Macro G	Micro ESG	Micro E	Micro S	Micro G	Micro ESG Mom	Micro E Mom	Micro S Mom	Micro G Mom
AUS	5.9	4.3	4.8	4.3	9.2	6.0	9.3	9.2	5.9	5.3	6.1	5.5
AUT	7.4	4.3	4.8	4.3	4.6	5.0	4.4	5.8	6.4	5.6	5.8	7.5
BEL	5.0	6.3	7.3	3.4	4.6	7.9	4.2	6.2	5.9	6.1	5.6	4.8
CAN	4.6	1.9	6.3	7.3	3.2	1.6	2.9	5.9	6.1	7.1	5.1	5.4
CHE	8.1	9.4	6.3	7.9	6.7	6.3	5.1	8.1	5.9	5.6	5.9	4.6
DEU	6.9	6.6	7.6	6.5	5.0	7.9	4.3	3.7	5.3	5.4	5.4	7.1
DNK	9.9	10.0	9.9	9.6	8.3	6.7	8.2	7.7	5.3	6.5	5.1	6.3
ESP	2.6	3.6	3.4	1.9	7.0	9.7	6.7	3.6	4.3	5.4	4.1	5.6
FIN	9.5	9.0	9.9	9.4	9.3	6.2	8.9	9.7	7.0	6.0	4.8	6.0
FRA	4.6	6.4	5.5	3.8	9.2	9.9	8.9	3.7	5.1	5.1	4.9	6.9
GBR	6.1	7.6	5.9	6.3	6.3	7.0	6.0	8.7	6.1	5.8	6.1	4.9
HKG	4.6	5.8	3.4	5.9	1.9	3.2	2.1	1.1	7.5	6.0	7.1	4.5
IRL	6.4	8.0	7.3	5.3	3.2	4.0	4.6	5.6	5.0	5.9	4.6	6.4
ISR	1.1	2.5	1.0	1.1	1.6	1.1	1.3	5.4	5.0	5.8	6.5	5.3
ITA	1.5	2.9	2.0	1.0	4.0	4.0	5.0	2.6	4.3	5.8	4.9	5.9
JPN	2.0	1.1	3.1	3.6	3.1	4.6	6.1	3.2	5.5	5.5	6.3	4.6
NLD	8.1	6.5	8.6	7.4	7.1	9.3	6.2	5.4	4.6	5.3	5.9	5.1
NOR	9.9	9.6	10.0	9.9	8.0	4.4	7.6	8.6	6.1	5.0	5.4	5.8
NZL	9.0	6.5	8.1	9.9	9.9	9.8	9.6	9.1	6.4	5.1	6.0	6.4
PRT	2.9	3.3	4.4	2.0	3.6	7.0	5.1	2.3	5.9	5.4	7.0	5.6
SGP	4.0	4.3	1.5	7.4	4.9	2.3	3.9	4.2	6.3	6.5	6.5	4.8
SWE	9.3	10.0	9.0	9.0	9.3	5.3	9.3	6.9	5.4	4.5	5.3	6.0
USA	1.9	1.0	1.6	4.1	1.0	1.8	1.2	4.4	6.0	6.5	6.8	6.3

Table 2.A11. Emerging Markets Sample: Average rank by factor for country and firm-level ESG factors

Average rank for country-level and firm-level ESG factors including firm-level ESG momentum factors in developed markets over the period 2012-2020. Data used for analysts in Section 7.

Country	Macro ESG	Macro E	Macro S	Macro G	Micro ESG	Micro E	Micro S	Micro G	Micro ESG Mom	Micro E Mom	Micro S Mom	Micro G Mom
ARE	7.8	8.2	5.6	8.6	7.0	3.7	7.8	4.1	4.7	6.9	4.2	5.0
BRA	5.3	5.6	5.8	4.9	7.9	9.9	6.8	5.8	5.9	5.9	5.9	5.1
CHL	9.5	10.0	9.5	9.9	7.9	5.7	8.9	8.8	6.0	6.0	5.3	6.4
CHN	1.8	1.9	1.0	2.3	1.2	3.0	1.1	6.7	5.9	6.5	7.5	6.1
IDN	2.4	2.3	3.5	2.9	4.8	4.0	5.0	4.1	4.3	4.9	5.9	4.1
IND	1.4	1.3	2.3	1.6	4.6	7.9	4.8	8.2	6.3	4.8	4.1	5.5
KOR	9.6	10.0	10.0	8.4	5.4	7.9	3.6	7.1	4.0	5.6	6.4	5.0
MEX	4.1	4.0	4.1	4.3	4.1	8.0	6.1	3.4	6.4	7.0	6.5	6.8
MYS	7.3	7.0	7.1	8.3	6.6	5.3	3.6	5.0	7.6	6.1	4.9	6.1
QAT	8.4	8.6	8.0	7.2	2.7	1.8	4.7	4.6	5.0	6.1	5.8	5.0
RUS	4.8	5.9	4.5	2.0	2.2	5.8	2.8	2.4	5.5	4.1	5.8	6.0
THA	4.1	4.4	4.1	5.3	9.9	7.8	9.9	3.7	5.8	6.5	6.0	5.6
TUR	5.4	6.8	4.3	5.6	4.3	3.8	8.6	3.7	5.8	4.8	5.5	4.9
TWN	8.9	7.6	9.5	10.0	7.8	4.2	7.4	8.6	6.0	6.4	7.0	7.1
ZAF	6.6	4.6	7.4	6.4	10.0	9.4	7.0	10.0	5.9	5.6	4.5	6.1
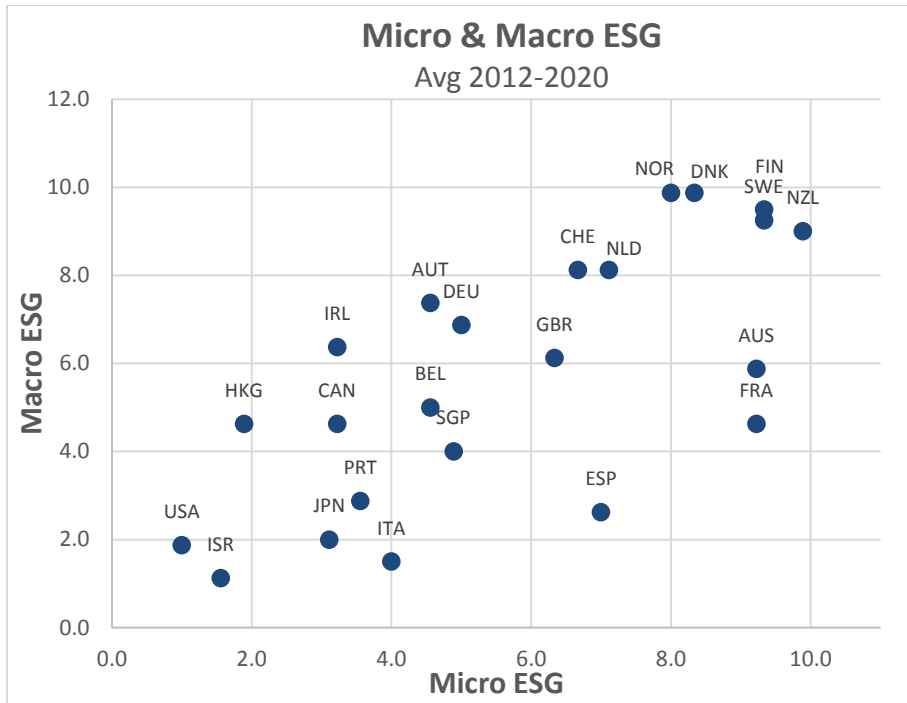
Figure 2.A15. Developed Markets: Average Firm-level and Country-Level ESG factor ranks

Average firm-level ESG ranks on the x axis and average country-level ESG ranks on the y axis, over the period, 2012 to 2020. Ranks range from 1-10, with the highest rank representing the best ESG profile.
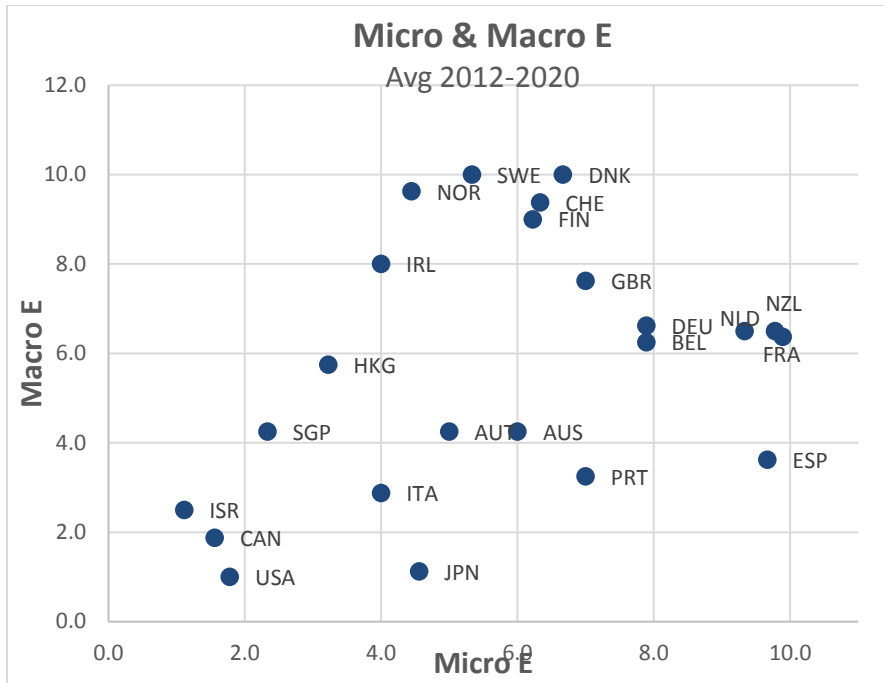
Figure 2.A16. Developed Markets: Average Firm-level and Country-Level Environmental factor ranks

Average firm-level Environmental (E) ranks on the x axis and average country-level E ranks on the y axis, over the period, 2012 to 2020. Ranks range from 1-10, with the highest rank representing the best Environmental profile.
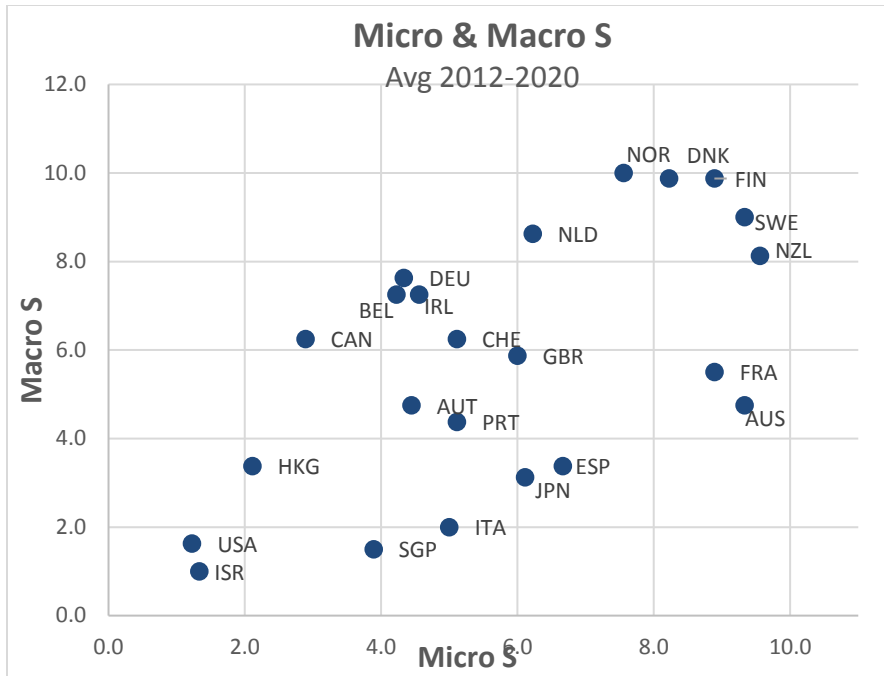
Figure 2.A17. Developed Markets: Average Firm-level and Country-Level Social factor ranks

Average firm-level Social (S) ranks on the x axis and average country-level S ranks on the y axis, over the period, 2012 to 2020. Ranks range from 1-10, with the highest rank representing the best Social profile.
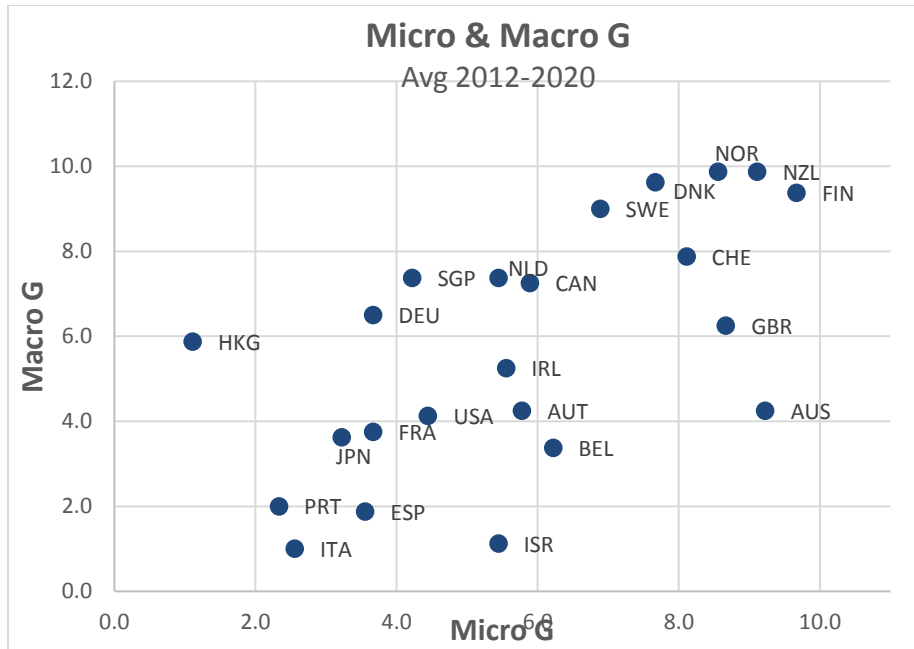
Figure 2.A18. Developed Markets: Average Firm-level and Country-Level Governance factor ranks

Average firm-level Governance (G) ranks on the x axis and average country-level G ranks on the y axis, over the period, 2012 to 2020. Ranks range from 1-10, with the highest rank representing the best Governance profile.
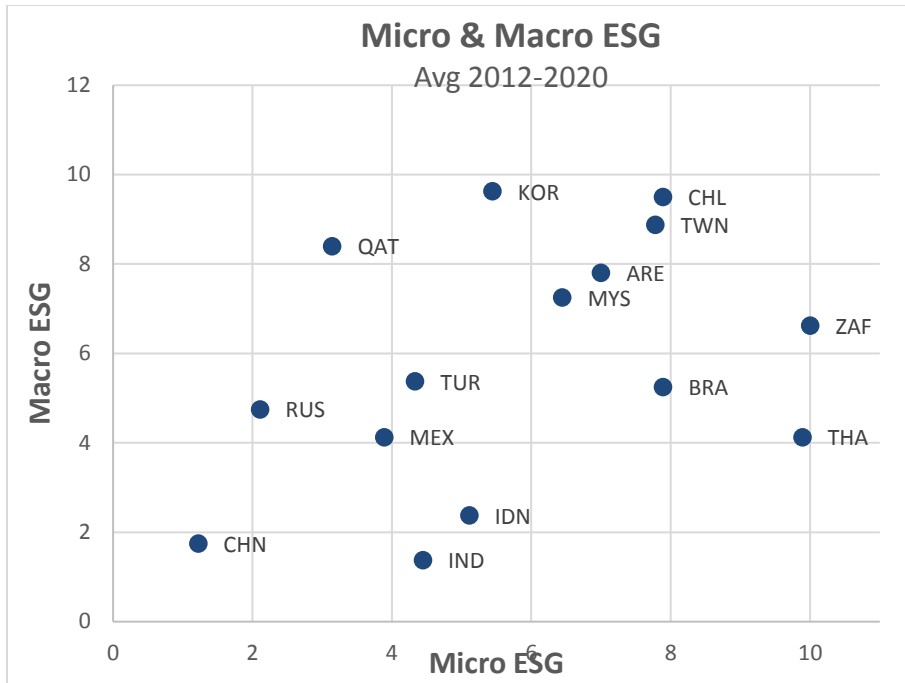
Figure 2.A19. Emerging Markets: Average Firm-level and Country-Level ESG factor ranks

Average firm-level ESG ranks on the x axis and average country-level ESG ranks on the y axis, over the period, 2012 to 2020. Ranks range from 1-10, with the highest rank representing the best ESG profile.
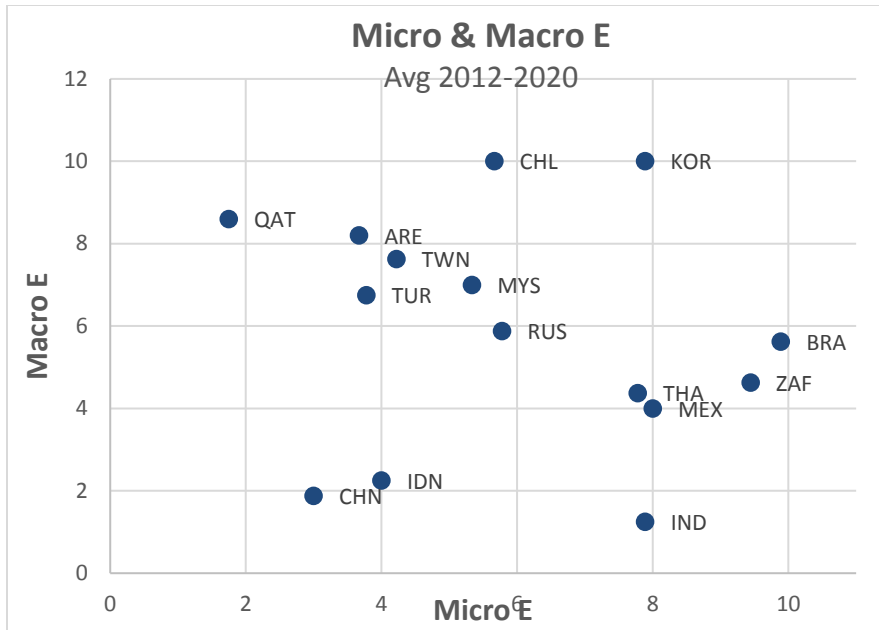
Figure 2.A20. Emerging Markets: Average Firm-level and Country-Level Environmental factor ranks

Average firm-level Environmental ranks on the x axis and average country-level Environmental ranks on the y axis, over the period, 2012 to 2020. Ranks range from 1-10, with the highest rank representing the best Environmental profile.
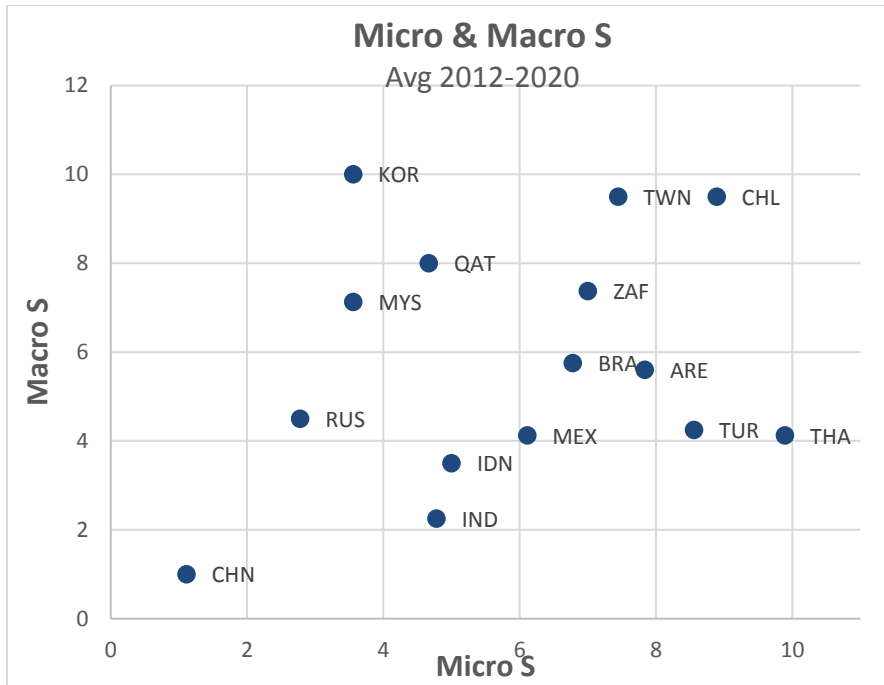
Figure 2.A21. Emerging Markets: Average Firm-level and Country-Level Social factor ranks

Average firm-level Social ranks on the x axis and average country-level Social ranks on the y axis, over the period, 2012 to 2020. Ranks range from 1-10, with the highest rank representing the best Social profile.
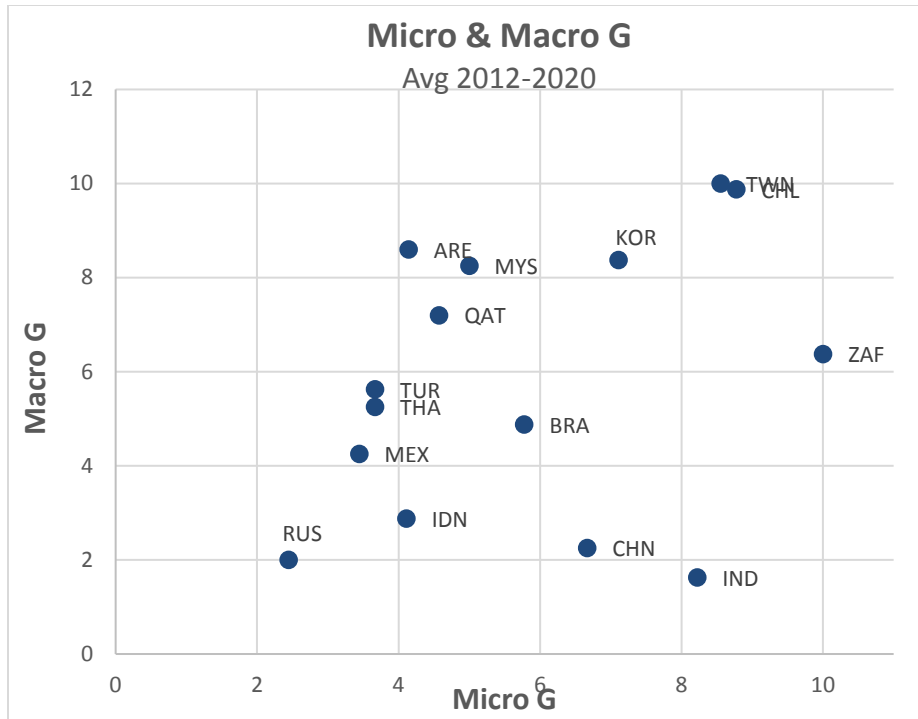
Figure 2.A22. Emerging Markets: Average Firm-level and Country-Level Governance factor ranks

Average firm-level Governance ranks on the x axis and average country-level Governance ranks on the y axis, over the period, 2012 to 2020. Ranks range from 1-10, with the highest rank representing the best Governance profile.

Tables and Figures

Table 1.1 Developed Markets: Correlation matrix of ESC factors and country-selection factors

Table 1.1 shows the pairwise correlation matrix of the ESG level factor ranks and the country factor ranks in the developed markets sample. The correlations presented are over the sample period from 2012-2020.

	ESG	E	S	G	Value	Momentum	Size	Quality
ESG	100%	60%	84%	53%	-19%	-5%	6%	14%
E	60%	100%	54%	13%	-11%	4%	-2%	-9%
S	84%	54%	100%	38%	-12%	-9%	8%	6%
G	53%	13%	38%	100%	-41%	-5%	9%	35%
Value	-19%	-11%	-12%	-41%	100%	-16%	6%	-28%
Momentum	-5%	4%	-9%	-5%	-16%	100%	-15%	6%
Size	6%	-2%	8%	9%	6%	-15%	100%	-15%
Quality	14%	-9%	6%	35%	-28%	6%	-15%	100%

Table 1.2 Emerging Markets: Correlation matrix of ESC factors and country-selection factors

Table 1.2 shows the pairwise correlation matrix of the ESG level factor ranks and the country factor ranks in the emerging markets sample. The correlations presented are over the sample period from 2012-2020.

	ESG	E	S	G	Value	Momentum	Size	Quality
ESG	100%	47%	57%	39%	11%	-10%	23%	1%
E	47%	100%	20%	26%	-10%	10%	-6%	-9%
S	57%	20%	100%	11%	3%	-6%	35%	-9%
G	39%	26%	11%	100%	5%	-13%	-27%	25%
Value	11%	-10%	3%	5%	100%	-8%	-15%	3%
Momentum	-10%	10%	-6%	-13%	-8%	100%	-22%	0%
Size	23%	-6%	35%	-27%	-15%	-22%	100%	1%
Quality	1%	-9%	-9%	25%	3%	0%	1%	100%

Table 1.3 Performance of Factor Portfolios formed on ESG Level in Developed Markets

Table 1.3 shows the performance of factor portfolios formed on ESG, Environmental (E), Social (S) and Governance (G) scores in developed markets over the period 2012-2020. P1 (portfolio 1) represents the low ranked portfolio of countries with relatively bad ESG scores while P3 represents the high ranked portfolio of countries with relatively good ESG scores. P3-P1 represents the zero-investment portfolio of being long portfolio 3 and short portfolio 1. Annualized monthly portfolio returns, standard deviation and t-statistics and Sharpe ratios for the zero-investment portfolios over the sample period 2012-2020 are shown below.

	Developed Markets									
	P1 (Bad)		*P2 (Med)*		*P3 (Good)*		P3-P1 (Good-Bad)			
	Mean	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	Mean	Std. Dev.	T-Stat	Sharpe
ESG	*3.1%*	*13.4%*	*6.9%*	*15.1%*	*6.9%*	*15.1%*	3.8%	6.2%	2.73	0.60
E	*3.3%*	*14.4%*	*7.4%*	*15.0%*	*7.4%*	*15.0%*	4.0%	7.4%	2.45	0.54
S	*3.8%*	*13.8%*	*6.0%*	*15.5%*	*6.0%*	*15.5%*	2.2%	7.2%	1.37	0.30
G	*3.9%*	*15.7%*	*6.5%*	*14.2%*	*6.5%*	*14.2%*	2.6%	6.1%	1.88	0.42

Table 1.4 Performance of Factor Portfolios formed on ESG Level in Emerging Markets

Table 1.4 shows the performance of factor portfolios formed on ESG, Environmental (E), Social (S) and Governance (G) scores in emerging markets over the period 2012-2020. P1 (portfolio 1) represents the low ranked portfolio of countries with relatively bad ESG scores while P3 represents the high ranked portfolio of countries with relatively good ESG scores. P3-P1 represents the zero-investment portfolio of being long portfolio 3 and short portfolio 1. Annualized monthly portfolio returns, standard deviation and t-statistics and Sharpe ratios for the zero-investment portfolios over the sample period 2012-2020 are shown below.

	Emerging Markets									
	P1 (Bad)		*P2 (Med)*		*P3 (Good)*		P3-P1 (Good-Bad)			
	Mean	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	Mean	Std. Dev.	T-Stat	Sharpe
ESG	*-0.9%*	*17.7%*	*-1.2%*	*16.8%*	*1.5%*	*18.0%*	2.4%	*9.9%*	1.09	0.24
E	*-2.2%*	*16.1%*	*-0.1%*	*15.8%*	*1.1%*	*20.5%*	3.3%	*10.0%*	1.49	0.33
S	*-0.9%*	*16.5%*	*-1.6%*	*17.0%*	*2.2%*	*19.0%*	3.2%	*12.5%*	1.15	0.25
G	*-3.8%*	*18.7%*	*1.7%*	*16.7%*	*-0.4%*	*17.8%*	3.4%	*11.2%*	1.37	0.30

Table 1.5 Performance of Factor Portfolios formed on ESG Momentum and Combined ESG (Level and Momentum) in Developed Markets

Table 1.5 shows the performance of factor portfolios formed on ESG, Environmental (E), Social (S) and Governance (G) momentum (ESG_Mom) and combined ESG level and momentum (ESG_Comb) in developed markets over the period 2012-2020. P1 (portfolio 1) represents the low ranked portfolio of countries with relatively low ESG momentum and low combined ESG level and momentum while P3 represents the high ranked portfolio of countries with relatively high ESG momentum and high combined ESG level and momentum. P3-P1 represents the zero-investment portfolio of being long portfolio 3 and short portfolio 1. Annualized monthly portfolio returns, standard deviation and t-statistics and Sharpe ratios for the zero-investment portfolios over the sample period 2012-2020 are shown below.

		Developed Markets									
		P1 (Bad)		*P2 (Med)*		*P3 (Good)*		P3-P1 (Good-Bad)			
		Mean	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	Mean	Std. Dev.	T-Stat	Sharpe
ESG Momentum	ESG_Mom	*1.1%*	*14.4%*	*4.5%*	*13.9%*	*4.5%*	*13.9%*	3.4%	*5.9%*	2.61	0.58
	E_Mom	*1.4%*	*14.2%*	*4.2%*	*14.0%*	*4.2%*	*14.0%*	2.8%	*5.0%*	2.54	0.56
	S_Mom	*2.5%*	*14.0%*	*3.7%*	*13.8%*	*3.7%*	*13.8%*	1.2%	*4.5%*	1.19	0.26
	G_Mom	*-1.7%*	*14.1%*	*4.2%*	*14.4%*	*4.2%*	*14.4%*	5.9%	*5.8%*	4.56	1.01
ESG Level and Momentum	ESG_Comb	*1.2%*	*14.1%*	*5.8%*	*15.4%*	*5.8%*	*15.4%*	4.6%	*5.4%*	3.86	0.86
	E_Comb	*2.1%*	*14.8%*	*7.3%*	*14.6%*	*7.3%*	*14.6%*	5.3%	*5.7%*	4.14	0.92
	S_Comb	*2.9%*	*13.8%*	*5.6%*	*14.9%*	*5.6%*	*14.9%*	2.7%	*5.9%*	2.06	0.46
	G_Comb	*2.2%*	*15.5%*	*6.7%*	*14.4%*	*6.7%*	*14.4%*	4.5%	*6.0%*	3.36	0.75

Table 1.6. Performance of Factor Portfolios formed on ESG Momentum and Combined ESG (Level and Momentum) in Emerging Markets

Table 1.6 shows the performance of factor portfolios formed on ESG, Environmental (E), Social (S) and Governance (G) momentum (ESG_Mom) and combined ESG level and momentum (ESG_Comb) in emerging markets over the period 2012-2020. P1 (portfolio 1) represents the low ranked portfolio of countries with relatively low ESG momentum or low combined ESG level and momentum while P3 represents the high ranked portfolio of countries with relatively high ESG momentum or high combined ESG level and momentum. P3-P1 represents the zero-investment portfolio of being long portfolio 3 and short portfolio 1. Annualized monthly portfolio returns, standard deviation and t-statistics and Sharpe ratios for the zero-investment portfolios over the sample period 2012-2020 are shown below.

		Emerging Markets									
		P1 (Bad)		P2 (Med)		P3 (Good)		P3-P1 (Good-Bad)			
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
ESG Momentum	ESG_Mom	-5.0%	17.1%	-4.7%	17.6%	0.8%	16.6%	5.8%	9.9%	2.63	0.58
	E_Mom	-4.9%	18.5%	-4.4%	16.0%	0.8%	17.1%	5.7%	11.1%	2.32	0.51
	S_Mom	-6.1%	17.5%	-2.8%	16.6%	0.6%	17.2%	6.7%	9.8%	3.09	0.68
	G_Mom	-3.0%	16.3%	-5.7%	17.8%	0.1%	17.6%	3.1%	10.8%	1.29	0.29
ESG Level and Momentum	ESG_Comb	-1.6%	17.6%	-2.3%	17.5%	2.4%	18.0%	3.9%	10.0%	1.77	0.39
	E_Comb	-6.1%	16.8%	2.9%	16.2%	1.2%	19.4%	7.3%	10.8%	3.06	0.68
	S_Comb	-5.6%	17.9%	0.8%	16.0%	2.9%	18.6%	8.5%	11.0%	3.48	0.77
	G_Comb	-2.4%	18.1%	-1.4%	17.8%	1.0%	16.9%	3.4%	11.7%	1.33	0.29

Table 1.7 Multi-variate regression results of ESG factor returns on country factors in Developed Markets

Table 1.7 shows the estimation results for equations 1 to 4 of ESG, Environmental (E), Social (S) and Governance (G) factor returns on country factor returns in developed markets over the period 2012-2020. The regressions are based on monthly returns and the numbers below are annualized. T-statistic greater than 1.64 represents significance at the 90% level; t-statistic greater than 1.96 represents significance at the 95% level; t-statistic greater than 2.57 represents significance at the 99% level.

	Developed Markets							
	Panel A: ESG		*Panel B: Environmental*		*Panel C: Social*		*Panel B: Governance*	
Factor	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*
Intercept	3.7%	1.77	2.5%	1.04	2.7%	1.18	1.4%	0.75
MktRF	11.8%	2.50	7.0%	1.30	2.9%	0.56	2.1%	0.51
Size	30.6%	2.39	4.8%	0.32	47.2%	3.38	13.6%	1.19
Value	0.4%	0.04	-24.1%	-2.18	9.2%	0.88	-25.9%	-3.03
Momentum	17.2%	2.20	11.7%	1.31	6.0%	0.71	3.0%	0.43
Quality	9.5%	0.99	-29.3%	-1.48	-14.8%	-1.38	32.3%	3.79
Adjusted R2	17.03%		11.97%		13.99%		12.98%	

Table 1.8 Multi-variate regression results of ESG factor returns on country factors in Emerging Markets

Table 1.8 shows the estimation results for equations 1 to 4 of ESG, Environmental (E), Social (S) and Governance (G) factor returns on country factor returns in emerging markets over the period 2012-2020. The regressions are based on monthly returns and the numbers below are annualized. T-statistic greater than 1.64 represents significance at the 90% level; t-statistic greater than 1.96 represents significance at the 95% level; t-statistic greater than 2.57 represents significance at the 99% level.

	Emerging Markets							
	Panel A: ESG		*Panel B: Environmental*		*Panel C: Social*		*Panel B: Governance*	
Factor	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*
Intercept	3.4%	1.13	3.3%	0.23	3.9%	1.17	1.0%	0.25
Mkt-Rf	6.9%	1.42	38.6%	0.54	17.0%	2.47	3.1%	0.48
Size	-3.6%	-0.38	5.7%	0.10	29.1%	1.19	-27.3%	-1.18
Value	20.3%	2.36	38.6%	0.33	7.8%	0.64	-17.1%	-1.49
Momentum	11.8%	1.56	36.0%	0.52	24.7%	2.32	-3.0%	-0.30
Quality	-22.5%	-3.24	31.0%	0.36	-26.2%	-2.66	12.0%	1.30
Adjusted R2	18.98%		21.43%		17.01%		8.10%	

Table 1.9 Multi-variate regression results of Combined Level and Momentum ESG factor returns on country factors in Developed Markets

Table 1.9 shows the estimation results for equations 5 to 9 of ESG, Environmental (E), Social (S) and Governance (G) combined level and momentum factor returns on country factor returns in developed markets over the period 2012-2020. The regressions are based on monthly returns and the numbers below are annualized. T-statistic greater than 1.64 represents significance at the 90% level; t-statistic greater than 1.96 represents significance at the 95% level; t-statistic greater than 2.57 represents significance at the 99% level.

| Factor | Developed Markets: ESG + ESG Momentum | | | | | | | |
| | Panel A: ESG | | Panel B: Environmental | | Panel C: Social | | Panel B: Governance | |
	coef	t-stat	coef	t-stat	coef	t-stat	coef	t-stat
Intercept	3.7%	2.35	3.5%	1.81	2.9%	1.44	4.4%	2.35
MktRF	9.9%	2.72	8.6%	1.90	3.7%	0.79	2.9%	0.69
Size	27.8%	2.82	7.8%	0.76	16.7%	1.59	-15.0%	-1.55
Value	10.1%	1.36	-29.5%	-2.99	-13.1%	-1.30	-17.1%	-1.84
Momentum	18.9%	3.16	3.9%	0.51	9.2%	1.18	7.4%	1.02
Quality	15.5%	2.11	-15.4%	-1.65	-11.2%	-1.16	26.6%	3.01
Adjusted R2	32.11%		24.56%		21.03%		32.63%	

Table 1.10 Multi-variate regression results of Combined Level and Momentum ESG factor returns on country factors in Emerging Markets

Table 1.10 shows the estimation results for equations 5 to 9 of ESG, Environmental (E), Social (S) and Governance (G) combined level and momentum factor returns on country factor returns in emerging markets over the period 2012-2020. The regressions are based on monthly returns and the numbers below are annualized. T-statistic greater than 1.64 represents significance at the 90% level; t-statistic greater than 1.96 represents significance at the 95% level; t-statistic greater than 2.57 represents significance at the 99% level.

Emerging Markets: ESG + ESG Momentum								
	Panel A: ESG		Panel B: Environmental		Panel C: Social		Panel B: Governance	
Factor	coef	t-stat	coef	t-stat	coef	t-stat	coef	t-stat
Intercept	4.7%	1.88	6.8%	1.82	8.7%	2.24	1.0%	0.24
Mkt-Rf	2.9%	0.55	16.3%	2.67	3.6%	0.56	6.1%	0.91
Size	14.4%	2.04	18.0%	1.53	25.8%	1.11	-27.6%	-2.13
Value	-13.3%	-1.58	-2.3%	-0.22	4.8%	0.43	-15.0%	-1.26
Momentum	9.1%	1.07	-21.6%	-2.29	20.7%	2.12	-2.4%	-0.24
Quality	-22.2%	-2.59	1.4%	0.16	-24.0%	-2.66	19.6%	2.05
Adjusted R2	18.26%		22.01%		18.99%		15.42%	

Table 1.11 Multi-variate regression results of ESG factor returns on stock based Fama and French factors in Developed Markets

Table 1.11 shows the estimation results for equations 9 to 12 of ESG, Environmental (E), Social (S) and Governance (G) factor returns on stock based Fama and French factor returns in developed markets over the period 2012-2020. The regressions are based on monthly returns and the numbers below are annualized. T-statistic greater than 1.64 represents significance at the 90% level; t-statistic greater than 1.96 represents significance at the 95% level; t-statistic greater than 2.57 represents significance at the 99% level.

Developed Markets								
Factor	Panel A: ESG		Panel B: Environmental		Panel C: Social		Panel B: Governance	
	coef	t-stat	coef	t-stat	coef	t-stat	coef	t-stat
Intercept	4.6%	2.02	3.9%	1.45	2.6%	0.99	2.1%	0.91
MktRF	-3.4%	-0.60	-4.8%	-0.72	-3.3%	-0.50	0.2%	0.04
SMB	31.4%	2.13	41.1%	2.37	29.2%	1.71	-15.9%	-1.08
HML	-2.9%	-0.19	-0.1%	-0.01	-6.7%	-0.37	8.3%	0.54
RMW	7.6%	0.35	26.5%	1.02	12.3%	0.48	11.6%	0.53
CMA	8.8%	0.34	-11.0%	-0.37	6.6%	0.22	-13.9%	-0.55
Adjusted R2	11.60%		8.20%		7.23%		6.46%	

Table 1.12 Multi-variate regression results of ESG factor returns on stock based Fama and French factors in Emerging Markets

Table 1.12 shows the estimation results for equations 9 to 12 of ESG, Environmental (E), Social (S) and Governance (G) factor returns on stock based Fama and French factor returns in developed markets over the period 2012-2020. The regressions are based on monthly returns and the numbers below are annualized. T-statistic greater than 1.64 represents significance at the 90% level; t-statistic greater than 1.96 represents significance at the 95% level; t-statistic greater than 2.57 represents significance at the 99% level.

	Emerging Markets							
	Panel A: ESG		Panel B: Environmental		Panel C: Social		Panel B: Governance	
Factor	coef	t-stat	coef	t-stat	coef	t-stat	coef	t-stat
Intercept	3.7%	1.35	4.7%	1.23	3.8%	0.80	3.5%	0.84
Mkt-Rf	3.3%	1.31	1.4%	0.37	1.4%	1.09	-1.2%	-1.06
SMB	-4.6%	-1.97	-1.3%	-0.49	0.6%	0.19	3.8%	1.35
HML	-5.5%	-1.89	-1.0%	-0.31	-4.7%	-1.17	1.7%	0.47
RMW	-2.3%	-0.61	-0.7%	-0.16	-1.1%	-0.20	0.9%	0.20
CMA	5.6%	1.41	-0.4%	-0.08	5.7%	1.04	-5.1%	-1.06
Adjusted R2	8.92%		6.80%		2.33%		5.48%	

Table 1.13 Multi-variate regression results of Combined Level and Momentum ESG factor returns on stock based Fama and French factors in Developed Markets

Table 1.13 shows the estimation results for equations 13 to 16 of ESG, Environmental (E), Social (S) and Governance (G) combined level and momentum factor returns on stock-based Fama and French factor returns in developed markets over the period 2012-2020. The regressions are based on monthly returns and the numbers below are annualized. T-statistic greater than 1.64 represents significance at the 90% level; t-statistic greater than 1.96 represents significance at the 95% level; t-statistic greater than 2.57 represents significance at the 99% level.

	Developed Markets: ESG + ESG Momentum							
	Panel A: ESG		Panel B: Environmental		Panel C: Social		Panel B: Governance	
Factor	coef	t-stat	coef	t-stat	coef	t-stat	coef	t-stat
Intercept	4.7%	2.63	4.7%	2.27	3.7%	1.73	4.8%	2.30
MktRF	1.8%	0.40	2.3%	0.44	-0.4%	-0.08	1.4%	0.27
SMB	23.4%	2.04	8.4%	0.62	13.3%	0.96	-15.6%	-1.15
HML	-21.1%	-1.75	5.1%	0.36	-7.3%	-0.51	-1.9%	-0.13
RMW	-24.0%	-1.40	0.6%	0.03	-10.8%	-0.53	-8.6%	-0.42
CMA	29.7%	1.50	-9.1%	-0.39	7.4%	0.31	28.7%	1.23
Adjusted R2	6.55%		6.89%		5.45%		8.98%	

Table 1.14 Multi-variate regression results of Combined Level and Momentum ESG factor returns on stock based Fama and French factors in Emerging Markets

Table 1.14 shows the estimation results for equations 13 to 16 of ESG, Environmental (E), Social (S) and Governance (G) combined level and momentum factor returns on stock-based Fama and French factor returns in emerging markets over the period 2012-2020. The regressions are based on monthly returns and the numbers below are annualized. T-statistic greater than 1.64 represents significance at the 90% level; t-statistic greater than 1.96 represents significance at the 95% level; t-statistic greater than 2.57 represents significance at the 99% level.

Emerging Markets: Micro ESG + Micro ESG Momentum								
	Panel A: ESG		Panel B: Environmental		Panel C: Social		Panel B: Governance	
Factor	coef	t-stat	coef	t-stat	coef	t-stat	coef	t-stat
Intercept	6.0%	1.73	8.0%	1.96	8.9%	2.13	2.3%	0.55
Mkt-Rf	4.9%	0.47	5.5%	0.48	7.6%	1.41	1.5%	0.21
SMB	-7.5%	-0.24	-1.7%	-0.60	0.9%	0.33	4.4%	1.81
HML	-8.9%	-1.68	-2.9%	-0.83	-4.2%	-1.18	-0.1%	-0.19
RMW	-2.0%	-0.53	-0.6%	-0.14	-1.2%	-0.26	3.4%	1.11
CMA	0.8%	0.20	1.5%	0.31	2.3%	0.49	-2.5%	-1.12
Adjusted R2	6.92%		7.22%		8.56%		3.32%	

Table 1.15 Performance of Country Factor Portfolios in Developed Markets

Table 1.15 shows the performance of factor portfolios formed on country selection factors in developed markets over the period 2012-2020. P1 (portfolio 1) represents the low ranked portfolio; for Size this represents large market capitalization countries; for Value this represents expensive countries; for Momentum (Mom) this represent countries with poor momentum; for Quality (Qual) this represents low Quality countries. P3 (portfolio 3) represents the high ranked portfolio; for Size this represents small market capitalization countries; for Value this represents cheap countries; for Momentum (Mom) this represent countries with high momentum; for Quality (Qual) this represents high Quality countries. Details of the specific factor construction are represented in Section 3. P3-P1 represents the zero-investment portfolio of being long portfolio 3 and short portfolio 1. Annualized monthly portfolio returns, standard deviation and t-statistics and Sharpe ratios for the zero-investment portfolios over the sample period 2012-2020 are shown below.

| | Developed Markets | | | | | | | | | |
| | P1 (Bad) | | P2 (Med) | | P3 (Good) | | P3-P1 (Good-Bad) | | | |
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
Size	2.8%	12.8%	6.5%	13.2%	6.5%	16.2%	0.7%	6.7%	0.47	0.10
Value	8.0%	12.7%	4.6%	16.5%	4.6%	16.5%	-3.4%	7.8%	-1.98	-0.44
Mom	0.1%	16.3%	7.8%	13.7%	7.8%	13.7%	7.7%	8.1%	4.25	0.94
Qual	5.4%	16.4%	5.7%	13.5%	5.7%	13.5%	0.4%	7.3%	0.23	0.05

Table 1.16 Performance of Country Factor Portfolios in Emerging Markets

Table 1.15 shows the performance of factor portfolios formed on country selection factors in developed markets over the period 2012-2020. P1 (portfolio 1) represents the low ranked portfolio; for Size this represents large market capitalization countries; for Value this represents expensive countries; for Momentum (Mom) this represent countries with poor momentum; for Quality (Qual) this represents low Quality countries. P3 (portfolio 3) represents the high ranked portfolio; for Size this represents small market capitalization countries; for Value this represents cheap countries; for Momentum (Mom) this represent countries with high momentum; for Quality (Qual) this represents high Quality countries. Details of the specific factor construction are represented in Section 3. P3-P1 represents the zero-investment portfolio of being long portfolio 3 and short portfolio 1. Annualized monthly portfolio returns, standard deviation and t-statistics and Sharpe ratios for the zero-investment portfolios over the sample period 2012-2020 are shown below.

| | Emerging Markets | | | | | | | | | |
| | P1 (Bad) | | P2 (Med) | | P3 (Good) | | P3-P1 (Good-Bad) | | | |
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
Size	4.2%	15.9%	0.2%	20.1%	-2.7%	17.1%	-6.9%	13.0%	-2.39	-0.53
Value	-4.4%	17.7%	3.2%	16.2%	0.4%	18.6%	4.8%	11.8%	1.84	0.41
Mom	1.2%	19.8%	1.0%	17.2%	-3.2%	17.3%	-4.4%	11.4%	-1.73	-0.38
Qual	0.0%	19.0%	-0.7%	16.6%	-0.9%	18.0%	-1.0%	10.8%	-0.40	-0.09

Table 1.17 Performance of ESG inclusion in multi-factor country allocation model in Developed Markets

Table 1.17 shows the performance of three multi-factor country allocation models in developed markets over the period 2012-2020. Base refers to the base model that includes Size, Value, Momentum and Quality, all equally-weighted. Base_ESG adds to that the standard ESG factor, equally-weighted. Base_ESGComb adds the combined ESG level and Momentum factor to the base model, again, equally-weighted. P1 (portfolio 1) represents the low ranked portfolio while P3 (portfolio 3) represents the high ranked portfolio. P3-P1 represents the zero-investment portfolio of being long portfolio 3 and short portfolio 1. Annualized monthly portfolio returns, standard deviation and t-statistics and Sharpe ratios for the zero-investment portfolios over the sample period 2012-2020 are shown below.

Developed Markets

	P1 (Bad)		P2 (Med)		P3 (Good)		P3-P1 (Good-Bad)			
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
Base	5.4%	15.6%	6.9%	14.0%	6.9%	14.0%	1.4%	7.0%	0.92	0.20
Base_ESG	2.4%	15.4%	5.8%	14.7%	5.8%	14.3%	3.4%	6.4%	2.41	0.53
Base_ESGComb	2.3%	15.2%	5.3%	14.3%	5.7%	14.3%	3.5%	6.9%	2.28	0.50

Table 1.18 Performance of ESG inclusion in multi-factor country allocation model in Emerging Markets

Table 1.18 shows the performance of three multi-factor country allocation models in emerging markets over the period 2012-2020. Base refers to the base model that includes Size, Value, Momentum and Quality, all equally-weighted. Base_ESG adds to that the standard ESG factor, equally-weighted. Base_ESGComb adds the combined ESG level and Momentum factor to the base model, again, equally-weighted. P1 (portfolio 1) represents the low ranked portfolio while P3 (portfolio 3) represents the high ranked portfolio. P3-P1 represents the zero-investment portfolio of being long portfolio 3 and short portfolio 1. Annualized monthly portfolio returns, standard deviation and t-statistics and Sharpe ratios for the zero-investment portfolios over the sample period 2012-2020 are shown below.

| | Emerging Markets | | | | | | | | | |
| | P1 (Bad) | | P2 (Med) | | P3 (Good) | | P3-P1 (Good-Bad) | | | |
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
Base	0.0%	18.8%	0.9%	17.5%	-2.5%	17.6%	-2.4%	9.3%	-1.19	-0.26
Base_ESG	-0.2%	18.8%	-2.1%	17.9%	-1.6%	17.5%	-1.4%	10.3%	-0.61	-0.14
Base_ESGComb	-0.2%	18.9%	-1.8%	17.1%	-0.8%	17.6%	-0.6%	10.4%	-0.27	-0.06

Table 1.19 Measuring ESG exposure of multi-factor country allocation models in Developed Markets

Table 1.19 shows the average ESG score of three multi-factor country allocation models in developed markets over the period 2012-2020. Base refers to the base model that includes Size, Value, Momentum and Quality, all equally-weighted. Base_ESG adds to that the standard ESG factor, equally-weighted. Base_ESGComb adds the combined ESG level and Momentum factor to the base model, again, equally-weighted. A higher score is representative of a higher ESG exposure. P1 (portfolio 1) represents the low ranked portfolio while P3 (portfolio 3) represents the high ranked portfolio. P3-P1 shows the ESG exposure of the zero-investment portfolio.

	Developed Markets		
	Exposure to ESG		
	Base	Base_ESG	Base ESG Comb
P1	5.10	3.73	3.96
P2	5.28	4.90	5.13
P3	4.72	6.48	5.76
P3-P1	*-0.39*	*2.75*	*1.80*

Table 1.20 Measuring ESG exposure of multi-factor country allocation models in Emerging Markets

Table 1.20 shows the average ESG score of three multi-factor country allocation models in emerging markets over the period 2012-2020. Base refers to the base model that includes Size, Value, Momentum and Quality, all equally-weighted. Base_ESG adds to that the standard ESG factor, equally-weighted. Base_ESGComb adds the combined ESG level and Momentum factor to the base model, again, equally-weighted. A higher score is representative of a higher ESG exposure. P1 (portfolio 1) represents the low ranked portfolio while P3 (portfolio 3) represents the high ranked portfolio. P3-P1 shows the ESG exposure of the zero-investment portfolio.

Emerging Markets: Exposure to Micro ESG		
	Base	Base_ESG	Base ESG Comb
P1	5.55	3.65	3.95
P2	4.98	4.90	5.08
P3	4.89	6.47	6.08
P3-P1	*-0.66*	*2.82*	*2.13*

Table 2.1 Developed Markets Sample: Factor portfolio returns

Developed Markets Sample: Annualized monthly returns of equally-weighted factor portfolios formed on country selection factors, from 2000-2020. Also reported are annualized long-short portfolio returns, standard deviations, t-statistics and Sharpe ratios. Details of factor construction is presented in Section 3.

| | **Developed Markets** | | | | | | | | | |
| | *S (Short)* | | *N (Neutral)* | | *L (Long)* | | *L-S(Long – Short)* | | | |
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
Size	6.0%	16.2%	6.4%	19.5%	4.7%	19.1%	-1.3%	6.9%	-0.86	-0.19
Value	5.3%	17.0%	5.0%	18.7%	6.0%	19.9%	0.7%	9.2%	0.36	0.08
Momentum	3.8%	20.4%	4.8%	18.6%	8.2%	17.1%	4.3%	9.9%	1.96	0.43
Quality	5.6%	18.3%	6.1%	18.4%	5.4%	18.5%	-0.2%	7.8%	-0.10	-0.02

Table 2.2 Emerging Markets Sample: Factor portfolio returns

Emerging Markets Sample: Annualized monthly returns of equally-weighted factor portfolios formed on country selection factors, from 2000-2020. Also reported are annualized long-short portfolio returns, standard deviations, t-statistics and Sharpe ratios. Details of factor construction is presented in Section 3.

Emerging Markets

	S (Short)		N (Neutral)		L (Long)		L-S(Long – Short)			
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
Size	10.8%	23.5%	10.2%	20.5%	11.4%	23.6%	0.7%	8.7%	0.35	0.08
Value	7.7%	22.4%	10.5%	21.0%	13.5%	25.0%	5.7%	10.9%	2.36	0.52
Momentum	11.2%	23.9%	11.0%	22.2%	10.6%	22.8%	-0.6%	10.9%	-0.24	-0.05
Quality	11.1%	22.0%	9.5%	22.3%	11.5%	23.6%	0.5%	9.8%	0.21	0.05

Table 2.3 Full Sample: Factor portfolio returns

Full Sample (including all countries in developed and emerging markets): Annualized monthly returns of equally-weighted factor portfolios formed on country selection factors, from 2000-2020. Also reported are annualized long-short portfolio returns, standard deviations, t-statistics and Sharpe ratios. Details of factor construction is presented in Section 3

	Full sample									
	S (Short)		*N (Neutral)*		*L (Long)*		*L-S(Long – Short)*			
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
Size	7.6%	18.4%	7.8%	19.4%	8.0%	20.0%	0.4%	6.4%	0.31	0.07
Value	5.4%	18.4%	8.2%	18.5%	9.7%	21.5%	4.3%	8.9%	2.16	0.48
Momentum	6.1%	21.0%	7.4%	18.9%	10.1%	19.1%	4.1%	9.8%	1.88	0.42
Quality	8.1%	18.9%	6.9%	18.9%	8.8%	20.5%	0.7%	7.4%	0.41	0.09

Table 2.4 Developed Markets Sample: ESG Factor portfolio returns

Developed Markets Sample: Annualized monthly returns of equally-weighted ESG, E, S and G factor portfolios from 2000-2020. Also reported are annualized long-short portfolio returns, standard deviations, t-statistics and Sharpe ratios. Details of factor construction is presented in Section 3.

	S (Short)		*N (Neutral)*		*L (Long)*		*L-S(Long – Short)*			
Developed Markets										
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
ESG	4.0%	17.2%	5.0%	18.9%	8.2%	18.9%	4.2%	7.2%	2.60	0.58
Environment	4.8%	17.3%	5.3%	18.7%	7.3%	18.8%	2.5%	6.4%	1.75	0.39
Social	4.5%	17.6%	5.7%	18.5%	8.7%	19.4%	4.1%	7.2%	2.61	0.58
Governance	4.2%	17.3%	5.5%	18.4%	7.9%	19.0%	3.7%	7.8%	2.12	0.47

Table 2.5 Emerging Markets Sample: ESG Factor portfolio returns

Emerging Markets Sample: Annualized monthly returns of equally-weighted ESG, E, S and G factor portfolios from 2000-2020. Also reported are annualized long-short portfolio returns, standard deviations, t-statistics and Sharpe ratios. Details of factor construction is presented in Section 3.

| | **Emerging Markets** | | | | | | | | | |
| | *S (Short)* | | *N (Neutral)* | | *L (Long)* | | *L-S(Long – Short)* | | | |
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
ESG	10.7%	23.9%	7.9%	23.2%	13.2%	21.2%	2.6%	9.4%	1.24	0.27
Environment	8.8%	21.7%	10.9%	24.1%	12.1%	22.3%	3.3%	8.5%	1.74	0.39
Social	13.2%	23.6%	11.9%	22.5%	13.7%	21.9%	0.5%	9.5%	0.24	0.05
Governance	12.6%	23.8%	9.3%	24.0%	10.7%	20.0%	-1.9%	8.7%	-0.97	-0.22

Table 2.6: Full Sample ESG Factor portfolio returns

Full Sample (including Developed and Emerging Markets): Annualized monthly returns of equally-weighted ESG, E, S and G factor portfolios from 2000-2020. Also reported are annualized long-short portfolio returns, standard deviations, t-statistics and Sharpe ratios. Details of factor construction is presented in Section 3

	Full sample									
	S (Short)		*N (Neutral)*		*L (Long)*		*L-S(Long – Short)*			
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
ESG	8.0%	19.7%	6.1%	19.3%	9.9%	18.8%	2.3%	6.3%	1.68	0.37
Environment	6.7%	18.6%	8.2%	19.7%	8.6%	19.4%	2.6%	5.9%	1.99	0.44
Social	8.4%	19.7%	9.1%	19.1%	10.7%	19.9%	2.4%	6.4%	1.69	0.37
Governance	7.1%	19.2%	7.2%	19.5%	9.1%	18.8%	1.9%	5.3%	1.65	0.37

Table 2.7 ESG Momentum factor portfolio returns

Annualized monthly returns of equally-weighted factor portfolios formed on ESG momentum factors (ESG_Chg) and combined ESG level and momentum factors (ESG_Comb) from 2000-2020. Also reported are annualized long-short portfolio returns, standard deviations, t-statistics and Sharpe ratios. Presented are the results for the Developed Markets sample, the Emerging Markets sample and the combined full sample.

	S (Short)		*N (Neutral)*		*L (Long)*		*L-S(Long – Short)*			
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
Panel A: Developed Markets										
ESG_Chg	6.0%	17.9%	6.7%	18.9%	5.6%	18.2%	-0.4%	6.8%	-0.26	-0.06
ESG_Comb	3.6%	17.7%	5.3%	19.0%	7.6%	18.6%	4.1%	6.7%	2.75	0.61
Panel B: Emerging Markets										
ESG_Chg	11.0%	23.3%	12.7%	22.9%	12.8%	21.9%	1.8%	9.7%	0.84	0.19
ESG_Comb	10.0%	23.8%	8.5%	22.5%	13.0%	21.8%	2.9%	9.5%	1.40	0.31
Panel C: Full Sample										
ESG_Chg	8.7%	20.0%	6.6%	19.1%	9.0%	19.0%	0.2%	6.8%	0.14	0.03
ESG_Comb	7.6%	19.8%	6.5%	19.1%	9.2%	19.0%	1.6%	6.1%	1.18	0.26

Table 2.8. Correlation matrix of equity factors in Developed Markets Sample

Correlations are calculated as average annual spearman correlation of the factor ranks from 2000-2020 in the developed markets sample.

	ESG	E	S	G	Econ	Value	Momentum	Size	Quality
ESG	100%	78%	87%	79%	62%	-16%	5%	12%	17%
E	78%	100%	60%	38%	43%	-9%	1%	8%	5%
S	87%	60%	100%	50%	51%	-14%	-2%	18%	5%
G	79%	38%	50%	100%	64%	-24%	10%	6%	28%
Econ	62%	43%	51%	64%	100%	-17%	12%	-7%	27%
Value	-16%	-9%	-14%	-24%	-17%	100%	-21%	17%	-13%
Momentum	5%	1%	-2%	10%	12%	-21%	100%	-7%	2%
Size	12%	8%	18%	6%	-7%	17%	-7%	100%	0%
Quality	17%	5%	5%	28%	27%	-13%	2%	0%	100%

Table 2.9. Correlation matrix of equity factors in Emerging Markets Sample

Correlations are calculated as average annual spearman correlation of the factor ranks from 2000-2020 in the emerging markets sample.

	ESG	E	S	G	Econ	Value	Momentum	Size	Quality
ESG	100%	75%	88%	82%	33%	36%	-6%	30%	-41%
E	75%	100%	54%	39%	12%	35%	-10%	45%	-29%
S	88%	54%	100%	68%	33%	35%	-5%	23%	-38%
G	82%	39%	68%	100%	34%	24%	0%	11%	-33%
Econ	33%	12%	33%	34%	100%	3%	13%	-22%	-3%
Value	36%	35%	35%	24%	3%	100%	-22%	8%	-19%
Momentum	-6%	-10%	-5%	0%	13%	-22%	100%	-16%	8%
Size	30%	45%	23%	11%	-22%	8%	-16%	100%	-15%
Quality	-41%	-29%	-38%	-33%	-3%	-19%	8%	-15%	100%

Table 2.10. Developed Markets: Multi-factor regression analysis

Multi-factor regression analysis of long-short ESG, Environmental, Social and Governance factor returns on country equity factor returns. Analysis conducted on monthly returns over the period 2000-2020 with annualized results reported. Also reported are t-statistics whereby t-stat>1.64 represents 90% significance level; t-stat>1.96 represents 95% significance level; t-stat>2.57 represents 99% significance level.

	Developed Markets							
	Panel A: ESG		*Panel B: Environmental*		*Panel C: Social*		*Panel B: Governance*	
Factor	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*
Intercept	5.4%	3.62	3.5%	2.57	4.8%	3.07	5.2%	3.41
Mkt-Rf	11.7%	4.75	9.8%	4.28	11.2%	4.10	12.6%	4.94
Size	2.7%	0.37	-3.4%	-0.49	4.6%	0.58	-0.7%	-0.09
Value	-8.7%	-1.57	-3.5%	-0.68	-2.5%	-0.42	-16.2%	-2.83
Momentum	6.6%	1.49	1.4%	0.35	10.7%	2.16	1.4%	0.30
Quality	28.8%	4.98	14.9%	2.78	20.2%	3.22	34.9%	5.82
Adjusted R2	18.65%		9.96%		11.65%		25.51%	

Table 2.11. Emerging Markets: Multi-factor regression analysis

Multi-factor regression analysis of long-short ESG, Environmental, Social and Governance factor returns on country equity factor returns. Analysis conducted on monthly returns over the period 2000-2020 with annualized results reported. Also reported are t-statistics whereby t-stat>1.64 represents 90% significance level; t-stat>1.96 represents 95% significance level; t-stat>2.57 represents 99% significance level.

	Emerging Markets							
	Panel A: ESG		Panel B: Environmental		Panel C: Social		Panel B: Governance	
Factor	coef	t-stat	coef	t-stat	coef	t-stat	coef	t-stat
Intercept	0.9%	0.56	2.9%	1.79	-1.5%	-0.63	-3.8%	-1.70
Mkt-Rf	-6.1%	-2.41	-0.6%	-0.20	-7.9%	-2.48	-13.7%	-4.65
Size	9.4%	1.48	23.7%	3.96	20.1%	3.37	7.1%	1.26
Value	11.1%	2.13	21.1%	4.26	30.4%	5.90	17.0%	3.65
Momentum	-0.1%	-0.02	0.8%	0.17	18.2%	3.72	6.9%	1.53
Quality	-10.7%	-1.77	-2.1%	-0.39	-38.1%	-6.91	-27.8%	-5.43
Adjusted R2	27.28%		20.88%		23.33%		23.58%	

Table 2.12. Full Sample: Multi-factor regression analysis

Multi-factor regression analysis of long-short ESG, Environmental, Social and Governance factor returns on country equity factor returns. Analysis conducted on monthly returns over the period 2000-2020 with annualized results reported. Also reported are t-statistics whereby t-stat>1.64 represents 90% significance level; t-stat>1.96 represents 95% significance level; t-stat>2.57 represents 99% significance level.

Full Sample								
	Panel A: ESG		*Panel B: Environmental*		*Panel C: Social*		*Panel B: Governance*	
Factor	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*
Intercept	1.4%	1.66	2.4%	2.05	1.5%	0.93	0.9%	0.66
Mkt-Rf	5.1%	1.41	1.8%	0.76	0.4%	0.16	-4.2%	-1.96
Size	3.4%	1.18	-1.4%	-0.23	5.5%	0.85	7.7%	1.42
Value	3.1%	1.13	5.9%	1.17	15.8%	2.97	13.0%	2.91
Momentum	-1.1%	-0.62	-8.4%	-2.17	1.9%	0.47	1.0%	0.29
Quality	5.7%	1.37	12.2%	2.11	-20.1%	-3.24	-0.9%	-0.17
Adjusted R2	7.13%		2.91%		12.22%		4.87%	

Table 2.13. Developed Markets: Multi-factor regression analysis including Economics factor

Multi-factor regression analysis of long-short ESG, Environmental, Social and Governance factor returns on country equity factor returns and the Economic control variable. Analysis conducted on monthly returns over the period 2000-2020 with annualized results reported. Also reported are t-statistics whereby t-stat>1.64 represents 90% significance level; t-stat>1.96 represents 95% significance level; t-stat>2.57 represents 99% significance level.

	Developed Markets							
	Panel A: ESG		*Panel B: Environmental*		*Panel C: Social*		*Panel B: Governance*	
Factor	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*
Intercept	3.8%	3.10	2.6%	2.04	4.0%	2.65	2.9%	2.42
Mkt-Rf	10.0%	4.08	6.8%	2.66	10.1%	3.36	7.9%	3.35
Size	14.4%	2.27	6.1%	0.91	9.8%	1.26	13.3%	2.16
Value	-7.7%	-1.55	1.2%	0.23	-1.4%	-0.22	-7.7%	-1.61
Momentum	10.4%	2.51	3.6%	0.84	8.0%	1.57	9.2%	2.28
Quality	13.3%	2.44	1.5%	0.26	12.8%	1.92	13.3%	2.53
Economics	51.0%	8.47	38.1%	6.06	31.8%	4.31	66.1%	11.35
Adjusted R2	46.78%		24.65%		23.10%		56.27%	

Table 2.14. Emerging Markets: Multi-factor regression analysis including Economics factor

Multi-factor regression analysis of long-short ESG, Environmental, Social and Governance factor returns on country equity factor returns and the Economic control variable. Analysis conducted on monthly returns over the period 2000-2020 with annualized results reported. Also reported are t-statistics whereby t-stat>1.64 represents 90% significance level; t-stat>1.96 represents 95% significance level; t-stat>2.57 represents 99% significance level.

	Emerging Markets							
	Panel A: ESG		*Panel B: Environmental*		*Panel C: Social*		*Panel B: Governance*	
Factor	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*
Intercept	-2.8%	-1.50	2.4%	1.87	-4.3%	-2.16	-4.9%	-2.27
Mkt-Rf	-7.0%	-2.62	3.4%	1.25	-1.7%	-0.58	-10.5%	-3.42
Size	16.9%	3.34	39.8%	7.79	14.1%	2.57	9.0%	1.53
Value	33.3%	7.39	28.2%	6.20	21.2%	4.34	19.0%	3.62
Momentum	6.3%	1.46	8.2%	1.89	5.6%	1.19	-0.7%	-0.14
Quality	-29.4%	-6.17	-17.4%	-3.62	-24.3%	-4.71	-22.5%	-4.07
Economics	25.9%	5.83	20.6%	4.59	32.3%	6.70	22.3%	4.32
Adjusted R2	47.18%		41.81%		35.59%		28.36%	

Table 2.15. Full Sample: Multi-factor regression analysis including Economics factor

Multi-factor regression analysis of long-short ESG, Environmental, Social and Governance factor returns on country equity factor returns and the Economic control variable. Analysis conducted on monthly returns over the period 2000-2020 with annualized results reported. Also reported are t-statistics whereby t-stat>1.64 represents 90% significance level; t-stat>1.96 represents 95% significance level; t-stat>2.57 represents 99% significance level.

	Full Sample							
	Panel A: ESG		*Panel B: Environmental*		*Panel C: Social*		*Panel B: Governance*	
Factor	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*
Intercept	0.8%	0.81	1.2%	1.78	0.6%	0.38	0.0%	-0.04
Mkt-Rf	-5.5%	-2.44	2.4%	1.09	2.2%	0.91	-3.9%	-2.04
Size	16.3%	2.84	13.7%	2.47	11.3%	1.86	14.3%	2.92
Value	18.7%	4.05	16.3%	3.65	17.8%	3.63	14.3%	3.64
Momentum	-2.2%	-0.60	-8.0%	-2.23	0.6%	0.16	1.3%	0.42
Quality	-16.8%	-2.94	-8.1%	-1.47	-20.6%	-3.41	0.1%	0.01
Economics	44.0%	8.03	36.9%	7.00	42.6%	7.34	47.0%	10.07
Adjusted R2	28.10%		25.23%		25.13%		32.34%	

Table 2.16. Developed Markets: Multi-factor regression analysis on Fama-French factors

Multi-factor regression analysis of long-short ESG, Environmental, Social and Governance factor returns on stock Fama and French equity factor returns. Analysis conducted on monthly returns over the period 2000-2020 with annualized results reported. Also reported are t-statistics whereby t-stat>1.64 represents 90% significance level; t-stat>1.96 represents 95% significance level; t-stat>2.57 represents 99% significance level.

Developed Markets								
	Panel A: ESG		*Panel B: Environmental*		*Panel C: Social*		*Panel B: Governance*	
Factor	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*
Intercept	4.1%	2.35	2.4%	1.66	3.5%	1.99	4.2%	2.30
MktRF	-0.3%	-0.08	-1.2%	-0.35	3.0%	0.78	-3.9%	-0.95
SMB	5.2%	0.69	8.1%	1.31	8.6%	0.98	-8.4%	-1.05
HML	2.4%	0.28	-1.1%	-0.16	-6.6%	-0.71	18.2%	2.03
RMW	4.9%	0.47	6.5%	0.71	6.5%	0.56	1.6%	0.14
CMA	-8.1%	-0.68	3.1%	0.29	10.3%	0.83	-29.3%	-2.28
Adjusted R2	1.20%		0.80%		1.41%		0.56%	

Table 2.17. Emerging Markets: Multi-factor regression analysis on Fama-French factors

Multi-factor regression analysis of long-short ESG, Environmental, Social and Governance factor returns on stock Fama and French equity factor returns. Analysis conducted on monthly returns over the period 2000-2020 with annualized results reported. Also reported are t-statistics whereby t-stat>1.64 represents 90% significance level; t-stat>1.96 represents 95% significance level; t-stat>2.57 represents 99% significance level.

	Emerging Markets							
	Panel A: ESG		*Panel B: Environmental*		*Panel C: Social*		*Panel B: Governance*	
Factor	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*	*coef*	*t-stat*
Intercept	2.4%	0.78	4.6%	1.68	-2.6%	-0.80	-1.8%	-0.63
Mkt-Rf	-0.1%	-0.17	-0.7%	-1.19	0.5%	0.65	0.1%	0.21
SMB	-1.5%	-0.96	-2.3%	-1.56	0.4%	0.26	0.2%	0.10
HML	-0.4%	-0.21	-0.6%	-0.42	3.1%	1.55	-1.2%	-0.79
RMW	2.4%	0.97	-1.6%	-0.73	5.8%	2.17	1.5%	0.66
CMA	-1.5%	-0.65	-1.6%	-0.77	-1.8%	-0.68	1.0%	0.50
Adjusted R2	0.87%		0.56%		0.43%		0.98%	

Table 2.18. Developed Markets: ESG tilts of ESG-integrated country selection strategies

Average ESG, E, S and G scores by portfolio for the standard country selection strategy (SVMQ) and the ESG-integrated strategies including SVMQ_ESG, SVMQ_E, SVMQ_S and SVMQ_G, integrated with the relevant factor. Averages are calculated over the period 2000-2020.

	Developed Markets							
	ESG		E		S		G	
	SVMQ	SVMQ_ESG	SVMQ	SVMQ_E	SVMQ	SVMQ_S	SVMQ	SVMQ_G
S (Short)	5.49	3.91	5.83	4.04	5.47	4.16	5.23	4.49
N (Neutral)	5.72	5.69	5.58	5.83	5.71	5.41	5.82	5.78
L (Long)	5.90	7.24	5.69	7.02	5.99	7.50	5.92	6.70
L-S	*0.41*	*3.33*	*-0.13*	*2.98*	*0.52*	*3.34*	*0.69*	*2.21*

Table 2.19. Emerging Markets: ESG tilts of ESG-integrated country selection strategies

Average ESG, E, S and G scores by portfolio for the standard country selection strategy (SVMQ) and the ESG-integrated strategies including SVMQ_ESG, SVMQ_E, SVMQ_S and SVMQ_G, integrated with the relevant factor. Averages are calculated over the period 2000-2020.

	Emerging Markets							
	ESG		E		S		G	
	SVMQ	SVMQ_ESG	SVMQ	SVMQ_E	SVMQ	SVMQ_S	SVMQ	SVMQ_G
S (Short)	5.47	3.81	5.17	3.44	5.39	3.80	5.71	4.65
N (Neutral)	5.76	5.62	5.67	5.87	5.82	5.65	5.82	5.71
L (Long)	5.87	7.59	6.25	7.77	5.87	7.49	5.65	6.73
L-S	0.40	3.78	1.08	4.33	0.48	3.69	-0.06	2.08

Table 2.20. Full Sample: ESG tilts of ESG-integrated country selection strategies

Average ESG, E, S and G scores by portfolio for the standard country selection strategy (SVMQ) and the ESG-integrated strategies including SVMQ_ESG, SVMQ_E, SVMQ_S and SVMQ_G, integrated with the relevant factor. Averages are calculated over the period 2000-2020.

	Full Sample							
	ESG		E		S		G	
	SVMQ	SVMQ_ESG	SVMQ	SVMQ_E	SVMQ	SVMQ_S	SVMQ	SVMQ_G
S (Short)	5.57	3.86	5.50	4.17	5.53	4.68	5.55	4.26
N (Neutral)	5.86	5.82	5.65	5.88	5.66	5.43	5.79	5.89
L (Long)	5.84	7.51	5.94	6.85	5.96	7.04	5.76	6.86
L-S	*0.27*	*3.65*	*0.44*	*2.69*	*0.44*	*2.36*	*0.21*	*2.60*

Table 2.21. Developed Markets: Performance of ESG-integrated country selection strategies

Developed Markets: Annualized monthly returns of country-selection strategies from 2000-2020. Also reported are annualized long-short portfolio returns, standard deviations, t-statistics and Sharpe ratios. SVMQ represents the standard country-selection strategy while SVMQ_ESG, SVMQ_E, SVMQ_S and SVMQ_G represent the ESG-, Environmental-, Social-, and Governance-integrated strategies respectively.

| | Developed Markets | | | | | | | | | |
| | S (Short) | | N (Neutral) | | L (Long) | | L-S(Long – Short) | | | |
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
SVMQ	4.9%	17.5%	6.2%	19.3%	5.8%	18.2%	0.9%	7.1%	0.57	0.13
SVMQ_ESG	4.1%	17.5%	6.1%	19.0%	6.7%	18.3%	2.6%	7.0%	1.65	0.37
SVMQ_E	4.5%	17.0%	5.6%	18.9%	7.2%	18.4%	2.7%	7.3%	1.69	0.37
SVMQ_S	4.0%	17.4%	6.6%	18.6%	7.4%	18.4%	3.4%	7.1%	2.13	0.47
SVMQ_G	3.7%	17.5%	6.3%	18.5%	6.7%	18.3%	3.1%	7.3%	1.90	0.42

Table 2.22. Emerging Markets: Performance of ESG-integrated country selection strategies

Emerging Markets: Annualized monthly returns of country-selection strategies from 2000-2020. Also reported are annualized long-short portfolio returns, standard deviations, t-statistics and Sharpe ratios. SVMQ represents the standard country-selection strategy while SVMQ_ESG, SVMQ_E, SVMQ_S and SVMQ_G represent the ESG-, Environmental-, Social-, and Governance-integrated strategies respectively.

| | Emerging Markets | | | | | | | | | |
| | S (Short) | | N (Neutral) | | L (Long) | | L-S(Long – Short) | | | |
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
SVMQ	6.9%	22.4%	12.0%	22.2%	12.1%	23.7%	5.1%	10.3%	2.25	0.50
SVMQ_ESG	7.5%	22.9%	11.1%	21.9%	12.9%	23.4%	5.4%	9.8%	2.46	0.55
SVMQ_E	7.0%	21.8%	13.3%	24.0%	12.4%	23.4%	5.5%	9.7%	2.53	0.56
SVMQ_S	6.9%	22.7%	11.7%	21.6%	12.3%	23.8%	5.4%	10.3%	2.36	0.52
SVMQ_G	8.6%	23.4%	11.5%	21.4%	11.9%	23.3%	3.3%	10.2%	1.45	0.32

Table 2.23. Full sample: Performance of ESG-integrated country selection strategies

Full sample: Annualized monthly returns of country-selection strategies from 2000-2020. Also reported are annualized long-short portfolio returns, standard deviations, t-statistics and Sharpe ratios. SVMQ represents the standard country-selection strategy while SVMQ_ESG, SVMQ_E, SVMQ_S and SVMQ_G represent the ESG-, Environmental-, Social-, and Governance-integrated strategies respectively.

	Full sample									
	S (Short)		*N (Neutral)*		*L (Long)*		*L-S(Long – Short)*			
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
SVMQ	5.0%	18.2%	7.4%	19.2%	10.6%	20.6%	5.6%	7.5%	3.36	0.74
SVMQ_ESG	4.4%	18.1%	9.2%	19.6%	10.5%	20.2%	6.1%	7.1%	3.89	0.86
SVMQ_E	5.0%	18.0%	7.5%	19.4%	10.7%	20.4%	5.7%	7.3%	3.52	0.78
SVMQ_S	4.9%	18.1%	7.6%	19.5%	10.9%	20.5%	6.0%	7.5%	3.59	0.80
SVMQ_G	5.0%	18.5%	8.5%	19.4%	9.8%	20.2%	4.9%	7.3%	2.99	0.66

Table 2.24. Correlation matrix of Firm-level (Miro) and Country-Level (Macro) ESG factor ranks in Developed Markets Sample

Correlations are calculated as average annual spearman correlation of the factor ranks from 2012-2020 in the developed markets sample. Macro ESG scores refer to scores assigned on the country-level from the Verisk Maplecroft database. Micro ESG scores refer to firm-level ESG scores assign to the company by MSCI. Firm ESG are aggregated up to the country level by taking a mean of the ESG score in the country.

	Micro ESG	Micro E	Micro S	Micro G	Macro ESG	Macro E	Macro S	Macro G
Micro ESG	100%	60%	84%	53%	65%	60%	62%	51%
Micro E	60%	100%	54%	13%	34%	36%	43%	11%
Micro S	84%	54%	100%	38%	52%	48%	54%	37%
Micro G	53%	13%	38%	100%	56%	45%	50%	52%
Macro ESG	65%	34%	52%	56%	100%	85%	89%	85%
Macro E	60%	36%	48%	45%	85%	100%	78%	68%
Macro S	62%	43%	54%	50%	89%	78%	100%	73%
Macro G	51%	11%	37%	52%	85%	68%	73%	100%

Table 2.25. Correlation matrix of firm and country ESG factors in Developed Markets Sample

Correlations are calculated as average annual spearman correlation of the factor ranks from 2012-2020 in the developed markets sample. Macro ESG scores refer to scores assigned on the country-level from the Verisk Maplecroft database. Micro ESG scores refer to firm-level ESG scores assign to the company by MSCI. Firm ESG are aggregated up to the country level by taking a mean of the ESG score in the country.

	Micro ESG	Micro E	Micro S	Micro G	Macro ESG	Macro E	Macro S	Macro G
Micro ESG	100%	47%	57%	39%	36%	24%	40%	44%
Micro E	47%	100%	20%	26%	0%	-10%	7%	-12%
Micro S	57%	20%	100%	11%	23%	22%	18%	40%
Micro G	39%	26%	11%	100%	26%	10%	34%	29%
Macro ESG	36%	0%	23%	26%	100%	90%	91%	89%
Macro E	24%	-10%	22%	10%	90%	100%	82%	80%
Macro S	40%	7%	18%	34%	91%	82%	100%	83%
Macro G	44%	-12%	40%	29%	89%	80%	83%	100%

Table 2.26. Developed Markets Sample: ESG factor portfolio returns

Developed Markets Sample: Annualized monthly returns of equally-weighted country-level (Macro) ESG, E, S and G factor portfolios (ESG_Macro, E_Macro, S_Macro, G_Macro), firm-level ESG level factors (ESG_Micro, etc), firm-level equally-weighted, combined ESG level and momentum factors (ESG_MicroComb, etc), equally-weighted country and firm ESG level factors (ESG_Micro_Macro, etc.) and three-way equally-weighted country ESG level, firm ESG level and firm ESG momentum (ESG_MacroMicroMom). Analysis is conducted over the period 2012-2020. S portfolios refer to the bottom tertile of ranks, L portfolio refer to the top tertile of ranks. Also reported are annualized long-short portfolio returns, standard deviations, t-statistics and Sharpe ratios.

| | | Developed Markets | | | | | | | | | |
| | | S (Short) | | N (Neutral) | | L (Long) | | L-S(Long – Short) | | | |
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
Macro ESG	ESG_Macro	3.8%	14.5%	5.9%	14.9%	5.9%	14.9%	2.1%	5.3%	1.79	0.40
	E_Macro	3.8%	14.2%	6.4%	14.2%	6.4%	14.2%	2.6%	5.6%	2.09	0.46
	S_Macro	3.4%	14.2%	6.8%	14.6%	6.8%	14.6%	3.4%	5.8%	2.64	0.59
	G_Macro	2.8%	15.3%	7.3%	13.9%	7.3%	13.9%	4.5%	6.0%	3.34	0.74
Micro ESG	ESG_Micro	3.1%	13.4%	6.9%	15.1%	6.9%	15.1%	3.8%	6.2%	2.73	0.60
	E_Micro	3.3%	14.4%	7.4%	15.0%	7.4%	15.0%	4.0%	7.4%	2.45	0.54
	S_Micro	3.8%	13.8%	6.0%	15.5%	6.0%	15.5%	2.2%	7.2%	1.37	0.30
	G_Micro	3.9%	15.7%	6.5%	14.2%	6.5%	14.2%	2.6%	6.1%	1.88	0.42
Micro: Level and Momentum	ESG_MicroComb	1.2%	14.1%	5.8%	15.4%	5.8%	15.4%	4.6%	5.4%	3.86	0.86
	E_MicroComb	2.1%	14.8%	7.3%	14.6%	7.3%	14.6%	5.3%	5.7%	4.14	0.92
	S_MicroComb	2.9%	13.8%	5.6%	14.9%	5.6%	14.9%	2.7%	5.9%	2.06	0.46
	G_MicroComb	2.2%	15.5%	6.7%	14.4%	6.7%	14.4%	4.5%	6.0%	3.36	0.75
Macro and Micro ESG	ESG_Micro_Macro	4.3%	13.3%	6.6%	14.6%	6.6%	14.6%	2.3%	5.0%	2.05	0.45
	E_Micro_Macro	3.8%	14.4%	7.8%	14.2%	7.8%	14.2%	4.0%	6.1%	2.94	0.65
	S_Micro_Macro	3.4%	14.4%	7.2%	14.7%	7.2%	14.7%	3.8%	5.9%	2.90	0.64
	G_Micro_Macro	3.7%	15.1%	6.5%	14.0%	6.5%	14.0%	2.8%	5.6%	2.25	0.50
Macro, Micro and Momentum	ESG_MacroMicroMom	2.6%	13.6%	6.2%	14.9%	6.2%	14.9%	3.6%	4.9%	3.30	0.73
	E_MacroMicroMom	2.5%	14.7%	7.5%	14.7%	7.5%	14.7%	5.0%	5.5%	4.07	0.90
	S_MacroMicroMom	3.1%	14.5%	6.6%	14.8%	6.6%	14.8%	3.5%	5.6%	2.81	0.62
	G_MacroMicroMom	1.7%	15.5%	6.2%	14.7%	6.2%	14.7%	4.5%	5.7%	3.50	0.78

Table 2.27. Emerging Markets Sample: ESG factor portfolio returns

Emerging Markets Sample: Annualized monthly returns of equally-weighted country-level (Macro) ESG, E, S and G factor portfolios (ESG_Macro, E_Macro, S_Macro, G_Macro), firm-level ESG level factors (ESG_Micro, etc), firm-level equally-weighted, combined ESG level and momentum factors (ESG_MicroComb, etc), equally-weighted country and firm ESG level factors (ESG_Micro_Macro, etc.) and three-way equally-weighted country ESG level, firm ESG level and firm ESG momentum (ESG_MacroMicroMom). Analysis is conducted over the period 2012-2020. S portfolios refer to the bottom third of ranks, L portfolio refer to the top third of ranks. Also reported are annualized long-short portfolio returns, standard deviations, t-statistics and Sharpe ratios.

| | | Emerging Markets | | | | | | | | | |
| | | S (Short) | | N (Neutral) | | L (Long) | | L-S(Long – Short) | | | |
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
Macro ESG	ESG_Macro	0.6%	16.2%	-2.5%	21.3%	1.6%	14.8%	1.0%	8.7%	0.51	0.11
	E_Macro	0.6%	16.4%	-1.6%	20.0%	2.8%	16.0%	2.2%	8.6%	1.14	0.25
	S_Macro	2.9%	17.0%	-3.2%	19.2%	0.4%	15.6%	-2.5%	8.5%	-1.33	-0.29
	G_Macro	1.5%	17.8%	-1.1%	19.9%	-1.1%	14.3%	-2.6%	9.4%	-1.26	-0.28
Micro ESG	ESG_Micro	-0.9%	17.7%	-1.2%	16.8%	1.5%	18.0%	2.4%	9.9%	1.09	0.24
	E_Micro	-2.2%	16.1%	-0.1%	15.8%	1.1%	20.5%	3.3%	10.0%	1.49	0.33
	S_Micro	-0.9%	16.5%	-1.6%	17.0%	2.2%	19.0%	3.2%	12.5%	1.15	0.25
	G_Micro	-3.8%	18.7%	1.7%	16.7%	-0.4%	17.8%	3.4%	11.2%	1.37	0.30
Micro: Level and Momentum	ESG_MicroComb	-1.6%	17.6%	-2.3%	17.5%	2.4%	18.0%	3.9%	10.0%	1.77	0.39
	E_MicroComb	-6.1%	16.8%	2.9%	16.2%	1.2%	19.4%	7.3%	10.8%	3.06	0.68
	S_MicroComb	-5.6%	17.9%	0.8%	16.0%	2.9%	18.6%	8.5%	11.0%	3.48	0.77
	G_MicroComb	-2.4%	18.1%	-1.4%	17.8%	1.0%	16.9%	3.4%	11.7%	1.33	0.29
Macro and Micro ESG	ESG_Micro_Macro	1.2%	17.0%	-1.7%	18.4%	1.3%	16.9%	0.1%	9.5%	0.03	0.01
	E_Micro_Macro	-0.9%	16.0%	1.8%	15.6%	0.8%	21.0%	1.7%	11.8%	0.66	0.15
	S_Micro_Macro	-0.2%	15.4%	-2.6%	19.5%	1.2%	17.1%	1.4%	8.7%	0.71	0.16
	G_Micro_Macro	-0.4%	18.4%	2.1%	17.8%	-1.5%	16.2%	-1.1%	9.8%	-0.51	-0.11
Macro, Micro and Momentum	ESG_MacroMicroMom	-1.1%	18.3%	-1.7%	17.1%	2.1%	17.6%	3.2%	11.2%	1.27	0.28
	E_MacroMicroMom	-1.2%	16.7%	-3.9%	16.3%	4.2%	19.4%	5.4%	10.8%	2.26	0.50
	S_MacroMicroMom	-3.1%	17.4%	1.1%	17.3%	0.7%	18.0%	3.7%	10.4%	1.61	0.36
	G_MacroMicroMom	-1.6%	18.4%	-1.9%	17.2%	0.5%	17.5%	2.2%	11.9%	0.82	0.18

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Table 2.28. Developed Markets: Multi-factor regression analysis on country equity factor returns

Multi-factor regression analysis of long-short factor portfolios formed on combined country (Macro) ESG, firm (Micro) ESG level and firm (Micro) ESG momentum, on country equity factor returns. Analysis conducted for overall ESG factor as well as components: Environmental, Social and Governance on monthly factor returns over the period 2012-2020 with annualized results reported. Also reported are t-statistics whereby t-stat>1.64 represents 90% significance level; t-stat>1.96 represents 95% significance level; t-stat>2.57 represents 99% significance level.

	Developed Markets: Macro ESG, Micro ESG, Micro ESG Momentum							
	Panel A: ESG		Panel B: Environmental		Panel C: Social		Panel B: Governance	
Factor	coef	t-stat	coef	t-stat	coef	t-stat	coef	t-stat
Intercept	5.6%	3.07	3.8%	1.86	4.5%	2.14	3.8%	1.86
MktRF	7.5%	1.80	3.5%	0.74	1.1%	0.22	-1.4%	-0.30
Size	20.6%	1.82	15.4%	1.45	13.6%	1.25	-17.6%	-1.66
Value	20.1%	2.37	-16.8%	-1.64	9.8%	0.94	-15.0%	-1.46
Momentum	8.1%	1.17	-1.1%	-0.14	-4.8%	-0.59	11.6%	1.46
Quality	23.6%	2.79	-20.1%	-2.06	-15.1%	-1.51	16.2%	1.67
Adjusted R2	32.65%		23.97%		30.56%		24.54%	

Table 2.29. Emerging Markets: Multi-factor regression analysis on country equity factor returns

Multi-factor regression analysis of long-short factor portfolios formed on combined country (Macro) ESG, firm (Micro) ESG level and firm (Micro) ESG momentum, on country equity factor returns. Analysis conducted for overall ESG factor as well as components: Environmental, Social and Governance on monthly factor returns over the period 2012-2020 with annualized results reported. Also reported are t-statistics whereby t-stat>1.64 represents 90% significance level; t-stat>1.96 represents 95% significance level; t-stat>2.57 represents 99% significance level.

	Emerging Markets: Macro ESG, Micro ESG, Micro ESG Momentum							
	Panel A: ESG		Panel B: Environmental		Panel C: Social		Panel B: Governance	
Factor	coef	t-stat	coef	t-stat	coef	t-stat	coef	t-stat
Intercept	3.4%	1.50	4.9%	1.29	3.9%	1.03	0.9%	0.22
Mkt-Rf	1.8%	0.28	14.3%	2.32	2.0%	0.32	7.3%	1.05
Size	28.2%	1.35	19.5%	1.64	16.7%	1.41	-25.7%	-1.93
Value	11.5%	1.05	0.6%	0.06	0.6%	0.05	-17.3%	-1.41
Momentum	11.6%	1.21	-18.0%	-1.89	13.4%	1.41	9.1%	0.85
Quality	-0.6%	-0.06	-8.6%	-0.98	-19.3%	-2.20	9.6%	0.98
Adjusted R2	12.85%		13.22%		18.22%		16.21%	

Table 2.30. Developed Markets: Multi-factor regression analysis on Fama and French stock factors

Multi-factor regression analysis of long-short factor portfolios formed on combined country (Macro) ESG, firm (Micro) ESG level and firm (Micro) ESG momentum, on stock-based Fama and French factor returns. Analysis conducted for overall ESG factor as well as components: Environmental, Social and Governance on monthly factor returns over the period 2012-2020 with annualized results reported. Also reported are t-statistics whereby t-stat>1.64 represents 90% significance level; t-stat>1.96 represents 95% significance level; t-stat>2.57 represents 99% significance level.

	Developed Markets: Macro ESG, Micro ESG, Micro ESG Momentum							
	Panel A: ESG		Panel B: Environmental		Panel C: Social		Panel B: Governance	
Factor	coef	t-stat	coef	t-stat	coef	t-stat	coef	t-stat
Intercept	5.2%	2.60	4.5%	2.04	3.5%	1.66	4.4%	1.97
MktRF	0.5%	0.10	-1.3%	-0.24	-3.1%	-0.56	-0.4%	-0.07
SMB	14.4%	1.12	-2.5%	-0.18	4.9%	0.34	-4.8%	-0.33
HML	-18.5%	-1.37	7.0%	0.50	1.1%	0.07	-3.0%	-0.19
RMW	-6.7%	-0.35	16.2%	0.80	11.1%	0.51	4.4%	0.20
CMA	32.8%	1.47	-14.4%	-0.62	8.0%	0.32	15.9%	0.63
Adjusted R2	6.70%		6.23%		5.42%		4.87%	

Table 2.31. Emerging Markets: Multi-factor regression analysis on Fama and French stock factors

Multi-factor regression analysis of long-short factor portfolios formed on combined country (Macro) ESG, firm (Micro) ESG level and firm (Micro) ESG momentum, on stock-based Fama and French factor returns. Analysis conducted for overall ESG factor as well as components: Environmental, Social and Governance on monthly factor returns over the period 2012-2020 with annualized results reported. Also reported are t-statistics whereby t-stat>1.64 represents 90% significance level; t-stat>1.96 represents 95% significance level; t-stat>2.57 represents 99% significance level.

	Emerging Markets: Macro ESG, Micro ESG, Micro ESG Momentum							
	Panel A: ESG		Panel B: Environmental		Panel C: Social		Panel B: Governance	
Factor	coef	t-stat	coef	t-stat	coef	t-stat	coef	t-stat
Intercept	5.9%	1.44	6.7%	1.65	5.1%	1.31	1.3%	0.30
Mkt-Rf	1.2%	0.14	1.4%	0.35	1.4%	0.41	-0.3%	-0.28
SMB	-0.1%	-0.03	-2.2%	-0.80	1.2%	0.47	4.6%	1.54
HML	-3.3%	-0.99	-5.0%	-1.46	-5.3%	-1.60	0.1%	0.03
RMW	-0.2%	-0.04	-3.6%	-0.79	-4.2%	-0.98	4.3%	0.88
CMA	-0.6%	-0.12	4.0%	0.84	2.8%	0.62	-5.8%	-1.15
Adjusted R2	0.24%		3.56%		0.44%		0.12%	

Table 2.32. Developed Markets: ESG tilt of ESG-integrated country selection strategies

Average combined country (Macro) and firm (Micro) ESG scores by portfolio for the standard country selection strategy (SVMQ) and the ESG-integrated strategies. SVMQ_MacroMicro represents the ESG-integrated country-selection strategy using the combined country (Macro) and firm (Micro) ESG factor. SVMQ_MacroMicroMom represents the ESG-integrated country-selection strategy using the combined country (Macro) ESG, firm (Micro) ESG level and firm (Micro) ESG Momentum factor. Averages are calculated over the period 2012-2020.

	Developed Markets		
	Tilt to Micro + Macro ESG		
	SVMQ	SVMQ_MacroMicro	SVMQ_MacroMicroMom
S (Short)	5.27	3.73	3.87
N (Neutral)	5.09	4.84	4.98
L (Long)	4.70	6.50	6.17
L-S (Long-Short)	*-0.58*	*2.77*	*2.29*

Table 2.33. Emerging Markets: ESG tilt of ESG-integrated country selection strategies

Average combined country (Macro) and firm (Micro) ESG scores by portfolio for the standard country selection strategy (SVMQ) and the ESG-integrated strategies. SVMQ_MacroMicro and SVMQ_MacroMicroMom represents the ESG-integrated country-selection strategies using the combined country (Macro) and firm (Micro) ESG factor and the combined country (Macro) ESG, firm (Micro) ESG level and firm (Micro) ESG Momentum factor respectively. Averages are calculated over the period 2012-2020.

	Emerging Markets		
	Exposure to Micro + Macro ESG		
	SVMQ	SVMQ_MacroMicro	SVMQ_MacroMicroMom
S (Short)	5.29	3.73	3.73
N (Neutral)	5.04	4.73	5.07
L (Long)	4.95	6.67	6.28
L-S (Long-Short)	*-0.33*	*2.94*	*2.55*

Table 2.34. Developed Markets: Performance of ESG-integrated country selection strategies

Developed Markets: Annualized monthly returns of country-selection strategies from 2012-2020. Also reported are annualized long-short portfolio returns, standard deviations, t-statistics and Sharpe ratios. SVMQ represents the standard country-selection strategy while SVMQ_Macro, SVMQ_Micro, SVMQ_MicroMom and SVMQ_MacroMicroMom represent the ESG-integrated strategies, integrated using country (Macro) ESG, firm (Micro) ESG, firm (Micro) combined ESG Level and Momentum and the equally-weighted Macro ESG, Micro ESG and Micro ESG Momentum factor respectively.

	Developed Markets									
	S (Short)		N (Neutral)		L (Long)		L-S(Long – Short)			
	Mean	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	Mean	Std. Dev.	T-Stat	Sharpe
SVMQ	*5.4%*	*15.6%*	*6.9%*	*14.0%*	*6.9%*	*14.0%*	1.4%	7.0%	0.92	0.20
SVMQ_Macro	*1.8%*	*16.0%*	*5.6%*	*14.1%*	*5.6%*	*14.1%*	3.8%	7.4%	2.29	0.51
SVMQ_Micro	*2.4%*	*15.4%*	*5.8%*	*14.7%*	*5.8%*	*14.3%*	3.4%	6.4%	2.41	0.53
SVMQ_MicroMom	*2.3%*	*15.2%*	*5.3%*	*14.3%*	*5.7%*	*14.3%*	3.5%	6.9%	2.28	0.50
SVMQ_MacroMicro	*2.1%*	*15.2%*	*5.9%*	*14.5%*	*5.9%*	*14.5%*	3.8%	6.6%	2.60	0.58
SVMQ_MacroMicroMom	*2.0%*	*15.5%*	*5.2%*	*14.0%*	*5.9%*	*14.0%*	3.9%	6.7%	2.66	0.59

Table 2.35. Emerging Markets: Performance of ESG-integrated country selection strategies

Emerging Markets: Annualized monthly returns of country-selection strategies from 2012-2020. Also reported are annualized long-short portfolio returns, standard deviations, t-statistics and Sharpe ratios. SVMQ represents the standard country-selection strategy while SVMQ_Macro, SVMQ_Micro, SVMQ_MicroMom and SVMQ_MacroMicroMom represent the ESG-integrated strategies, integrated using country (Macro) ESG, firm (Micro) ESG, firm (Micro) combined ESG Level and Momentum and the equally-weighted Macro ESG, Micro ESG and Micro ESG Momentum factor respectively.

| | Emerging Markets | | | | | | | | | |
| | S (Short) | | N (Neutral) | | L (Long) | | L-S(Long – Short) | | | |
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	T-Stat	Sharpe
SVMQ	0.0%	18.8%	0.9%	17.5%	-2.5%	17.6%	-2.4%	9.3%	-1.19	-0.26
SVMQ_Macro	0.0%	18.6%	-0.3%	17.5%	-2.3%	17.3%	-2.3%	9.3%	-1.11	-0.25
SVMQ_Micro	-0.2%	18.8%	-2.1%	17.9%	-1.6%	17.5%	-1.4%	10.3%	-0.61	-0.14
SVMQ_MicroMom	-0.2%	18.9%	-1.8%	17.1%	-0.8%	17.6%	-0.6%	10.4%	-0.27	-0.06
SVMQ_MacroMicro	0.1%	18.7%	0.3%	18.2%	-2.1%	17.2%	-2.2%	9.3%	-1.09	-0.24
SVMQ_MacroMicroMom	-0.1%	18.9%	-1.6%	17.1%	-2.2%	17.7%	-2.1%	9.8%	-0.98	-0.22
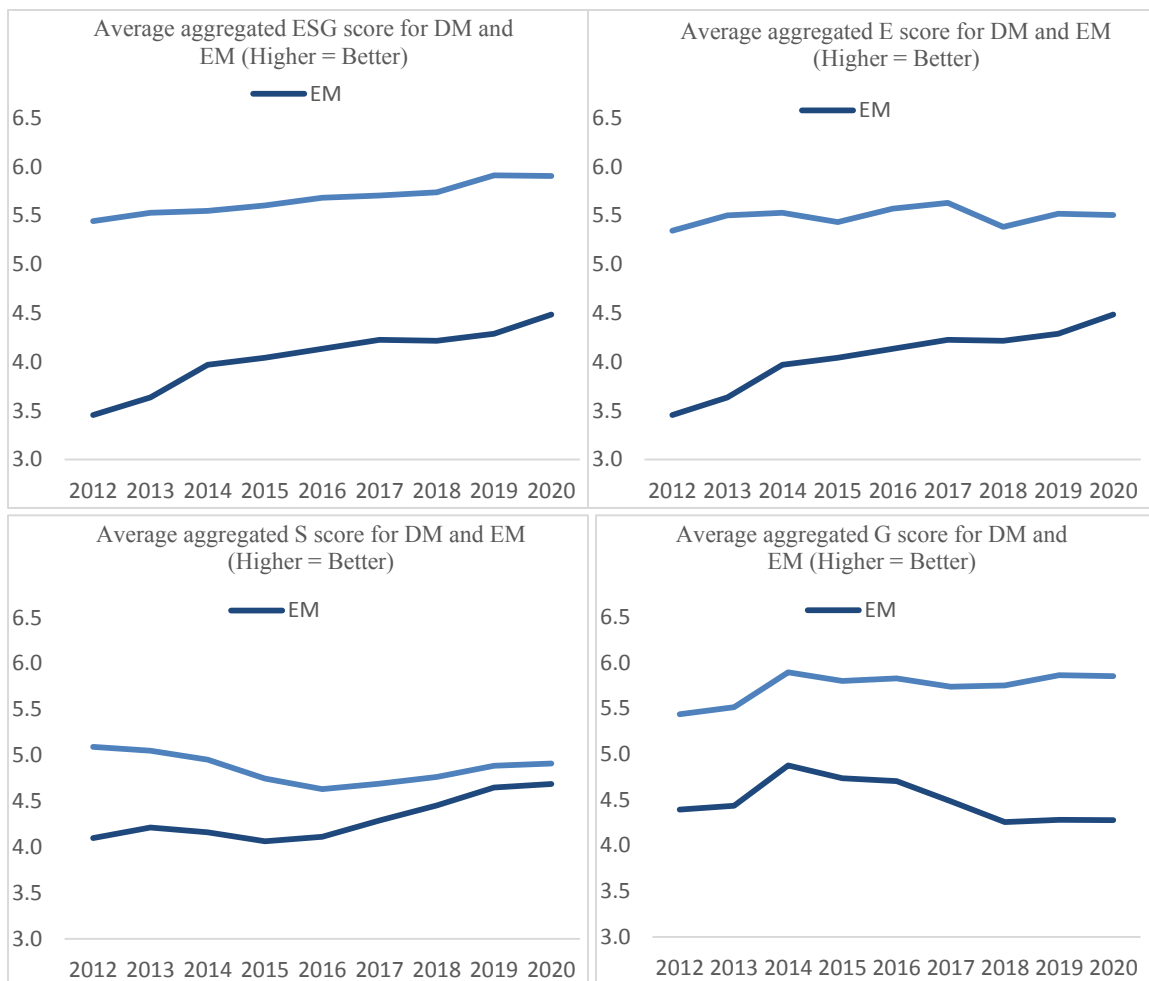
Figure 1.1 ESG scores for Developed Markets sample (DM) and Emerging Markets (EM) sample

This figure displays four graphs of the ESG, Environmental (E), Social (S) and Governance (G) scores respectively aggregated for the developed markets (DM) sample and the emerging markets (EM) sample. First, country scores are calculated as aggregates of firm-level scores by taking the mean of the company scores within each country. Next, we take the mean of the country scores within each sample to arrive at aggregates score for the developed markets sample and the emerging markets sample. This is conducted for the overall ESG score and repeated for each of the three pillars: E, S and G. The scores range from 1 – 10, with the highest score representing the best ESG profile. The aggregated scores are shown over the sample period (2012-2020).
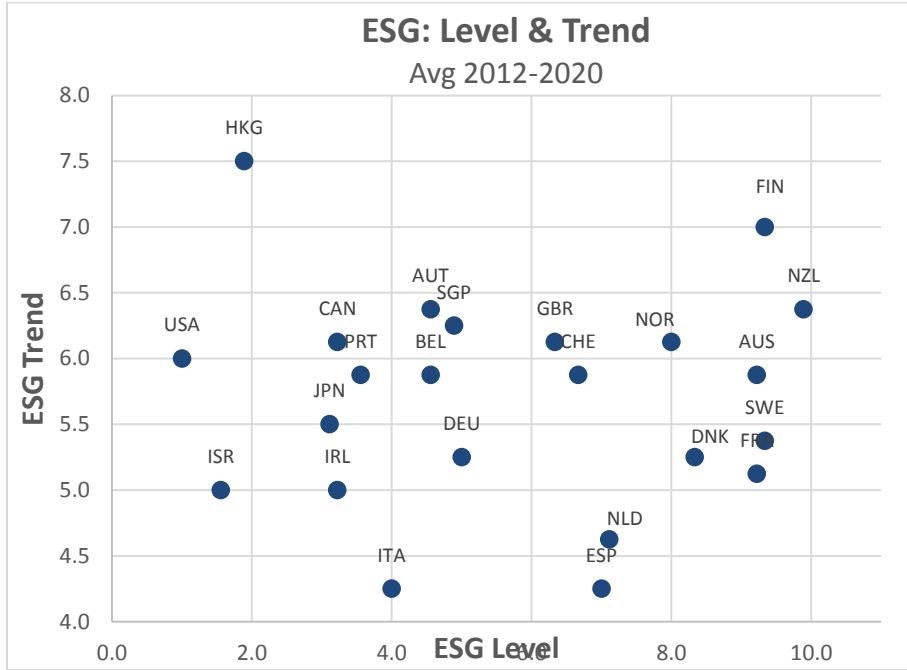
Figure 1.2 Developed Markets Scatter Plot: Average ESG Level and ESG Momentum ranks (2012-2020)

This figure displays a scatterplot graph of the average ESG level ranks on the x axis and average ESG momentum (trend) on the y axis for each developed market country over the sample period, 2012-2020. The ESG level rank is calculated as the ESG score of the companies within each country, ranked on a scale from 1 through 10, with 10 representing the best ESG profile and then averaged for the sample period. The ESG trend is calculated as the average annual change in ESG score over the sample period for each country, ranked from 1-10 with the highest rank representing the most improved ESG profile (highest ESG momentum).

Figure 1.3 Emerging Markets Scatter Plot: Average ESG Level and ESG Momentum ranks (2012-2020)

This figure displays a scatterplot graph of the average ESG level ranks on the x axis and average ESG momentum (trend) on the y axis for each developed market country over the sample period, 2012-2020. The ESG level rank is calculated as the ESG score of the companies within each country, ranked on a scale from 1 through 10, with 10 representing the best ESG profile and then averaged for the sample period. The ESG trend is calculated as the average annual change in ESG score over the sample period for each country, ranked from 1-10 with the highest rank representing the most improved ESG profile (highest ESG momentum).

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Portfolio Exposure to ESG
Developed Markets

Figure 1.4 ESG Exposure in Developed Markets Sample

Figure 1.4 shows the average ESG score of three multi-factor country allocation models in developed markets over the period 2012-2020. Base refers to the base model that includes Size, Value, Momentum and Quality, all equally-weighted. Base_ESG adds to that the standard ESG factor, equally-weighted. Base_ESGComb adds the combined ESG level and Momentum factor to the base model, again, equally-weighted. A higher score is representative of a higher ESG exposure. P1 (portfolio 1) represents the low ranked portfolio while P3 (portfolio 3) represents the high ranked portfolio. P3-P1 shows the ESG exposure of the zero-investment portfolio.

Portfolio Exposure to ESG
Emerging Markets
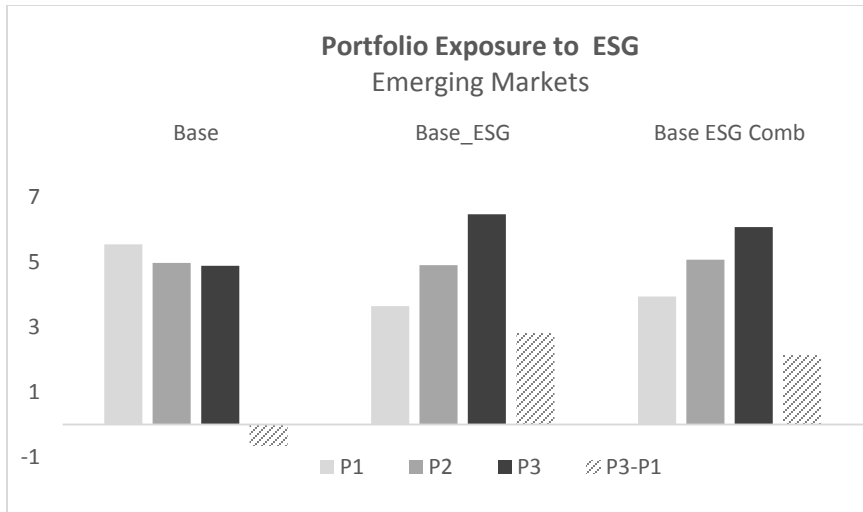
Figure 1.5 ESG Exposure in Emerging Markets Sample

Figure 1.5 shows the average ESG score of three multi-factor country allocation models in emerging markets over the period 2012-2020. Base refers to the base model that includes Size, Value, Momentum and Quality, all equally-weighted. Base_ESG adds to that the standard ESG factor, equally-weighted. Base_ESGComb adds the combined ESG level and Momentum factor to the base model, again, equally-weighted. A higher score is representative of a higher ESG exposure. P1 (portfolio 1) represents the low ranked portfolio while P3 (portfolio 3) represents the high ranked portfolio. P3-P1 shows the ESG exposure of the zero-investment portfolio.
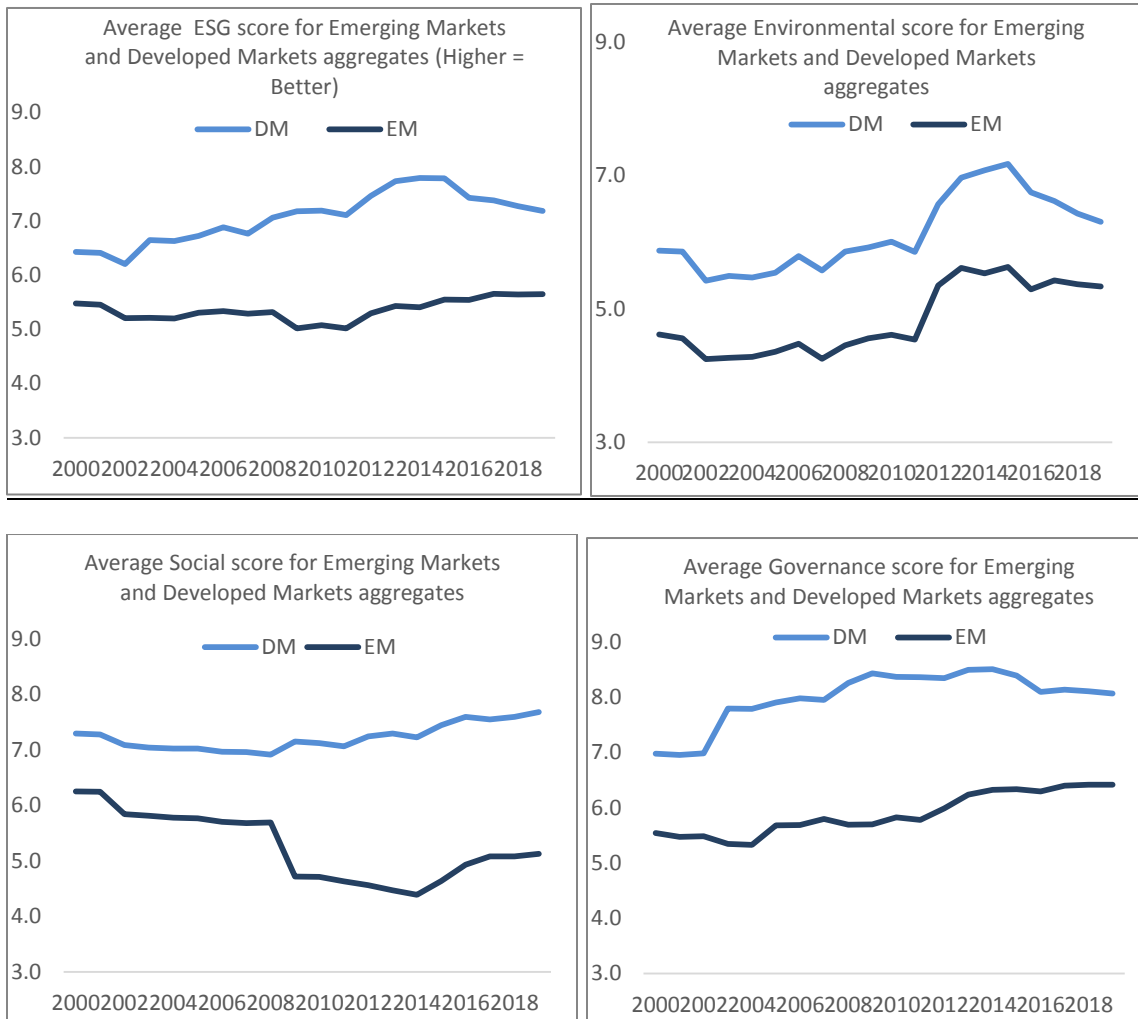
Figure 2.1 ESG performance in Developed Markets and Emerging Markets

Average (mean) ESG, Environmental (E), Social (S) and Governance (G) scores of countries in developed markets and emerging markets over the period 2000-2020. Scores range from 1 through 10 with a higher score representing better ESG performance.
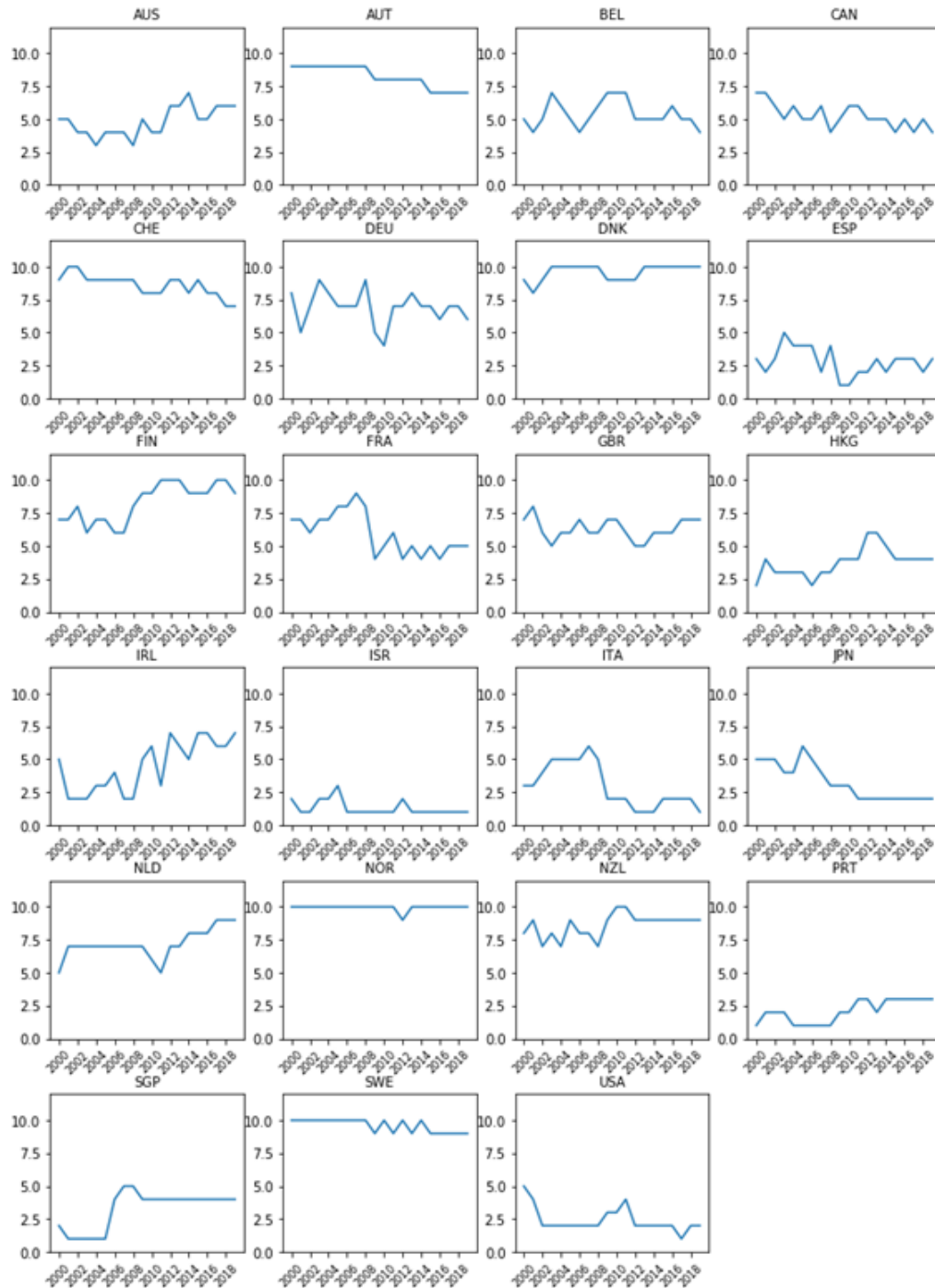
Figure 2.2 Time-series of ESG factor ranks in Developed Markets (2000-2020)

ESG factor ranks for developed markets countries displayed from 2000-2020. Ranks range from 1-10 with higher ranks representing better ESG performance.
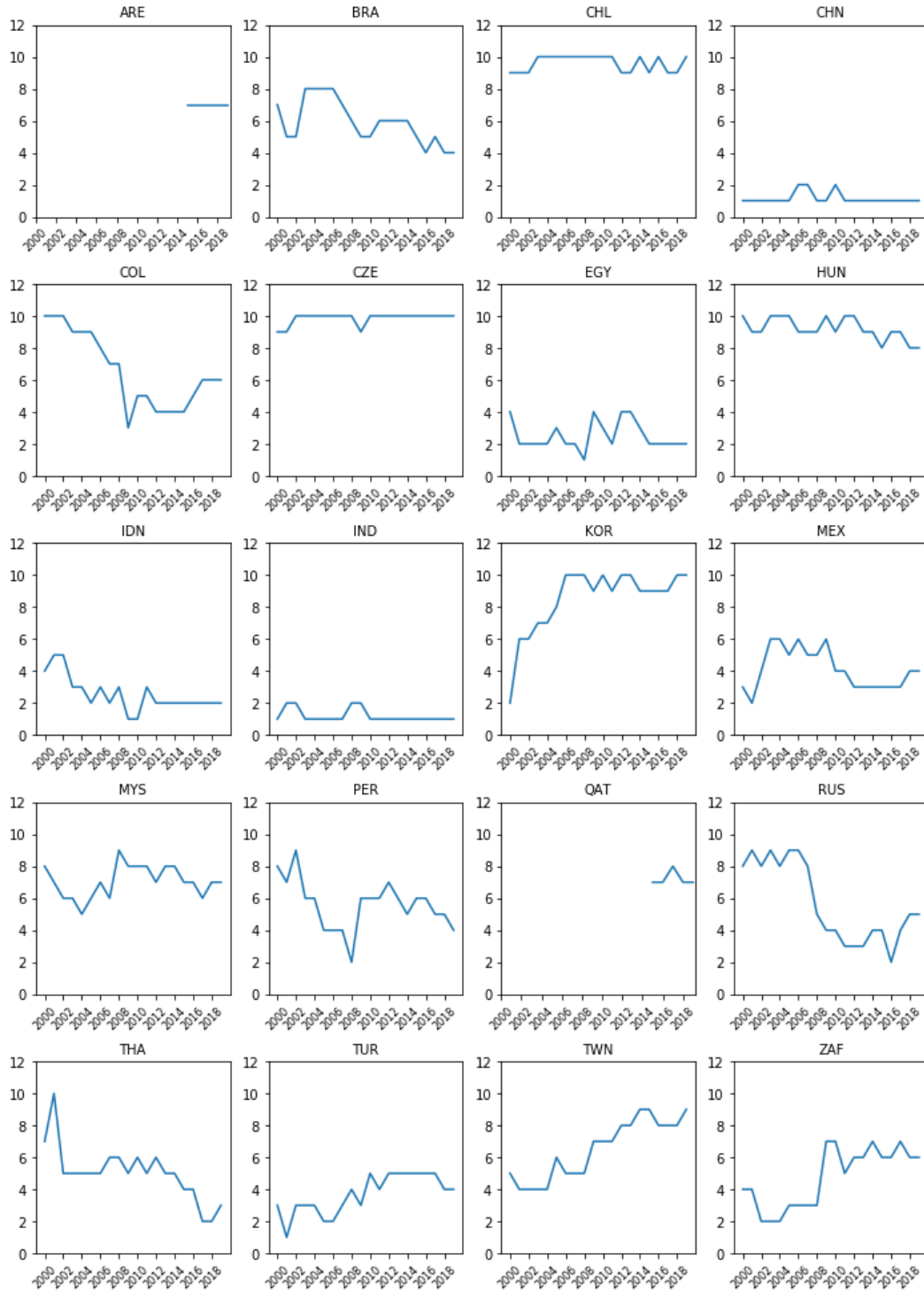
Figure 2.3 Time-series of ESG factor ranks in Emerging Markets (2000-2020)

ESG factor ranks for emerging markets countries displayed from 2000-2020. Ranks range from 1-10 with higher ranks representing better ESG performance.
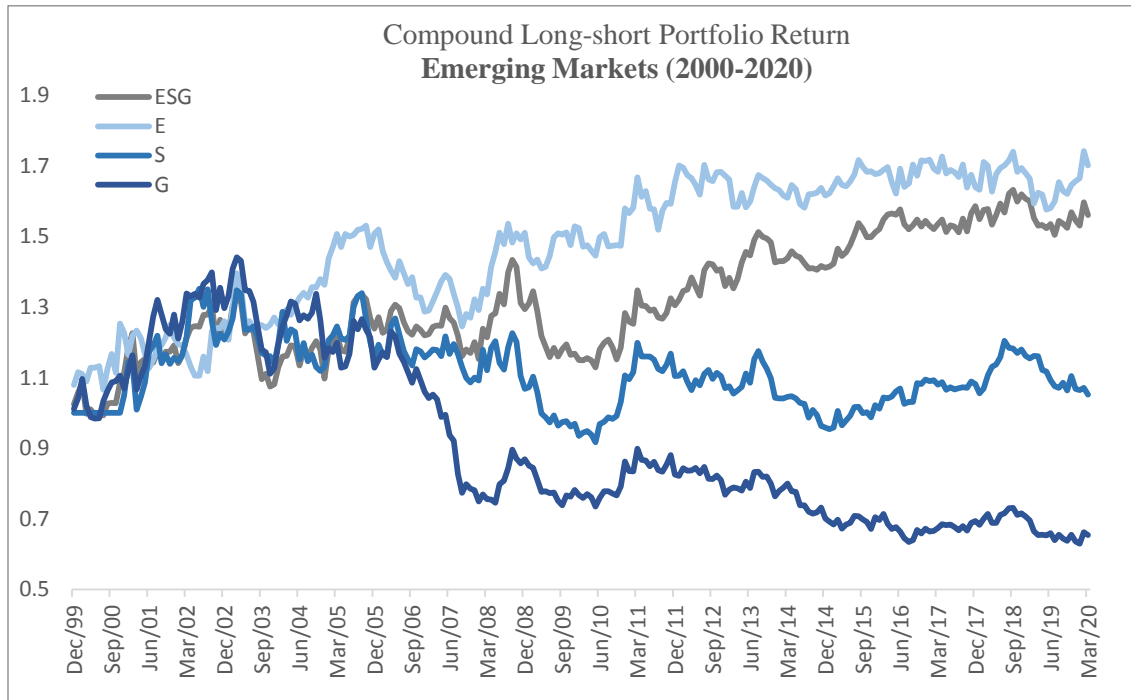
Figure 2.5 Emerging Markets Sample: ESG Factor long-short portfolio compound returns

Emerging Markets Sample: Time-series of compound monthly returns of long-short ESG, E, S and G factor portfolios, from 2000-2020.
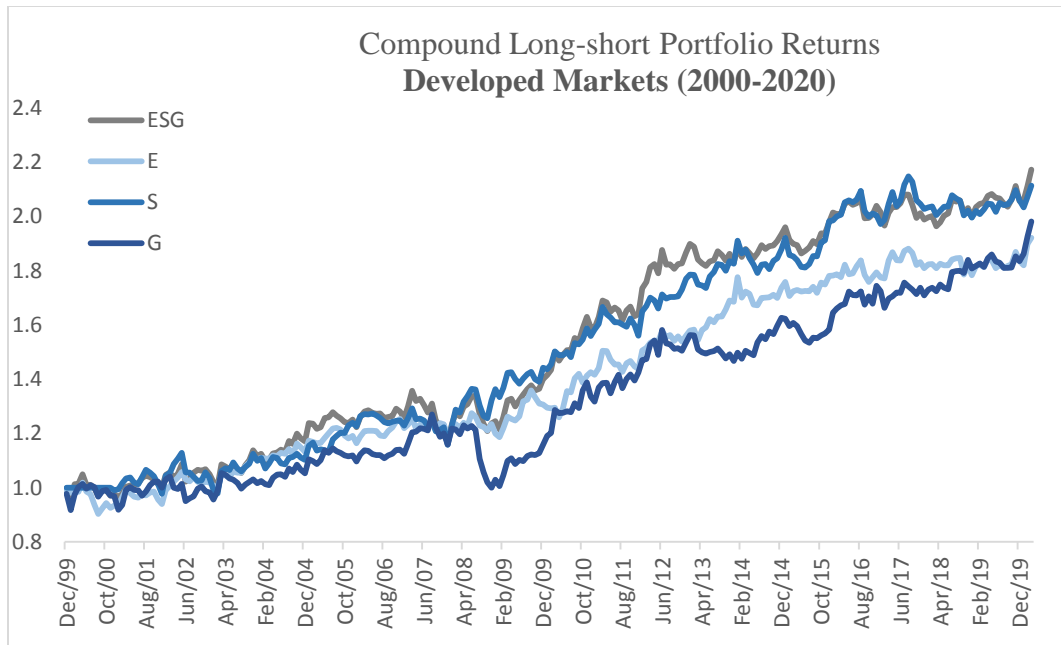
Figure 2.4: Developed Markets Sample: ESG Factor long-short portfolio compound returns

Developed Markets Sample: Time-series of compound monthly returns of long-short ESG, E, S and G factor portfolios, from 2000-2020.
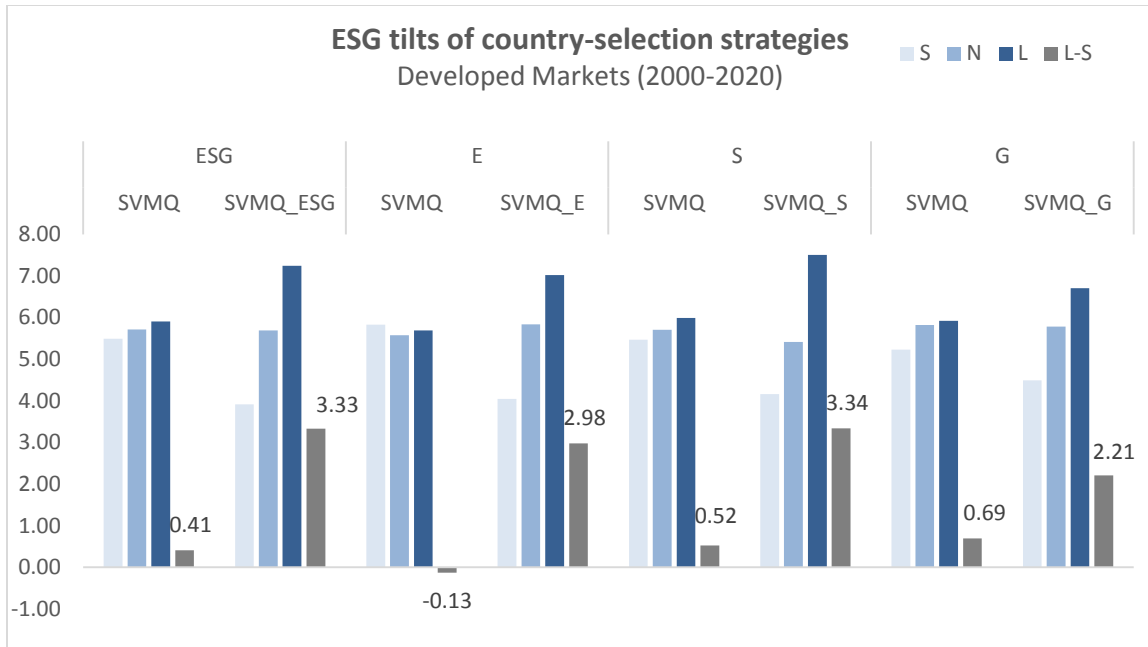
Figure 2.6 Developed Markets: ESG tilt of ESG-integrated country selection strategies

Average ESG, E, S and G scores by portfolio for the standard country selection strategy (SVMQ) and the ESG-integrated strategies including SVMQ_ESG, SVMQ_E, SVMQ_S and SVMQ_G, integrated with the relevant factor. Averages are calculated over the period 2000-2020.
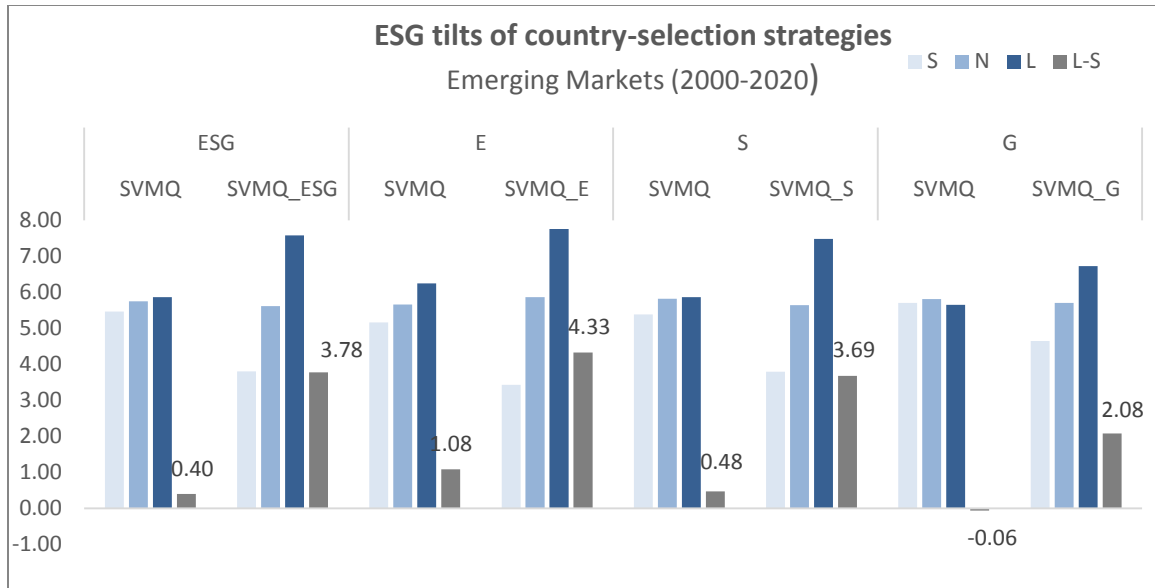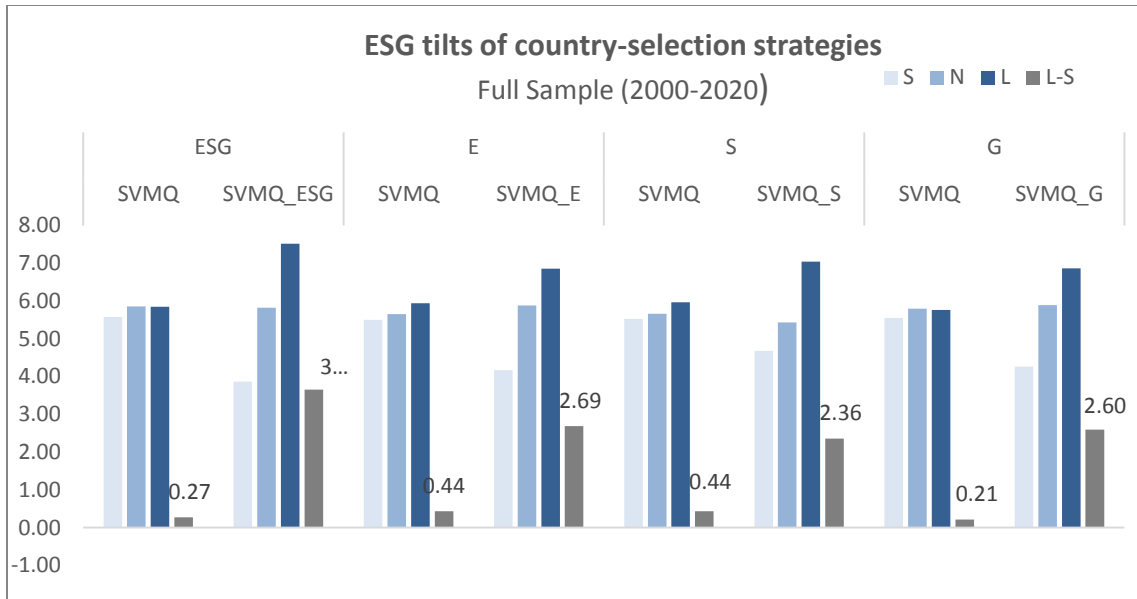
Figure 2.7 Emerging Markets: ESG tilts of ESG-integrated country selection strategies

Average ESG, E, S and G scores by portfolio for the standard country selection strategy (SVMQ) and the ESG-integrated strategies including SVMQ_ESG, SVMQ_E, SVMQ_S and SVMQ_G, integrated with the relevant factor. Averages are calculated over the period 2000-2020.
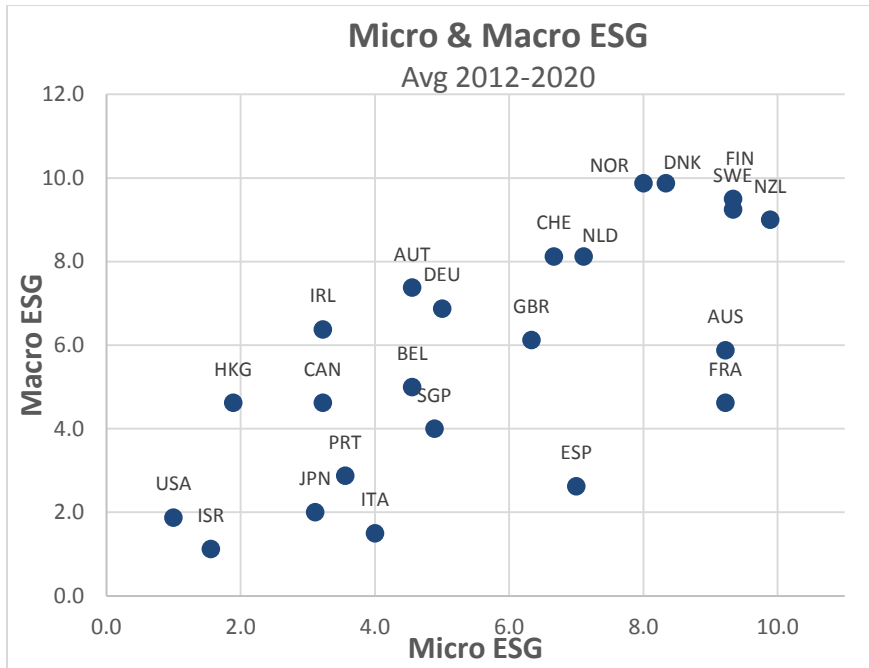
Figure 2.8 Full Sample: ESG tilts of ESG-integrated country selection strategies
Average ESG, E, S and G scores by portfolio for the standard country selection strategy (SVMQ) and the ESG-integrated strategies including SVMQ_ESG, SVMQ_E, SVMQ_S and SVMQ_G, integrated with the relevant factor. Averages are calculated over the period 2000-2020.

Figure 2.9. Developed Markets: Average Firm (Miro) and Country (Macro) ESG factor ranks

Average firm-level (Micro) ESG ranks on the x axis and average country-level (Macro) ESG ranks on the y axis, over the period 2012 to 2020. Ranks range from 1-10, with the highest rank representing the best ESG profile.
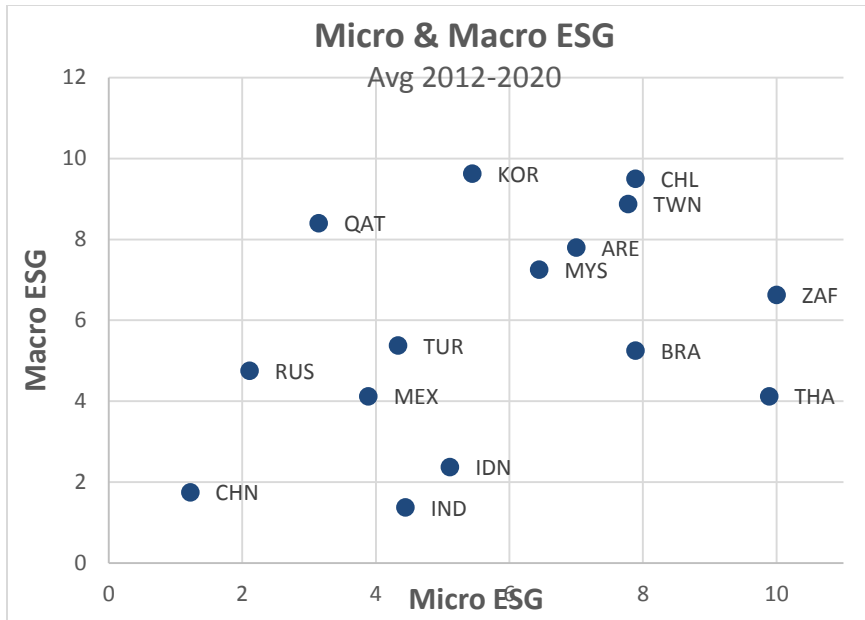
Figure 2.10. Emerging Markets: Average Firm (Micro) and Country (Macro) ESG factor ranks

Average firm-level (Micro) ESG ranks on the x axis and average country-level (Macro) ESG ranks on the y axis, over the period 2012 to 2020. Ranks range from 1-10, with the highest rank representing the best ESG profile.
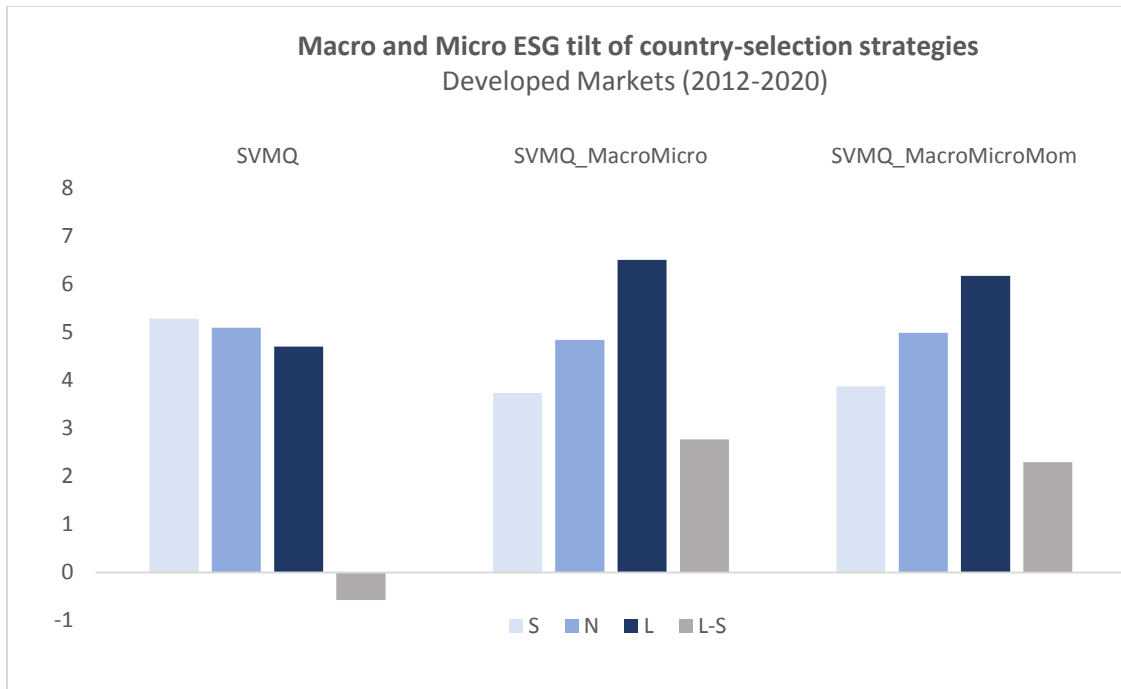
Figure 2.11 Developed Markets: ESG tilt of ESG-integrated country selection strategies

Average combined country (Macro) and firm (Micro) ESG scores by portfolio for the standard country selection strategy (SVMQ) and the ESG-integrated strategies. SVMQ_MacroMicro and SVMQ_MacroMicroMom represents the ESG-integrated country-selection strategies using the combined country (Macro) and firm (Micro) ESG factor and the combined country (Macro) ESG, firm (Micro) ESG level and firm (Micro) ESG Momentum factor respectively. Averages are calculated over the period 2012-2020.
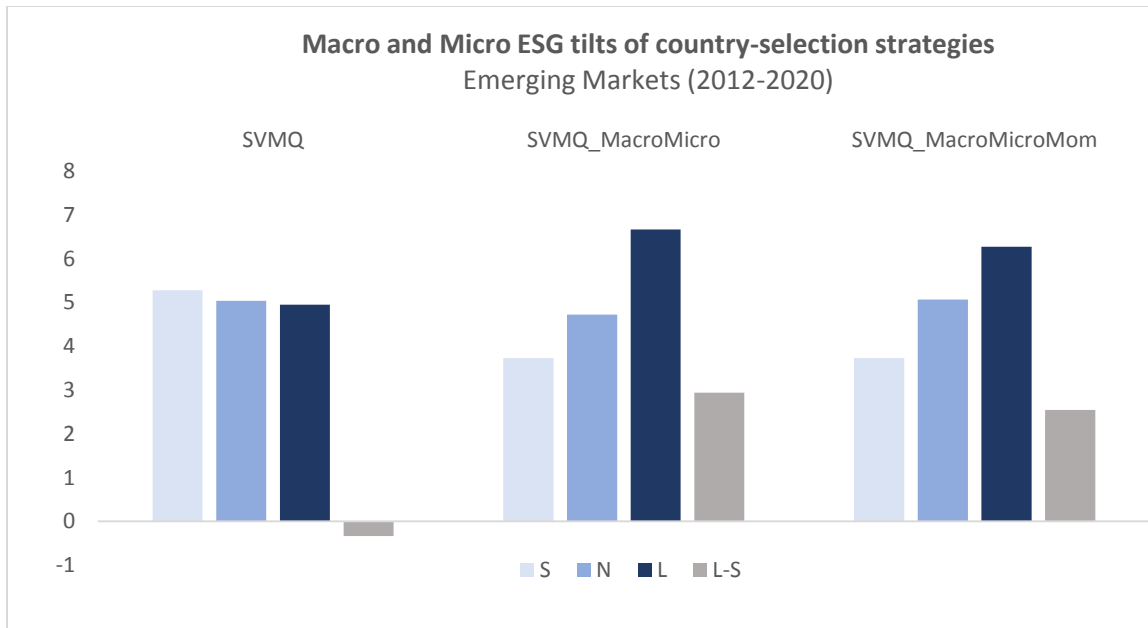
Figure 2.12 Emerging Markets: ESG tilt of ESG-integrated country selection strategies

Average combined country (Macro) and firm (Micro) ESG scores by portfolio for the standard country selection strategy (SVMQ) and the ESG-integrated strategies. SVMQ_MacroMicro and SVMQ_MacroMicroMom represents the ESG-integrated country-selection strategies using the combined country (Macro) and firm (Micro) ESG factor and the combined country (Macro) ESG, firm (Micro) ESG level and firm (Micro) ESG Momentum factor respectively. Averages are calculated over the period 2012-2020.