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Drawing Up the Bill: Does Sustainable Investing Affect Stock Returns Around the World?

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Abstract

This paper aims to provide the most comprehensive analysis of the relationship between Environmental, Social, and Governance (ESG) ratings and stock returns to date, based on over 9,000 stocks in 46 countries, a 20-year sample period, three different ESG rating providers, and extensive controls and fixed effects. We find very little evidence that ESG ratings are related to stock returns. This finding holds globally and within various geographic regions, within different sample periods, sectors, ESG ratings and subratings, and whether we use ratings in levels or changes. We also find little evidence that negative ESG screens affect investment returns. Overall, our results suggest that ESG investing has not affected investment performance during the past two decades.

Summary

Sustainable investing is on the rise. Institutional investors increasingly take Environmental, Social & Governance (ESG) considerations into account in their investment strategies. The impact of such strategies on financial returns is an important yet unresolved question. Thousands of academic and applied studies have investigated the relationship between ESG and stock returns but report conflicting findings – reflecting large differences in the choice of ESG ratings, empirical methods, and data coverage. We aim to conduct the most comprehensive analysis to date of the relationship between ESG and stock returns. In particular, we use ESG ratings from three different data providers (MSCI, Refinitiv & Sustainalytics) for 9,253 stocks in 46 countries over the last 20 years. Our analysis is conservative by controlling for an elaborate set of stock characteristics (such as size, value, and profitability) as well as for country and sector effects. Our main finding is that there is very little evidence for any relationship between ESG and stock returns. There is no robust relationship either globally or within different regions, sectors, ESG ratings and subratings, and ratings in levels or changes. Overall, our results suggest that ESG investing did not systematically affect investment performance over the past two decades.

Samenvatting

Duurzaam beleggen zit in de lift. Institutionele beleggers nemen steeds vaker ESG (Environmental, Social & Governance) criteria mee in hun beleggingsbeleid. Wat de gevolgen hiervan zijn voor financiële rendementen is een belangrijke, maar openstaande vraag. Er zijn duizenden academische studies naar de relatie tussen ESG en aandelenrendementen, maar deze rapporteren conflicterende bevindingen – wat een weergave is van grote verschillen in gebruikte ESG ratings, empirische methoden en reikwijdte van de sample. Ons doel is om de meest complete analyse van de relatie tussen ESG en aandelenrendementen tot nu toe te bieden. We gebruiken ESG ratings van drie verschillende bronnen (MSCI, Refinitiv & Sustainalytics) voor 9253 aandelen in 46 landen. Onze aanpak is conservatief door te controleren voor een groot aantal aandeelkarakteristieken (zoals size, value, profitability) en ook voor landen- en sectoreffecten. Ons belangrijkste resultaat is dat er geen overtuigend bewijs is voor een relatie tussen ESG en aandelenrendementen. We vinden geen robuuste relatie zowel globaal als regionaal, binnen verschillende sectoren, voor verschillende ESG (sub)ratings en met ratings gemeten in niveaus of in veranderingen. Al met al suggereren onze resultaten dat ESG beleggen de afgelopen 20 jaar geen systematische invloed heeft gehad op beleggingsrendementen.

We have witnessed remarkable growth in sustainable or “Environmental, Social, and Governance” (ESG) investing in the past decade. According to the 2018 Global Sustainable Investment Review, sustainable investing represents 63% of professionally managed assets in Europe and 49% in Australia. Other regions are catching up rapidly. In Japan and the USA sustainable investments grew by 38% and 307% between 2016 and 2018, respectively. Institutional investors such as pension funds account for most of this rise, underscoring the social welfare implications of sustainable investing. As such, sustainable investing has drawn the attention of policymakers worldwide, a recent example being the EU’s Sustainable Investing Disclosure Regulations (SFDR), an attempt to curb greenwashing.

An important question is how sustainable investing affects stock returns. A popular view in both academic research and the financial industry is that it is possible to attain higher risk-adjusted returns with sustainable investing. For example, Friede, Busch and Bassen (2015) conclude that “the large majority of studies report positive findings” and thus that “the business case for ESG investing is empirically very well founded.” Some prominent scholars disagree, however. For example, in a recent review Liang and Renneboog (2020) conclude that there is still no consensus about whether ESG investing helps or hurts performance.

Indeed, there are reasons for skepticism. First, many studies use a single ESG database even though these databases differ substantially from one another (e.g., Berg, Koelbel and Rigobon (2020)). Second, studies often use short sample periods, thus being prone to capture temporary outperformance due to, for example, unexpected shifts in investor demand for sustainable assets (e.g., Pastor, Stambaugh and Taylor (2020)). Third, at least a few prominent papers find that sustainable investing hurts performance (e.g., Hong and Kacperczyk (2009), Chava (2014), Bolton and Kacperczyk (2021)), which is in line with theoretical predictions (e.g., Fitzgibbons, Pedersen and Pomorski (2020), Pastor, Stambaugh and Taylor (2020)). Fourth, studies often focus on the USA despite 60% of sustainable investing assets being managed elsewhere (GSIA (2018)). As such, the performance of sustainable investing in less developed equity markets with fewer ESG regulations is unclear. Other geographic factors may play a role too. For example, pro-social European investors may be more willing to trade off financial for social returns than

their US counterparts are (e.g., Dyck et al. (2019)). In short, it is still unclear how sustainable investing affects stock returns around the world. We aim to fill this gap by leveraging a comprehensive dataset covering 9,253 unique stocks traded in 46 countries between 2001 and 2020, and by measuring sustainability using ESG ratings from three major raters (Refinitiv, MSCI, and Sustainalytics). To our knowledge, this is the most comprehensive dataset assembled to date to study the stock market performance of sustainable investing.

We begin our study by examining whether or not ESG ratings predict cross-sectional variation in future stock returns using our global sample. Following Bolton and Kacperczyk (2021) we do so using panel regressions of stock returns on lagged ESG ratings. Since there is a strong industry and country-level component in ESG ratings (e.g., Gillan, Koch and Starks (2021)), we aim to be conservative and include a rich variety of fixed effects.

Our main finding is that there is very little evidence that ESG is related to future stock returns once other stock characteristics and fixed effects are controlled for. This finding holds for all three rating agencies, in different periods, within different sectors of economic activity, within different regions, and when using the global sample. Strikingly, the only rating that shows predictive power for future stock returns in the global sample is MSCI's *G* rating. The economic significance of this effect is also small. We estimate that increasing the *G* rating by one standard deviation is associated with 0.55% greater annualized returns. Moreover, this finding is not robust across alternative specifications.

We also explore the possibility that ESG ratings can be combined into *Composite* ratings that predict future returns better than individual ratings do. Following Serafeim and Yoon (2021), we create *Composite* ratings for each ESG dimension (*E*, *S*, *G*, *ESG*) by averaging over the three individual raters along the relevant dimension. Whether or not *Composite* ratings predict better is theoretically unclear. On the one hand, *Composite* ratings can have more predictive power for future value-relevant news than individual raters have by canceling out noise (e.g., Serafeim and Yoon (2021)). It is also conceivable that sustainability-minded investors as a group demand more of a stock when various raters give that stock a high rating, making it more likely that non-pecuniary preferences are priced in (e.g., Fama and French (2007)). This scenario is more likely

to happen when *Composite* is high. On the other hand, *Composite* ratings may (i) mostly capture accessible information that is quickly incorporated into prices, or (ii) cancel out the disagreement component of ratings that has predictive power for risk premia (e.g., Gibson, Krueger and Schmidt (2020)), or (iii) be noisy predictors of future returns. In line with the latter explanations, we find little evidence that *Composite* ratings affect future returns.

To understand whether or not sustainable investing affects returns differently around the world, we study the performance of sustainable investing within different regions: Asia-Pacific, Europe, Emerging countries, Japan, and North America. We conduct this analysis for the full sample period (2001-2020), but we also conduct separate analyses for the periods 2001-2012 and 2013-2020. Isolating the post-2013 period accommodates the possibility that the large inflow of funds into high ESG assets during this period might have led to temporary outperformance of sustainable investing (e.g., Pastor, Stambaugh and Taylor (2020)).

Overall, we find that our previous results using the global sample often hold when considering each region separately. There are, however, three nuances that occurred during the post-2013 period. First, *G* ratings positively predicted future stock returns in North America when we used MSCI and Sustainalytics ratings, but not when we used Refinitiv or *Composite*. This result is consistent with Fitzgibbons, Pedersen and Pomorski (2020) who find similar results for the USA using a proxy for *G* based on accounting accruals. One possible explanation is that the the ESG boom in the post-2013 period made investors more attentive to *E* and *S* at the expense of *G*. Second, higher *E* is associated with lower future returns in Europe. This effect, however, is only significant at the 10% level post-2013 using MSCI ratings and over the full sample period using either MSCI's or Sustainalytics' ratings. Given the rising prominence of climate change concerns among Europeans, this result may reflect environmentally-minded investors accepting lower returns when holding green assets (e.g., Pastor, Stambaugh and Taylor (2020)).

Third, stocks with higher *E* and *S* ratings tend to perform better in emerging economies post-2013. The effect sizes are not negligible. For instance, a one standard deviation increase in MSCI's (Sustainalytics') *E* ratings is associated with 2.14% (1.48%) greater annualized returns. This result is consistent with Friede, Busch and Bassen (2015). In their meta-analysis, 65.4% of the un-

derlying studies find a positive relationship between sustainability and financial performance in emerging economies, almost double the 38% figure for developed markets.

Although we are careful not to overinterpret individual results in a rich set of empirical analyses, we believe there may be good economic reasons for this finding. For example, the fact that emerging markets tend to have less efficient stock markets (e.g., Levine (2005)) makes it more likely that the information that ESG ratings may contain about future firm fundamentals is incorporated into prices with a delay. Emerging markets may also be particularly inefficient in processing ESG information because cross-rater disagreement in ESG ratings may be particularly high in these markets. This may lead to value-relevant information in ratings being incorporated more slowly into prices (e.g., Serafeim and Yoon (2021)). Our results might also be partly driven by investors not wanting to pay a premium to hold high ESG stocks with high cross-rater disagreement (e.g., Avramov et al. (2021)).

In line with these ideas, our summary statistics indicate that cross-rater disagreement tends to be high in emerging economies. For example, the full sample correlations between the *E* ratings of Sustainalytics-MSCI (Refinitiv-MSCI) are 26.56% (12.84%) in Latin America and 13.04% (11.30%) in Emerging Europe, Middle-East and Africa. The equivalent figures in Europe and North America are 31.70% (33.16%) and 38.28% (30.73%), respectively.

Our next goal is to analyze the extent to which the performance of sustainable investing varies across sectors of economic activity – a topic on which there is little consensus (e.g., Coqueret (2021)).¹ We find that investors can pursue sustainable investing within any sector without affecting returns. The exception to the rule is the energy sector, where firms with higher *G* tend to have higher returns. This result is robust across ESG raters and is economically meaningful. A one standard deviation increase in *G* is associated with an annualized gain between 1.90% and 3.71% depending on the rater. Although we do not rule out the possibility that this is a type I error, we note that the result is consistent with (i) the idea that investors may fail to fully appreciate the information that *G* has about future returns (e.g., Fitzgibbons, Pedersen and Pomorski (2020)), and (ii) the evidence in Giroud and Mueller (2010) that good governance is more likely

¹The results relating to the impact of sustainable investing by sector of economic activity are available on request.

to create value in non-competitive industries such as the energy industry.

Next, we evaluate the effects of screening out stocks with low ESG ratings by comparing the performance of low ESG stocks with the performance of the remaining stocks in our sample. This is important because negative screens are still the most frequent sustainable investing strategy (e.g., Amel-Zadeh and Serafeim (2017)). This analysis also lessens the concern that we may be overlooking a potentially important non-linearity in the relationship between ESG ratings and returns. We find that low ESG stocks tend to perform worse than their better-rated counterparts, but this effect is often not precisely estimated.²

Throughout the paper, we also repeat most analyses based on changes in ESG ratings (ESG momentum) following Nagy, Kassam and Lee (2016). We do not find robust evidence that ESG momentum predicts cross-sectional variation in stock returns.

Overall, our findings suggest that sustainable investing has not hurt performance over the last two decades. Three important implications follow from this. First, our results suggest that sustainable investing has not systematically reduced the cost of equity of sustainable firms in the past. This casts doubt on the view that sustainable investing is a reliable solution to push firms to internalize climate and social externalities (e.g., Pastor, Stambaugh and Taylor (2020), Fama (2021)), at least if we consider the past to be indicative of the future. Second, it might be possible to “do good without doing poorly.” In other words, sustainable investing may not always imply worse risk-adjusted performance even over relatively long periods. Third, the flat relationship between ratings and returns also has a positive aspect, which is that the valuations of high ESG stocks may not be excessive – at least yet.

We caution, however, that our findings do not show whether or not the documented relationship between ESG ratings and stock returns will persist going forward. For example, one scenario is that investors’ non-pecuniary preferences for sustainability are priced in, resulting in the underperformance of sustainable stocks. Innovations in the ESG ratings industry might also lead to a timelier release of ratings that are more informative about future profitability, which

²These results are unreported and available on request. In detail, we define low ESG stocks to be those stocks which belong to the bottom 10% of the distribution of ESG ratings or ESG momentum in a given month. We consider both the case in which stocks perform worse than their sector peers do in terms of ESG and the case in which they perform worse than the rest of the stocks in our sample do.

could lead to a temporary outperformance of ESG strategies. Over the long-term, however, if ratings improvements reduce uncertainty about the future payoffs of high ESG stocks the most, models of incomplete information would predict lower expected returns for these stocks (e.g., Merton (1987), Avramov et al. (2021)). A reduction in greenwashing due to improvements in the informativeness of ESG ratings and increased accountability of socially responsible investment managers may also lead to lower returns by making it easier for pro-ESG preferences to be priced in (e.g., Liang, Sun and Teo (2020)). More generally, our analysis takes ESG ratings at face value and thus bypasses potential concerns about the reliability of the ratings, changes in rating methodologies, and other issues. We thus take the perspective of an investor who directly uses these general ESG ratings as input for investment strategies. We cannot rule out that there may have been a relationship between more sophisticated approaches to sustainable investments or those that are based on more fine-grained ESG subscores with stock returns in the past.

We contribute to the vast literature studying the performance of sustainable investing strategies. Despite a wealth of research on this topic, we have not yet reached a consensus. For each of the many papers that find a negative relationship between sustainability and stock returns (e.g., Fornell et al. (2006), Hong and Kacperczyk (2009), Edmans (2011), Bolton and Kacperczyk (2021)) there is another paper that finds a positive or flat relation (e.g., Derwall et al. (2005), Kempf and Osthoff (2007), Statman and Glushkov (2009), Khan, Serafeim and Yoon (2016)). In a related paper, Gianfrate, Kievid and van Dijk (2021) studied whether high ESG stocks outperformed low ESG stocks during the COVID-19 market crash. It is often argued that high ESG stocks have the characteristic of "rainy day assets" in the sense that they shield investors from the impact of adverse market shocks, for example because of enhanced customer and investor loyalty. Gianfrate, Kievid and van Dijk (2021) find evidence for such an effect in stock markets in North America, but not in any other major region in the world. This lack of consensus in the literature arises at least partly because these studies differ in quality, geographic coverage, period studied, and the sustainability measures used. We try to tackle these limitations by studying the performance of sustainable investing using different measures of sustainability over a long pe-

riod and many geographies and industries, all under the umbrella of the same methodological framework.

We also contribute to the relatively young literature that studies disagreement in ESG ratings. A few papers show that correlations of ESG ratings across different raters are fairly low (e.g., Chatterji et al. (2016), Berg, Koelbel and Rigobon (2020), Gibson, Krueger and Schmidt (2020), Avramov et al. (2021), Serafeim and Yoon (2021)). However, all of these studies focus on the USA market, often over a short period. For example, Berg, Koelbel and Rigobon (2020) focus on a single year and Gibson, Krueger and Schmidt (2020) study the period 2010-2017. Our contribution is twofold. First, we show that cross-rater disagreement is not a US phenomenon but rather a global phenomenon that applies to rated firms all over the world. Second, we show that there is some geographic variation in cross-rater disagreement, with disagreement often being higher in some emerging economies.

1 Data and Summary Statistics

In this section, we detail how we construct the dataset (Section 1.1) and present summary statistics (Section 1.2).

1.1 Data and sample

We construct a global dataset of monthly stock returns covering the period from January 1999 to December 2020. This period is chosen to match the availability of ESG data. The data is sourced from The Center for Research in Security Prices (CRSP), Compustat North America, and Compustat Global. According to Compustat and CRSP, together these databases cover over 98% of the worldwide market capitalization and are close to being survivorship bias-free.³

We limit the sample to securities traded in major stock exchanges to reduce concerns about stock illiquidity. Since the literature uses different criteria to define whether or not a stock exchange is minor, we limit our discretion by defining an exchange as minor if both Bessembinder et al. (2019) and Chaieb, Langlois and Scaillet (2021) do so.⁴

We compute stock returns and clean the data using the procedures detailed in Bessembinder et al. (2019). We retain securities classified as common or ordinary shares and exclude depositary receipts, preferred stock, warrants, investment funds, and investment trusts. To avoid double counting we select the primary issue for each firm using Compustat flags. In case there is more than one primary issue, we retain the issue with the longest listing period and, if a tie remains, we select the issue in the headquarters country. The remaining filters include: (i) the exclusion of stock months with fewer than five daily observations with positive closing prices, (ii)

³Compustat is not completely survivorship bias-free, especially before 1978, when coverage was more limited. As noted in previous literature, however, this is unlikely to affect the results of studies using more recent data (e.g., Porta (1996), Chan, Jegadeesh and Lakonishok (1995)).

⁴We acknowledge that many papers use Datastream as a source of data for international stock returns. We use Compustat Global instead. Our main motivation is that Chaieb, Langlois and Scaillet (2021) conducted an in-depth comparison of both databases and concluded that Compustat Global has considerably fewer errors than Datastream. Compustat Global also differs from Datastream in that it provides historical identifiers, and it distinguishes between types of daily quotes (e.g., the difference between a closing price and a price that is carried forward). An additional advantage of Compustat Global is that accounting data is normalized and made comparable across countries by taking into account cross-country differences in accounting principles. Datastream has the advantage of having the 1970s as the starting date for the time series of stock returns in some countries. The equivalent series in Compustat start in the 1980s. This is, however, inconsequential for our purposes because ESG rating data did not exist in the 1970s. The first rater, Vigeo Eiris, was founded in 1983 (e.g., Berg, Koelbel and Rigobon (2020)).

the exclusion of stocks with fewer than six months of coverage, (iii) textual algorithms applied to firm names and business descriptions to identify and exclude misclassified non-common stock and investment funds and trusts, (iv) one algorithm to correct decimal errors in the data (e.g., 34.5 instead of 3.45), (v) various filters to correct mistakes (e.g., abrupt jumps) in the time series of the number of shares outstanding, stock returns, and market capitalization, and (vi) adjustments for delisting returns and inactive securities that are erroneously flagged as active. Despite their comprehensiveness, these filters correct market capitalization and stock returns data in fewer than 2% of the observations not excluded by the filters (Bessembinder et al. (2019)). For the full list of filters refer to Bessembinder et al. (2019).

In addition, we employ two additional filters outlined in Chaieb, Langlois and Scaillet (2021): (i) security name screens which correct misclassifications of security types in Compustat, and (ii) manual data corrections.⁵ Once all the filters are applied the dataset covers 6,567,124 stock-month observations corresponding to 57,655 stocks traded in 65 exchanges spread over 50 countries.

We expanded the dataset to include several standard variables used as controls in studies of cross-sectional predictability of international stock returns (e.g., Hou, Kho and Karolyi (2011), Fama and French (2017), Bolton and Kacperczyk (2021)), such as *size*, *B/M*, gross profitability, and momentum. Appendix Table A.1 provides detailed variable definitions and sources.⁶ As in previous literature (e.g., Fama and French (1992, 2017)), we assume that it takes at least six months for fiscal year-end accounting data to become publicly available. Hence, we match stock return data between July of year $t+1$ and June of year $t+2$ to the latest fiscal year-end accounting data available at the end of calendar year t . *Size* (natural logarithm of market capitalization) is measured at the end of the calendar year before the year in which stock returns are mea-

⁵An example of a misclassification that is corrected by the first filter of Chaieb, Langlois and Scaillet (2021) is that of Brazilian depository receipts that are misclassified as common stock. An example of a manual data correction done in the second filter is the following: "There is an error in the adjustment factor (*ajexdi*) [for one specific security] from 01/09/2007 to 20/03/2007, it should be 1 instead of 10, verified on Bloomberg." Another example of a manual data correction is the following: "The Canadian stock is delisted on January 1, 2017, there is a spike in the price on December 30, 2016, and the time series ends on December 2, 2016, on Bloomberg. We remove it for December 2016. CSXF is also missing the total return adjustment for the 100-to-1 conversion on November 1, 2013, which creates a 100+ % return. We remove it for November 2013." For the full list of 20 manual corrections refer to Chaieb, Langlois and Scaillet (2021).

⁶The Appendix and the Internet Appendix are available on request.

sured. The values of market capitalization used to compute the book-to-market ratio are measured as of the end of the calendar year in which the fiscal year-end of the book value of equity measurement falls in. All control variables are winsorized at the 0.5% and 99.5% levels based on the whole sample distribution.

We merge the global dataset of monthly stock returns with the following ESG rating products: MSCI Intangible Value Assessment (MSCI IVA), Refinitiv ESG, and Sustainalytics' ESG Risk Ratings. These rating products have been widely used in the literature (e.g., Berg, Koelbel and Rigobon (2020), Serafeim and Yoon (2021)). We use them for three reasons. First, they have wider global coverage relative to competitors. Second, they are among the most widely used ESG ratings by investors, with a recent survey finding Sustainalytics, MSCI and Refinitiv being ranked by investors as the first, third, and eighth most useful ESG ratings, respectively (SustainAbility, 2020).⁷ Third, these raters have different countries of origin which can lead to cross-rater differences in ESG ratings. For example, Eccles, Lee and Stroehle (2020) argue that Dutch rater Sustainalytics is more stakeholder-oriented than its USA counterpart MSCI due to their different origins. Another example is Gibson et al. (2020), who argue that raters from civil law countries (e.g., Sustainalytics and Refinitiv) may have a comparative advantage in identifying financially material social issues while raters from common law countries (e.g., MSCI) may rate better on governance dimensions. By choosing raters that differ along these dimensions, our analysis allows for cross-rater heterogeneity that might affect the returns to sustainable investing. We use the separate environmental (*E*), social (*S*), and governance (*G*) dimensions of ESG provided by each rater. Importantly, all three raters take into account the materiality of the underlying ESG data for each company when constructing ESG ratings. Despite differences in methodology, raters do this mainly by identifying the most relevant *E* and *S* issues in each industry. These ratings are, therefore, sector-specific.⁸ We re-scale the ratings to range from zero to 100

⁷Note that in the report Refinitiv ESG is identified as *Thomson Reuters ESG Scores*. The inconsistency arises because Thomson Reuters ESG was renamed Refinitiv ESG after the spin-off of Thomson Reuters' Financial & Risk Unit.

⁸In the case of MSCI IVA, the rater sometimes also takes into account company-specific key issues that may not be relevant to the rest of the industry. The methodology is often different for *G* scores, however. Refinitiv uses country of incorporation as a benchmark under the assumption that optimal governance practices do not vary across industry or geography and, as such, does not apply a benchmark. As for Sustainalytics, our understanding is that it applies the methodology described above across all three dimensions of ESG.

by multiplying by 10 when necessary as in previous research (e.g., Christensen, Serafeim and Sikochi (2021), Serafeim and Yoon (2021)) and obtain ESG (*ESG*) ratings by averaging *E*, *S*, and *G*. In the case of Sustainalytics and MSCI we use weighted averages that reflect the raters' assessment of the relative importance of each dimension for a given firm at a given point in time. The weights are directly provided by the raters. In the case of Refinitiv such weights are not provided and we use a simple average.⁹

To ensure that ESG information is available as of December of the year before the year in which stock returns are realized, we follow previous studies (e.g., Lins, Servaes and Tamayo (2017), Albuquerque et al. (2020),) and match the most recent ESG ratings available as of the end of year $t-1$ to stock returns in year $t+1$.¹⁰ The ESG data used in this paper covers the period 1999 to 2018 and stock return data covers the period 2001 to 2020. We also compute ESG momentum variables for each dimension of ESG, following the method used by Nagy, Kassam and Lee (2016). These are defined as the year-on-year changes in ratings.

To allow for the possibility that combining information across raters enhances the predictive power of ESG ratings, we also create a fictitious rater (*Composite*) by separately averaging each dimension (*E*, *S*, *G*, and *ESG*) across raters. To lessen the effect of the problem that statistical distributions of ratings differ across raters, we follow Gibson, Krueger and Schmidt (2020) and convert the ratings at each point in time to percentile ranks before averaging.

To ensure a minimum standard of representativeness in each country we only retain stocks traded in countries for which there is ESG data for at least ten stocks during the sample period. This criterion excludes Jordan, Oman, Sri Lanka, and the United Arab Emirates. The final dataset covers 9,253 stocks in 46 countries and operating across 73 industries from January 2001 to December 2020.¹¹ The coverage differs substantially across raters, however. The MSCI subsample is the most comprehensive. Its starting date is between January 2001 and January 2003 for most countries and covers 8,291 stocks in 45 countries. The Refinitiv subsample starts in Jan-

⁹In the cases of MSCI IVA and Sustainalytics, the results are similar if we use simple averages instead of weighted averages. These results are available on request.

¹⁰Our approach is equivalent to rebalancing an investment portfolio at the end of December of each year t using ESG ratings as of the end of year $t-1$ and holding that portfolio until the end of year t . This is done to alleviate the concern that our results are based on ESG data that is not available to investors at the time of portfolio rebalancing.

¹¹We use historical six-digit Global Industry Classification Standard Codes (GICS) codes.

uary 2004 and includes 6,593 stocks in 43 countries. The Sustainalytics subsample is smaller, starting in January 2011 for most countries and encompassing 4,371 stocks in 38 countries. Internet Appendix Table IA.1 reports the number of unique firms/stocks, industries, and sample period starting dates for each country-rater pair.

1.2 Summary statistics

Figure 1 summarizes how the unique firms/stocks in our sample are distributed across world regions and countries. A total of 80% of the stocks are traded in developed countries and 20% in emerging economies. North American stock exchanges are home to 42% of sample stocks, followed by Europe and Emerging Asia with proportions of 21% and 14%, respectively. Japan constitutes 8% of the sample stocks and the remaining stocks in other Asia-Pacific countries sum up to 9%. The remaining 6% of stocks are equally spread between Latin America (3%) and Emerging Europe, Middle-East and Africa (3%).¹²

[Figure 1 see page 48]

The distribution across countries is even more uneven, with 80% of sample stocks listed in 11 of the 46 countries. Other than the USA which accounts for 38% of sample stocks, the most well-represented countries are Japan (8%), the UK (7%), China (5%), Australia (4%), Canada (4%), Hong Kong (4%), India (3%), Germany (2%), Sweden (2%), and France (2%).

The heatmaps in Figure 2 illustrate the geographic distribution of 2018 *ESG* ratings across countries for the three raters and the cross-rater combination *Composite*. Since *ESG* changes slowly over time and coverage differs across raters, we use the last year of data to maximize cross-sectional coverage and comparability across raters. A detailed table with mean values of *ESG* by country, region, and rater covering the entire sample period is provided in the Internet Appendix Table IA.2.

¹²We separate Asia-Pacific from Japan throughout the paper to accommodate the finding in the literature that cross-sectional variation in Japanese and non-Japanese Asia-Pacific stock returns are explained by different asset pricing models (e.g., Fama and French (2017)). Japan is also often singled out as the most notorious exception to the ubiquity of momentum premia around the world (e.g., Fama and French (2012), Asness, Moskowitz and Pedersen (2013)), even though some authors disagree with this interpretation of the evidence (e.g., Asness (2011)). The use of the region Emerging Europe, Middle-East and Africa (EMEA) follows Chaieb, Langlois and Scaillet (2021).

[Figure 2 see page 49, 50]

Comparing the heatmaps we see that ESG ratings tend to be highest in non-Eastern European countries, with Finland often topping the list, and lowest in some emerging economies such as China, Russia, and the Philippines. The USA and the UK tend to have medium-low and medium-high ratings, respectively. This is consistent with the findings in Liang and Renneboog (2017) that ESG is lowest in countries with a strong history of socialism and highest in civil law countries. The latter countries typically have stronger pro-social community norms, lower likelihood of shareholder litigation against management, and stronger labor and environmental regulations – all forces likely to favor ESG (e.g., Liang and Renneboog (2017), Dyck et al. (2019), Ilhan et al. (2020)).

There is, however, substantial disagreement across raters in many cases. For example, Brazil and India's MSCI ratings are noticeably lower than those of the other two raters. Even more striking is that Australia's Refinitiv ratings place it on par with the USA whereas MSCI ratings suggest Australia's ESG performance is close to that of Western Europe.

To better understand the extent to which raters' ESG ratings diverge, we compute the correlation between the ESG ratings of different raters within geographic regions and worldwide. Since ESG data coverage increases over time we follow Gibson, Krueger and Schmidt (2020) and compute correlations over the full sample period instead of computing the time series means of within-period correlations. Figure 3 shows the results. Four findings emerge. First, for every dimension of ESG and every region, the average correlation across raters is relatively low, often in the 0.1-0.5 range. Second, there is wide variation in correlations across rater pairs, with Sustainalytics and Refinitiv displaying correlations close to 0.7 in some cases. MSCI diverges the most from the other two raters, with correlations often fluctuating between 0.1 and 0.4. This is consistent with Berg, Koelbel and Rigobon (2020) who find, based on a smaller US-only sample, that MSCI's choices of which ESG attributes to measure are the most idiosyncratic among six leading raters (e.g., whether or not to include electromagnetic radiation as part of *E*). Third, there is a tendency for raters to agree the most on the ratings of European and Asian firms and disagree the most with respect to firms in Latin America and Emerging Europe, Middle-East, and Africa

(EMEA). This might be driven by cross-country differences in the quality of ESG disclosure. Fourth, and also consistent with the findings obtained by Berg, Koelbel and Rigobon (2020) and Gibson, Krueger and Schmidt (2020) for the US, average correlations across raters are highest for *ESG* (0.43-0.54 depending on region), followed by *E* (0.3-0.46), *S* (0.24-0.34), and *G* (0.17-0.29). This pattern is to be expected since *ESG* ratings are likely to average out noise and *E* is often more objective than *S* and *G* (e.g. Gibson, Krueger and Schmidt (2020)). For example, whereas carbon emissions are an objective measure that most raters would agree should be used as a pollution metric, it is less clear whether gender parity is better captured by gender seniority gaps, gender pay gaps, or the number of sexual harassment lawsuits. *G* is also prone to disagreement since (i) optimal governance arrangements are likely to differ across firms and countries (e.g., Bebchuk and Hamdani (2009), Black, Carvalho and Érica Gorga (2012), Homanen and Liang (2018)), and (ii) there is a continuous ongoing debate about the nuances of several governance arrangements, perhaps most prominently about CEO compensation contracts (e.g., Bertrand (2009), Edmans and Gabaix (2009), Geiler and Renneboog (2010)) and board structure (e.g., Ferreira (2010), Adams (2016), Amihud, Schmid and Solomon (2017)).

[Figure 3 see page 51, 52]

Table 1 presents summary statistics for monthly returns and all control variables used throughout the paper. We report mean, medians, and standard deviations for the four samples we conduct empirical analyses on: Refinitiv, Sustainalytics, MSCI, and *Composite*. In Panel A we do not detect pronounced differences in the summary statistics across raters. Stocks in the Sustainalytics subsample are on average larger than those in MSCI, which is to be expected given that MSCI covers a much wider cross-section of stocks. This might also be partially driven by the fact that the Sustainalytics subsample starts a decade later than MSCI's and the fact that average stock market capitalization, at least in the US, has been increasing at a fast pace since the 1980s (e.g., Gabaix and Landier (2008), Gutiérrez and Philippon (2017)). The average monthly returns and momentum returns for Sustainalytics are also slightly smaller than those of the other two raters, which coincides with the evidence that returns and momentum returns are larger among smaller stocks (e.g. Fama and French (2012), Asness, Moskowitz and Pedersen (2013), Israel and

Moskowitz (2013)).

[Table 1 see page 44]

2 Methods

We study the extent to which various ESG metrics have information about future stock returns around the world. We do so by running panel regressions of monthly stock returns on lagged ESG metrics available at the end of the previous year and a set of control variables. To focus on cross-sectional variation in stock returns we follow Bolton and Kacperczyk (2021) and include month fixed effects in all of our regressions.

The ESG metrics are either the ESG ratings or the year-on-year changes in ESG ratings (ESG momentum) attributed to each firm by one of the four raters (Refinitiv, Sustainalytics, MSCI, and *Composite*) in one of the four ESG dimensions (*ESG*, *E*, *S*, and *G*). For a description of the control variables, see Appendix Table A.1.

The choice of fixed effects is an important consideration given the strong industry and country components of ESG scores (e.g., Gillan, Koch and Starks (2021)). A possible avenue is to use month, country, and industry fixed effects (e.g., Bolton and Kacperczyk (2021)). However, month fixed effects do not absorb industry and country-level factors that are likely to be correlated with ESG. For the same reason, industry and country fixed effects assume that there is no time variation in the country and industry-specific unobservables that may bias the results. This seems unlikely since various potentially relevant unobservables such as ESG regulations, climate sentiment, investors' tastes for ESG assets, and macroeconomic conditions are likely to vary simultaneously over time and across industries and countries.

We deal with these concerns by using country-month and industry-month fixed effects. Our panel regressions with industry-month and country-month fixed effects are comparable to the regressions used by Fama and MacBeth (1973) with industry and country dummies.¹³ The fixed effects tighten the identification by allowing us to zoom in on cross-sectional predictability within industries and countries. In other words, we compare firms exposed to similar macroeconomic shocks but with different levels of ESG. This is a relevant concern in our setting because indus-

¹³An important difference, however, is that panel regressions tend to give more weight to periods with more observations whereas Fama and MacBeth's (1973) regressions equally weigh each period. Since ESG data coverage has improved substantially over time, it is possible that Fama and MacBeth (1973) underweight those periods in which we can more reliably estimate the relationship between ESG and stock returns. This is one of the reasons why we use panel over Fama and MacBeth's (1973) regressions.

try and country-level factors are important determinants of ESG scores likely to be correlated with a variety of macroeconomic unobservables (e.g., Borghesi, Houston and Naranjo (2014), Liang and Renneboog (2017), Gillan, Koch and Starks (2021))).¹⁴ A related advantage is that by comparing similar firms we partially alleviate the concern that the lack of financial integration across geographically dispersed firms reduces the effectiveness of our control variables (e.g., Fama and French (2017), Chaieb, Langlois and Scaillet (2021)).

Our identification strategy further purges out time-varying cross-industry and cross-country variation in customers' and investors' ESG-related risk perceptions, tastes and sentiment (e.g., Engle et al. (2020), Sautner et al. (2020), Pastor, Stambaugh and Taylor (2020)) that may lead to spurious results. In this way, our results are more likely to be indicative of the relationship between ESG and stock returns going forward as opposed to mainly capturing short-term sample specific shocks. A case in point is the evidence in Chou and Kimbrough (2019) that climate sentiment varies not only over time but also across industries. A shift in sentiment in industries with low levels of pre-existing ESG could thus lead to the conclusion that low ESG stocks outperform when in fact the outperformance comes from high ESG stocks within that industry. Another concrete example is that most of the carbon risk premium documented by Bolton and Kacperczyk (2021) is priced within industries. Ignoring this would have led to severe underestimation of the economic significance of the carbon premium.

¹⁴An alternative to fixed effects is to demean the ESG metrics at the industry or country level while leaving the remaining variables unchanged. This approach can lead to inconsistent estimates, however. Fixed effect methods sidestep this concern (e.g., Gormley and Matsa (2014), Ferson (2019))

3 Results

In this section we investigate the relationship between stock returns and lagged ESG metrics using our full sample covering 9,253 stocks traded in 46 countries between January 2001 and December 2020 (Section 3.1). We also examine how this relationship varies across different world regions (Section 3.2).

3.1 Does sustainable investing affect stock returns?

To estimate the extent to which sustainable investing affects future stock returns, we run panel regressions of stock returns on lagged ESG ratings. Table 2 shows the results. Columns (1) through (4) in Panel A (Panel B) show the results when using *ESG*, *E*, *S*, and *G* ratings of Refinitiv (Sustainalytics), respectively. Columns (5) through (8) report the results for the specifications that use the ratings of MSCI (Panel A) and *Composite* (Panel B). All specifications use the entire sample and include industry-month and country-month fixed effects. The control variables are listed in the table and their detailed definitions can be found in Appendix Table A.1. *t*-statistics are reported in parentheses. Standard errors are double clustered at the stock and month levels.

[Table 2 see page 45, 46, 47]

We find little evidence for a robust relationship between ESG ratings and future stock returns. The only metric with statistically significant predictive power is MSCI's *G* rating. The effect size is also modest: a one standard deviation increase in *G* is associated with an additional 0.55% in annualized returns. This result is at first sight striking given the extensive literature finding evidence that sustainable investing outperforms on a risk-adjusted basis (e.g., Friede, Busch and Bassen (2015)).¹⁵ What generates this discrepancy? Putting aside the concern that many studies that find evidence of outperformance suffer from methodological issues, there are at least four

¹⁵We note that many of the stock characteristics we use as control variables are statistically insignificant. This is in line with the findings of Green, Hand and Zhang (2020) that only two of the 94 stock characteristics in their study independently predicted stock returns in non-microcap stocks since 2003. Gibson, Krueger and Schmidt (2020), who merge stock returns data with ESG ratings data, also found little evidence of stock return predictability based on the stock characteristics they used as control variables.

other reasons that may explain the discrepancy in the findings.¹⁶

First, some studies do not use ratings as a measure of sustainability (e.g., Edmans (2011)) or rely on exogenous variation in ESG that cannot be used by investors. For example, Flammer (2015) finds that the random approval of shareholder-sponsored ESG proposals leads to positive abnormal returns on the vote day and a posterior increase in ESG ratings. This suggests that stock markets incorporate the information in ratings before they are released.

Second, some of the studies that find that sustainability pays off focus on the period until the early 2000s (e.g., Derwall et al. (2005), Kempf and Osthoff (2007)). Anomalies, however, tend to disappear as markets learn over time (e.g., McLean and Pontiff (2016)). Consistent with this idea, Borgers et al. (2013) and Halbritter and Dorfleitner (2015) find that high ESG portfolios outperform low ESG portfolios until the early 2000s but not after.

Third, many studies use only data for one country over a short period of time, making it possible that they capture temporary outperformance due to unexpected shifts in consumer and investor tastes for sustainability (e.g., Pastor, Stambaugh and Taylor (2020)).

Fourth, part of the evidence for the outperformance of sustainable investing comes from meta-analyses (e.g., Friede, Busch and Bassen (2015)) which pool together studies that look at both accounting and market measures of performance. This is problematic because even if ESG ratings predict future profitability, they might not predict stock returns provided markets are efficient enough (e.g., Fitzgibbons, Pedersen and Pomorski (2020)).

Notwithstanding the congruence between our findings and those of the literature, an important concern is that our specifications are overly conservative due to the inclusion of high-dimensional fixed effects. Furthermore, by including fixed effects we effectively build a long-short portfolio that weighs each stock based on how its ESG rating compares to that of its country and industry

¹⁶See the discussion in Matos (2020) and Dimson, Marsh and Staunton (2020) about the methodological problems that plague this literature. For example, according to Dimson, Marsh and Staunton (2020) (i) two-thirds of studies do not lag ESG metrics and thus suffer from look-ahead bias, and (ii) only a minority of those studies are high-quality studies that undergo intense peer review in top journals.

peers.¹⁷ As with many asset pricing tests, this leads to a joint hypothesis problem. We cannot separate the hypothesis of interest from the assumption that the underlying portfolio formation restrictions are adequate. To deal with this concern we replicate our baseline results using only one of the following: month fixed effects, industry-month fixed effects, or country-month fixed effects.

To simplify the presentation we show the results in Figure 4. Each plot shows the regression loadings on one ESG metric using a different combination of fixed effects indicated in the plot. We use the full set of controls in all regressions. We depict 90% and 95% confidence intervals as whiskers. Three findings emerge.

First, ESG metrics fail to explain variation in stock returns across the board, including in specifications that use month fixed effects instead of industry-month and country-month fixed effects. Hence, the statistically insignificant relationship between ESG and future stock returns is not driven by an overly conservative use of high-dimensional fixed effects.

Second, the predictive power of ESG tends to be stronger, albeit imprecisely estimated, within countries than across countries. This follows from the fact that the effect sizes are larger when we replace month fixed effects by country-month fixed effects. This suggests that the performance of ESG strategies may depend on geography, a possibility which we explore later.

Third, the effect sizes shrink the most in the specifications that use industry-month fixed effects. This suggests that investors' pro-social preferences have modest asset pricing implications in our sample. To see why, note that pro-social preferences can in theory lead to lower expected returns for sustainable stocks (e.g., Pastor, Stambaugh and Taylor (2020)). The industry-month fixed effects, however, may make it hard to capture this effect because they do not distinguish unsustainable stocks that pro-social investors dislike from sustainable stocks that investors like

¹⁷To see this note that the coefficient of interest could be obtained as follows. First, regress stock returns on all control variables and industry-month and country-month fixed effects and save the residuals (denote them as \hat{R}). Second, regress the ESG metric on the same control variables and fixed effects and save the residuals (denote them as ESG). Third, regress \hat{R} on the (transformed) ESG metric ESG . This follows from the Frisch-Waugh-Lovell theorem (Frisch and Waugh, 1933). The coefficient of interest, which has a zero mean, is given by $\beta = \sum_{it} w_{it} \hat{R}_{it}$, where $w_{it} = \frac{ESG_{it}}{\sum_{m,t} ESG_{m,t}^2}$. Since the mean of ESG is zero at the industry-month and country-month level, it must follow that whenever $w_{it} < 0$ (shorting) it is also the case that w_{it} has a (transformed) ESG score below that of its industry and country peers at time t . The parallel logic applies when $w_{it} > 0$ (going long). For a related discussion in a more general context refer to Campbell (2017) and footnote 8 of Hou, Xue and Zhang (2020).

but which happen to have lower ESG ratings than their industry peers do. It could thus be the case that removing industry-month fixed effects pushed the coefficients toward negative territory. The exact opposite happens.

[Figure 4 see page 53, 54]

Next, we present the results obtained when using ESG momentum variables instead of ESG ratings in Plot 5. There are a few instances in which ESG momentum has significant predictive power. When this is the case, the sign is always positive. These results are not robust across the specifications, however. For example, in the specification with month fixed effects *ESG* momentum is a significant predictor at the 5% level if we employ Sustainalytics ratings but not if we use any of the other raters. Moreover, once we include country-month fixed effects the estimates become more imprecise and statistical significance is only obtained at the 10% level. The effect size is modest, with a one standard deviation increase in the rating being associated with an additional 1.18% in annualized returns. If we use industry-month fixed effects instead, the economic significance almost completely vanishes - that is, the coefficients hover around zero. A similar pattern is observed for *E*, *S* and *G* momentum.

[Figure 5 see page 55, 56]

It is also interesting that *Composite* does not have an edge over individual raters in terms of predictive power. This is the case whether we look at ESG momentum or at ESG ratings. In theory, however, pooling information across raters may enhance the predictive power of ESG metrics relative to value-relevant unexpected news by canceling out noise (e.g., Serafeim and Yoon (2021)). In addition, since different investors rely on different raters, it is possible that the total demand for a stock by pro-social investors is higher (lower) if many raters give a high (low) rating to that stock. This is likely to be the case when *Composite* is high (low). Since pro-social preferences are only priced in if pro-social investors' demand is large enough (Fama and French (2007)), it follows that *Composite* can in theory be more informative about expected returns than individual raters.

Our results do not provide evidence in favor of these views, but they are not necessarily inconsistent with them either. Instead, the results may simply reflect the existence of counter-veiling forces. For example, even if *Composite* is more informative about future cash flows than individual raters, it might be that *Composite* captures information that is quickly impounded in prices. This may be the case because the information on which raters agree is likely to be the information that is less subjective and easier to obtain. Another explanation is related to the evidence in Gibson, Krueger and Schmidt (2020) that cross-rater disagreement in ESG predicts risk premia. It is possible that *Composite* partly cancels out the disagreement component of ESG metrics that has predictive power for stock returns.

Overall, our results thus far suggest that sustainable investing based on ESG is not related to future stocks returns in the cross-section. This finding is consistent with existing asset pricing models and admits a number of interpretations. For example, one explanation for our findings is that (i) ESG metrics have value-relevant information but markets are efficient enough to eliminate evidence of predictability, and (ii) the demand of pro-social investors willing to accept lower expected returns for holding stocks represents a small enough share of total investor demand (e.g., Fitzgibbons, Pedersen and Pomorski (2020)).

It is also possible that ESG ratings do not systematically have value-relevant information and that investors recognize this (e.g., Fitzgibbons, Pedersen and Pomorski (2020)). It is reasonable to expect that this is the case for at least some ESG metrics since (i) there are hundreds of ESG ratings products that have low correlations among themselves, making it unlikely that all metrics have value-relevant information for a large number of firms (e.g., Berg, Koelbel and Rigobon (2020)), and (ii) ESG ratings may be contaminated by greenwashing (e.g. Yang (2019)), may be biased toward larger firms with better disclosure (e.g., de Silanes, McCahery and Pudschedl (2019)), may be backward-looking, and may rely too much on box-ticking methods (e.g., Edmans (2020), Matos (2020)).

3.2 Does the performance of sustainable investing vary across geographic regions?

In this section we explore whether or not the ability of ESG to predict cross-sectional variation in future stock returns is mediated by geography. In theory, there are several reasons why our results may differ geographically, such as differences in market efficiency across countries (e.g., Fitzgibbons, Pedersen and Pomorski (2020)), the differential ability of ESG metrics to predict firm fundamentals due to cross-country differences in labor regulations (see e.g., Edmans, Li and Zhang (2014)), and permanent differences in social norms across regions. The latter could, for instance, lead to lower returns to sustainable investing in pro-social Europe compared to North America (e.g., Pastor, Stambaugh and Taylor (2020)).

We proceed by repeating the baseline analysis for each of the following regions: Asia-Pacific, Japan, Europe, North America, and Emerging Countries. The region Emerging Countries includes all the emerging economies in Africa, Asia, Europe, Latin American, and Middle-East listed in Internet Appendix Table IA.1. We do not use Sustainalytics ratings in the pre-2013 specifications because there are little data. All specifications include all controls used before as well as industry-month and country-month fixed effects, with the exception of the specifications relating to Japan, which exclude country-month fixed effects.

We also split the sample in two: one covering the period before 2013 and another covering the period from 2013 onwards. We do this to account for the possibility that the massive inflow of money into sustainable products since 2013 has led to abnormally good performance of high ESG stocks in recent years in some regions. Such a finding would be consistent with the model created by Pastor, Stambaugh and Taylor (2020) which predicts that sustainable stocks can outperform non-sustainable stocks temporarily due to shifts in customer and investor tastes for sustainable stocks. The period 2013-2020 is also a notorious post-crisis rebound period in which the S&P500, MSCI ACWI Index and Shiller's P/E ratio increased by 148%, 115%, and 59% after adjusting for dividends and stock splits, respectively. The increase in wealth during this period might also have caused a demand surge for ESG as a luxury good (e.g., Bansal, Wu and Yaron (2018)). The full sample results are similar to the results using the post-2013 subsample. We report full sample results in Internet Appendix Figures IA.1 and IA.2 for ESG ratings and ESG

momentum, respectively.

Figure 6 shows the results from specifications using ESG ratings in levels. The left-hand side and the right-hand side plots show the results for the pre-2013 and post-2013 subsamples, respectively. Before 2013 there is little evidence of a robust relationship between ESG ratings and future stocks returns and the effect sizes tend to be small. The regression loadings on MSCI's *E* and *S* ratings are significantly positive at the 10% level in Japan and Europe, respectively. All other coefficients are insignificant.

[Figure 6 see page 57, 58, 59, 60]

The finding that ESG ratings are very noisy signals for future stock returns also seems to be the case during the post-2013 period. There are three interesting nuances, however. First, *G* often predicts higher returns in North America in recent years, which is consistent with the findings of Fitzgibbons, Pedersen and Pomorski (2020) that investors in the USA underestimate the extent to which *G* has information about future profitability (they measure *G* as accruals over assets). The fact that *G* seems to matter in North America and not in other regions may be due to optimal governance arrangements varying around the world in ways not accounted for by raters. For example, Black et al. (2019) find that "improvements" to board structure increase firm value in Brazil and Korea but not in India and Turkey. Given that current knowledge in academia about geographical heterogeneity in optimal governance is still limited, it is unlikely that raters successfully adjust ratings for that.

This finding is, however, unexpected given the survey evidence that North American investors pay substantial attention to *G* (e.g., Eccles, Serafeim and Krzus (2011), Aggrawal et al. (2011)). It is possible, however, that there was a shift in attention from *G* to *E* and *S* in recent years that generated an underreaction to governance information. Another explanation is that our result is a chance result due to multiple hypotheses testing. Either way, to our knowledge there is no theoretical reason to expect that this effect should last going forward.

Second, higher *E* tends to predict lower future returns in Europe post-2013 but not pre-2013. Even though the effect is only significant at the 10% level based on MSCI ratings, it may reflect the rising importance given to environmental issues in Europe. This may lead investors to ac-

cept lower returns when holding green stocks (e.g., Pastor, Stambaugh and Taylor (2020)). If so, it is possible, albeit uncertain, that this result will strengthen going forward.¹⁸

Third, more sustainable stocks (as measured by *E* and *S*) seem to perform better in emerging economies in most specifications. The effect sizes are modest, but not negligible. For example, a one standard deviation increase in the *E* rating of Sustainalytics (MSCI) is associated with a 2.14% (1.48%) gain in annualized returns. This result is consistent with the finding in the meta-analysis of Friede, Busch and Bassen (2015) that 65.4% of the sample studies find a positive relationship between ESG and financial performance in emerging economies. In developed markets only 38% of the studies find such an effect.

What is driving this effect? Since the effects are concentrated in the post-2013 period our results are consistent with the story that an unexpected rise in ESG concerns among investors has led to temporarily high realized returns in recent years (e.g., Pastor, Stambaugh and Taylor (2020)). Emerging economies could be particularly exposed to these demand surges because investors may regard sustainable stocks as an important hedge against adverse conditions in emerging economies. For example, some of these countries' geo-location exposes them to higher climate risks (Bathiany et al. (2018)) and their governments may be poorly positioned to respond to ESG concerns due to weaker institutions and tighter budget constraints.

We note, however, that it is also possible that the results are weaker in the pre-2013 period because ESG data coverage in emerging economies is better in recent years. Hence, our results may be partially driven by other more general factors. For example, it may be the case that predictability is stronger for emerging economies because their stock markets are less efficient than those of developed countries. Even if the stock markets of emerging economies are not less efficient in general, they may be less efficient than their developed counterparts when it comes to processing ESG information. This would be consistent with our finding in Figure 3 that cross-rater disagreement tends to be higher in emerging economies and with the finding of Serafeim and Yoon (2021) that the information in ESG ratings is less likely to be incorporated

¹⁸We also find that both MSCI's and Sustainalytics' *E* ratings are positively related to returns in Europe at the 10% significance level when using the full sample period. Note that for Sustainalytics the full sample period corresponds to the post-2011 period. The results are reported in Internet Appendix IA.1.

in prices when disagreement is high. In addition, Avramov et al. (2021) provide evidence that investors are less willing to pay a premium to hold high ESG stocks with high disagreement. This effectively mutes the non-pecuniary preferences channel of Pastor, Stambaugh and Taylor (2020) that suggests that high ESG stocks have lower stock returns.

It is also possible that ESG ratings are more informative about future firm fundamentals in emerging economies than in developed countries. For example, it might be the case that high pressure from regulators, investors, and customers for firms in developed countries to be sustainable and disclose ESG information leads firms in these countries to invest in non-material ESG (e.g., Christensen, Hail and Leuz (2018)).

Next, we turn to the ESG momentum results shown in Internet Appendix Figure IA.3. There are similarities with the results obtained using ESG ratings in levels, but overall there is less evidence for a robust relationship between ESG momentum and stock returns. For example, when using MSCI ratings we find that North American firms with higher *G* momentum tend to have higher returns in the post-2013 period. This result is, however, not robust when using other raters. We also find that higher *E* momentum predicts lower returns in Europe in the post-2013 period when we use *Composite* ratings but not when we use other raters.

In summary, our results show that stocks with higher ESG ratings do not have higher stock returns in most regions of the world. This is true over the full sample but also if we split the sample around 2013 when there was an explosion in money inflows into ESG assets. This suggests that valuation of stocks with high ESG ratings is not yet excessive, broadly in line with the opinions of investors in the survey carried out by Krueger, Sautner and Starks (2020). The main exception is that higher *E* and *S* ratings are associated with higher future returns in emerging economies in the post-2013 period. This is probably explained by a combination of weaker market efficiency in these countries, a temporary demand surge in investment flows due to rising ESG concerns in recent years and, perhaps, ESG ratings being more informative about future firm fundamentals in emerging economies.

4 Conclusion

Is sustainable investing a royal road to higher risk-adjusted returns as many in the financial industry claim?¹⁹ And is sustainable investing a promising market-based mechanism that can be used to address social and environmental externalities (e.g., Fama (2021))?

Our results suggest there is little reason to be optimistic about either possibility, at least based on what has happened in the past. Using a comprehensive dataset spanning 9,253 stocks in 46 countries over the last two decades we find that it is seldom the case that higher ESG ratings are associated with higher future stock returns. This general finding holds for both negative and positive screens, for different dimensions of sustainability (*E*, *S*, *G*, *ESG*), whether we use ratings in levels or changes, and whether we use either one of the three most widely used ratings in the industry or combinations of these ratings. It also holds in our global sample under different specifications, within all major world regions other than emerging economies, and within the various sectors of economic activity.

There are some positive aspects, however. First, our results suggest that it has been possible to “do good without doing poorly” in the last two decades. This indicates that the prediction that sustainable investing satisfies investors’ non-pecuniary preferences at the expense of financial returns has not yet materialized. Whether or not that will happen is uncertain. It will likely depend on factors such as whether or not enough investors are willing to substitute social for financial returns (e.g., Fama and French (2007)) and whether or not investors’ pro-social preferences are elicited and incorporated in investment decisions by investment managers (e.g., Bauer, Ruof and Smeets (2021)). Second, our results cast doubt on the idea that there is widespread overvaluation in sustainable stocks. This is reassuring given the widespread concern that we are currently living through an ESG “bubble.”²⁰

We end with a word of caution about our results. We do not rule out the possibility that our re-

¹⁹For example, according to a recent Financial Times article (Riding, 2020), the Chief Executive of a leading sustainability-oriented asset management company stated “ESG factors are not just ‘nice to have’ but drivers of out-performance.” Larry Fink, in his 2021 annual letter to shareholders, wrote the following: “(...) our deeply held investment conviction is that integrating sustainability can help investors (...) achieve better long-term, risk-adjusted returns.”

²⁰See, for example, the Financial Times article (Temple-West, 2020) entitled “‘Monstrous’ run for responsible stocks stokes fears of a bubble.”

sults might be different if we were to use different raters or more complex trading strategies, such as combining ESG ratings with other information sources or using ratings in fundamental analysis (ESG integration). Our results also do not address the issue of the ability of ESG engagement strategies to make firms more sustainable and create financial value (e.g., Dimson, Karakaş and Li (2015), Barko, Cremers and Renneboog (2018)). Nonetheless, at the very least our paper provides comprehensive evidence that there may be good reason to be skeptical about claims that ESG investing outperforms or is a reliable alternative to non-market-based solutions when it comes to solving the major climate and social problems of our time.

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Table 1
Summary statistics

This table reports the mean, median, and standard deviation of stock returns and various stock characteristics (Panel A), ESG ratings (Panel B), and ESG momentum variables (Panel C). Variable definitions are available in Appendix Table A.1. The table also reports the starting date, the number of unique firms/stocks, and the number of stock months in the sample. These statistics are provided for the full sample and subsamples. The subsamples restrict the sample to those stock months in year $t+1$ for which ESG ratings from a specific rater are available in year $t-1$. This results in a subsample for each rater: the Refinitiv subsample, the Sustainalytics subsample, and the MSCI IVA subsample. The full sample is obtained by constructing a fictitious rater (*Composite*) which combines the available ratings of the other three raters. This is done by averaging the ratings across the other three raters. We convert the ratings of each of these three raters at each point in time to percentile ranks before averaging. There are four possible types of ESG ratings for any given rater: environmental (*E*), social (*S*), governance (*G*), and ESG (*ESG*). The full sample period is January 2001 to December 2020.

	Refinitiv Sample			Sustainalytics Sample			MSCI IVA Sample			Composite Sample		
Variable	Mean	Median	S.D.	Mean	Median	S.D.	Mean	Median	S.D.	Mean	Median	S.D.
Panel A: Stock Returns & Characteristics												
Returns (in % p.m.)	0.83	0.73	11.14	0.73	0.67	10.23	0.79	0.67	11.24	0.81	0.67	11.36
Size	8.21	8.22	1.52	8.43	8.43	1.46	8.09	8.11	1.59	7.91	7.92	1.60
B/M	0.76	0.52	1.02	0.79	0.54	1.08	0.73	0.51	0.98	0.77	0.52	1.06
B/M Dummy	0.02	0.00	0.13	0.02	0.00	0.13	0.02	0.00	0.14	0.02	0.00	0.14
Momentum	0.08	0.05	0.39	0.06	0.04	0.34	0.07	0.04	0.38	0.08	0.05	0.40
Total Volatility (in %)	9.86	8.43	5.61	9.03	7.86	4.89	9.89	8.41	5.71	10.11	8.61	5.79
Inverse Price Ratio	0.42	0.05	1.56	0.43	0.05	1.51	0.35	0.05	1.35	0.48	0.06	1.70
Leverage	0.24	0.22	0.18	0.25	0.23	0.18	0.24	0.22	0.18	0.24	0.22	0.19
Investment	0.11	0.05	0.31	0.08	0.05	0.25	0.10	0.05	0.28	0.11	0.05	0.31
Gross Profitability	0.28	0.24	0.23	0.27	0.23	0.21	0.29	0.25	0.24	0.29	0.24	0.24
R&D	0.02	0.00	0.05	0.02	0.00	0.04	0.02	0.00	0.06	0.02	0.00	0.06
Tangibility	0.29	0.23	0.24	0.30	0.25	0.24	0.29	0.22	0.24	0.29	0.23	0.24
Panel B: ESG Ratings												
<i>E</i>	31.49	25.96	28.47	54.79	53.04	13.73	48.40	47.60	20.63	47.46	46.33	25.33
<i>S</i>	40.43	37.04	23.22	56.08	54.96	11.43	43.86	45.70	19.76	47.89	46.88	24.29
<i>G</i>	48.34	48.49	22.65	62.87	62.40	10.32	50.91	51.00	22.90	48.36	48.13	23.75
<i>ESG</i>	40.09	37.28	20.33	57.22	56.00	9.87	47.26	46.00	22.85	47.39	46.03	25.66
Panel C: ESG Momentum												
<i>E</i> Momentum	2.53	0.00	9.72	1.05	0.00	5.16	0.59	0.00	10.88	1.21	0.22	11.29
<i>S</i> Momentum	2.25	0.65	9.09	0.78	0.00	5.08	1.09	0.00	12.90	0.97	0.10	13.64
<i>G</i> Momentum	1.25	0.57	13.89	0.39	0.00	4.62	1.05	0.00	18.23	0.70	0.00	16.27
<i>ESG</i> Momentum	2.01	1.14	7.37	0.78	0.00	3.61	0.61	0.00	11.87	1.22	0.65	11.62

Table 2
The returns to sustainable investing: baseline results

This table reports the results from panel regressions of monthly stock returns on lagged ESG ratings using the global sample of stocks. The sample period is from January 2001 to December 2020. The ESG rating variable is one of the following ratings: environmental (*E*), social (*S*), governance (*G*), or ESG (*ESG*). All regressions include all control variables listed in Appendix Table A.1 as well as country-month and industry-month fixed effects. Following Bolton and Kacperczyk (2021), industries are defined based on six-digit Global Industry Classification Standard Codes (GICS) codes. Panel A (Panel B) shows the results obtained when using Refinitiv and MSCI IVA (Sustainalytics and *Composite*) ratings. *t*-statistics are shown in parentheses. Standard errors are double clustered at the stock and month levels. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	Panel A: ESG Ratings (Levels) of Refinitiv and MSCI IVA							
	Refinitiv				MSCI IVA			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>ESG</i>	0.000 (0.296)				0.001 (1.061)			
<i>E</i>		-0.000 (-0.049)				0.000 (0.287)		
<i>S</i>			0.001 (0.547)				0.001 (0.693)	
<i>G</i>				0.000 (0.465)				0.002** (2.202)
Size	0.029 (0.807)	0.033 (0.939)	0.027 (0.748)	0.031 (0.947)	0.049 (1.463)	0.050 (1.510)	0.051 (1.526)	0.050 (1.495)
B/M	-0.019 (-0.552)	-0.017 (-0.504)	-0.019 (-0.557)	-0.018 (-0.525)	-0.004 (-0.108)	-0.004 (-0.115)	-0.003 (-0.098)	-0.002 (-0.068)
B/M Dummy	-0.276* (-1.694)	-0.280* (-1.723)	-0.281* (-1.730)	-0.275* (-1.692)	-0.361* (-1.967)	-0.362** (-1.977)	-0.362** (-1.972)	-0.358* (-1.954)
Momentum	0.581** (2.110)	0.578** (2.094)	0.581** (2.104)	0.580** (2.097)	0.458* (1.659)	0.458* (1.656)	0.457* (1.655)	0.458* (1.657)
Total Volatility	0.007 (0.285)	0.007 (0.295)	0.007 (0.291)	0.007 (0.286)	-0.000 (-0.013)	-0.000 (-0.016)	-0.000 (-0.014)	-0.000 (-0.008)
Inverse Price Ratio	0.004 (0.142)	0.004 (0.145)	0.003 (0.127)	0.004 (0.152)	-0.027 (-1.057)	-0.027 (-1.054)	-0.027 (-1.048)	-0.026 (-1.048)
Leverage	-0.216 (-1.128)	-0.202 (-1.060)	-0.208 (-1.078)	-0.214 (-1.099)	-0.306 (-1.420)	-0.307 (-1.426)	-0.306 (-1.420)	-0.305 (-1.413)

Table 2
The returns to sustainable investing: baseline results
 (continued)

Panel A: ESG Ratings (Levels) of Refinitiv and MSCI IVA								
	Refinitiv				MSCI IVA			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Investment	0.002 (0.022)	0.001 (0.009)	0.005 (0.060)	0.001 (0.017)	-0.010 (-0.113)	-0.012 (-0.127)	-0.012 (-0.131)	-0.011 (-0.120)
Gross Profitability	0.466*** (3.957)	0.462*** (3.937)	0.461*** (3.919)	0.467*** (3.975)	0.367*** (2.937)	0.370*** (2.961)	0.368*** (2.952)	0.362*** (2.905)
R&D	2.124** (2.541)	2.112** (2.527)	2.088** (2.493)	2.131** (2.566)	1.214 (1.477)	1.232 (1.495)	1.231 (1.493)	1.231 (1.493)
Tangibility	-0.150 (-1.015)	-0.146 (-0.987)	-0.146 (-0.988)	-0.150 (-1.015)	-0.085 (-0.531)	-0.085 (-0.537)	-0.087 (-0.542)	-0.089 (-0.557)
Industry-by-Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-by-Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	552,962	552,097	552,073	552,962	577,047	577,047	577,047	577,047
R-squared	0.389	0.389	0.389	0.389	0.376	0.376	0.376	0.376

Panel B: ESG Ratings (Levels) of Sustainalytics and Composite								
	Sustainalytics				Composite			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ESG	0.002 (0.917)				0.000 (0.406)			
E		0.001 (0.733)				0.000 (0.486)		
S			0.001 (0.302)				0.000 (0.525)	
G				0.003 (1.217)				0.001 (0.835)

Table 2
The returns to sustainable investing: baseline results
 (continued)

	Panel B: ESG Ratings (Levels) of Sustainability and Composite							
	Sustainability				Composite			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Size	0.047 (1.258)	0.048 (1.270)	0.052 (1.402)	0.050 (1.328)	0.035 (1.142)	0.034 (1.098)	0.035 (1.134)	0.035 (1.165)
B/M	0.009 (0.248)	0.009 (0.246)	0.010 (0.291)	0.009 (0.262)	-0.008 (-0.285)	-0.009 (-0.299)	-0.008 (-0.283)	-0.008 (-0.280)
B/M Dummy	-0.390** (-2.071)	-0.390** (-2.072)	-0.389** (-2.069)	-0.389** (-2.065)	-0.418*** (-2.695)	-0.421*** (-2.714)	-0.420*** (-2.712)	-0.417*** (-2.691)
Momentum	0.666** (2.136)	0.666** (2.137)	0.664** (2.126)	0.666** (2.129)	0.597** (2.486)	0.597** (2.479)	0.596** (2.481)	0.597** (2.485)
Total Volatility	-0.015 (-0.583)	-0.015 (-0.584)	-0.015 (-0.580)	-0.015 (-0.579)	-0.009 (-0.424)	-0.009 (-0.420)	-0.009 (-0.420)	-0.009 (-0.422)
Inverse Price Ratio	-0.016 (-0.514)	-0.016 (-0.517)	-0.016 (-0.502)	-0.015 (-0.496)	-0.003 (-0.122)	-0.003 (-0.136)	-0.003 (-0.126)	-0.002 (-0.112)
Leverage	-0.238 (-1.194)	-0.239 (-1.205)	-0.236 (-1.181)	-0.238 (-1.192)	-0.225 (-1.193)	-0.222 (-1.180)	-0.222 (-1.175)	-0.224 (-1.186)
Investment	-0.077 (-0.817)	-0.077 (-0.828)	-0.082 (-0.866)	-0.078 (-0.820)	0.047 (0.599)	0.048 (0.621)	0.047 (0.597)	0.048 (0.609)
Gross Profitability	0.350** (2.135)	0.350** (2.144)	0.351** (2.145)	0.350** (2.147)	0.478*** (4.331)	0.478*** (4.338)	0.477*** (4.323)	0.476*** (4.327)
R&D	2.082** (2.000)	2.080** (1.998)	2.105** (2.026)	2.087** (2.008)	1.520** (2.036)	1.520** (2.036)	1.520** (2.038)	1.524** (2.043)
Tangibility	-0.224 (-1.228)	-0.222 (-1.215)	-0.222 (-1.220)	-0.226 (-1.244)	-0.056 (-0.399)	-0.055 (-0.388)	-0.055 (-0.390)	-0.057 (-0.407)
Industry-by-Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-by-Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	335,486	335,486	335,486	335,486	730,011	729,682	729,682	730,011
R-squared	0.378	0.378	0.378	0.378	0.360	0.360	0.360	0.360

Figure 1. Sample coverage by world region and by country, January 2001 - December 2020

The pie chart on top shows the number and percentage of unique firms/stocks in our sample that were publicly traded in each world region between January 2001 and December 2020. The bottom pie chart shows the number and percentage of sample stocks that were publicly traded in each country during the same period. To ensure readability only the 11 countries with the most stocks are shown. The category *Other Countries* refers to the remaining 35 countries in the sample. For a complete list of countries and summary statistics per country and region see Internet Appendix IA.1.

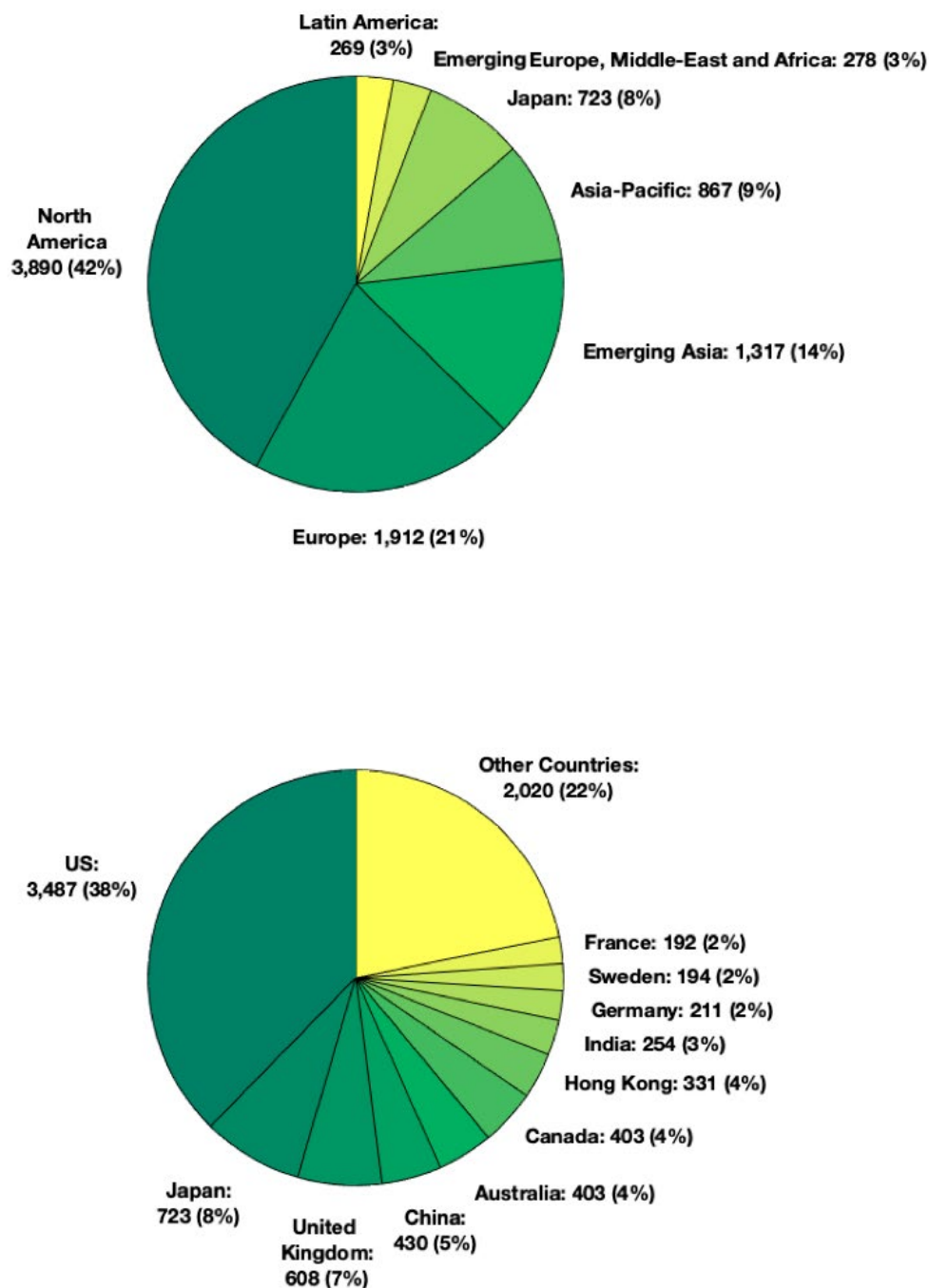


Figure 2. Geographical distribution of ESG ratings around the world in 2018

The figure shows the average ESG ratings/scores per country in 2018 according to three raters (Refinitiv, MSCI IVA, Sustainalytics) and a fictitious rater *Composite*. *Composite* combines the available ESG ratings of the other three raters by averaging their ratings. We convert the ratings of the other three raters at each point in time to percentile ranks before averaging. The green end of the spectrum indicates high ESG ratings and the yellow end indicates low ESG ratings. For a list of average ESG ratings per country see Internet Appendix IA.2.

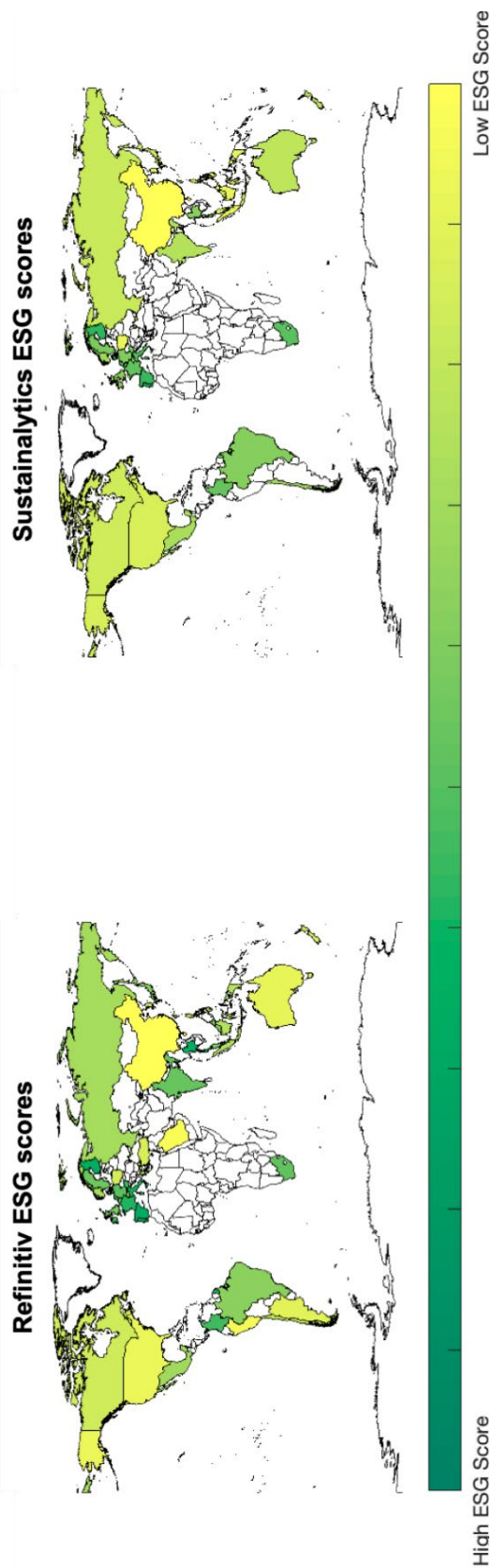


Figure 2. Geographical distribution of ESG ratings around the world in 2018
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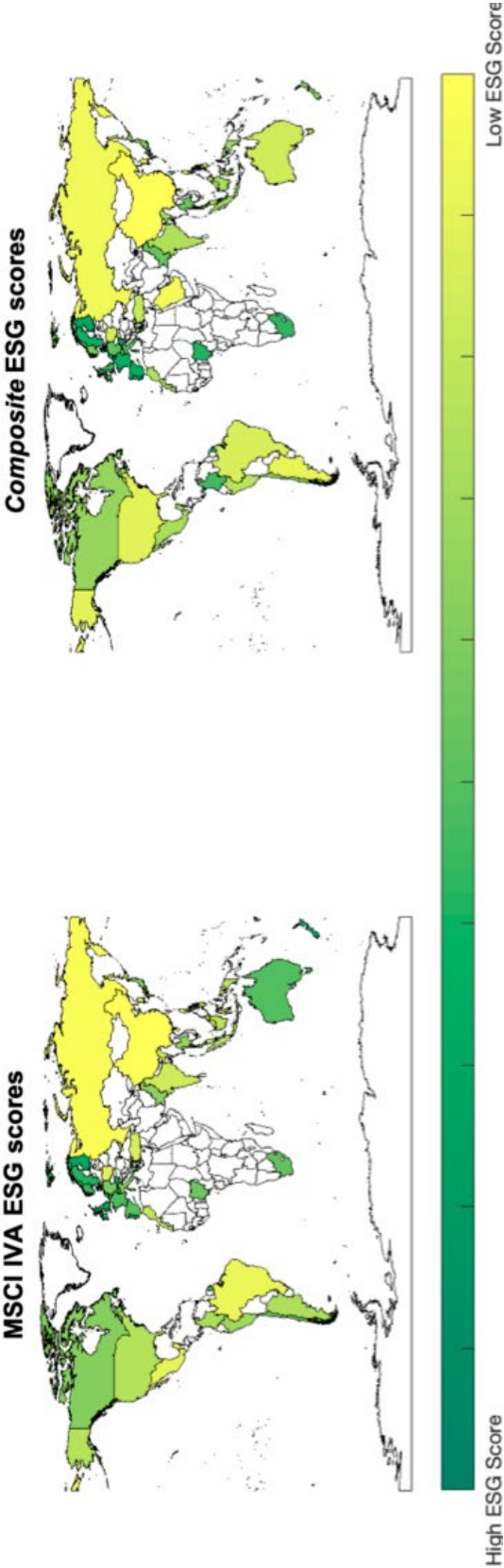


Figure 3. Full sample correlations of ESG ratings among raters

The figure shows full sample correlations of ESG ratings across rater pairs (Refinitiv-MSCI IVA, Sustainalytics-MSCI IVA, and Sustainalytics-Refinitiv) for each world region and worldwide. We also show the average correlations across all three rater pairs (Cross-Rater Average). Each plot shows the correlations for one type of ESG rating: environmental (E), social (S), governance (G), and ESG (ESG). The correlations are computed using all firms in our sample and over the full sample period encompassing ESG ratings from 1999 to 2018. The starting point of each time series differs across raters and countries as indicated in Internet Appendix IA.1.

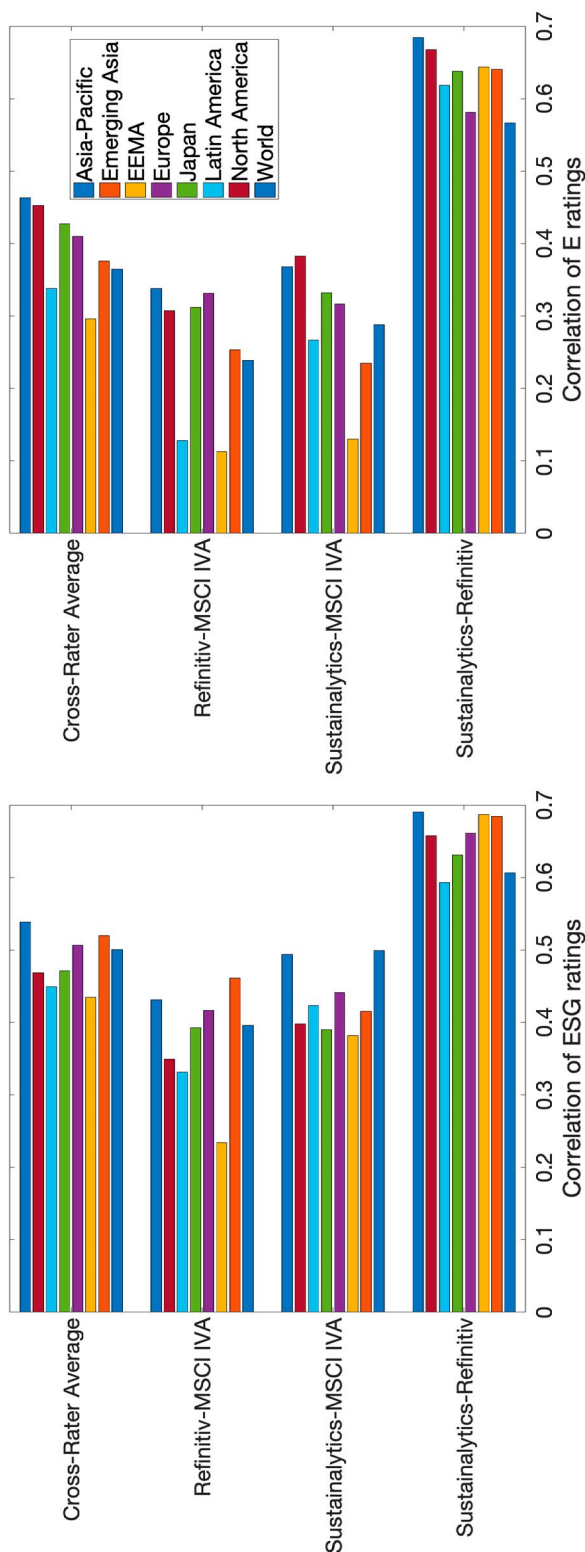


Figure 3. Full sample correlations of ESG ratings among raters
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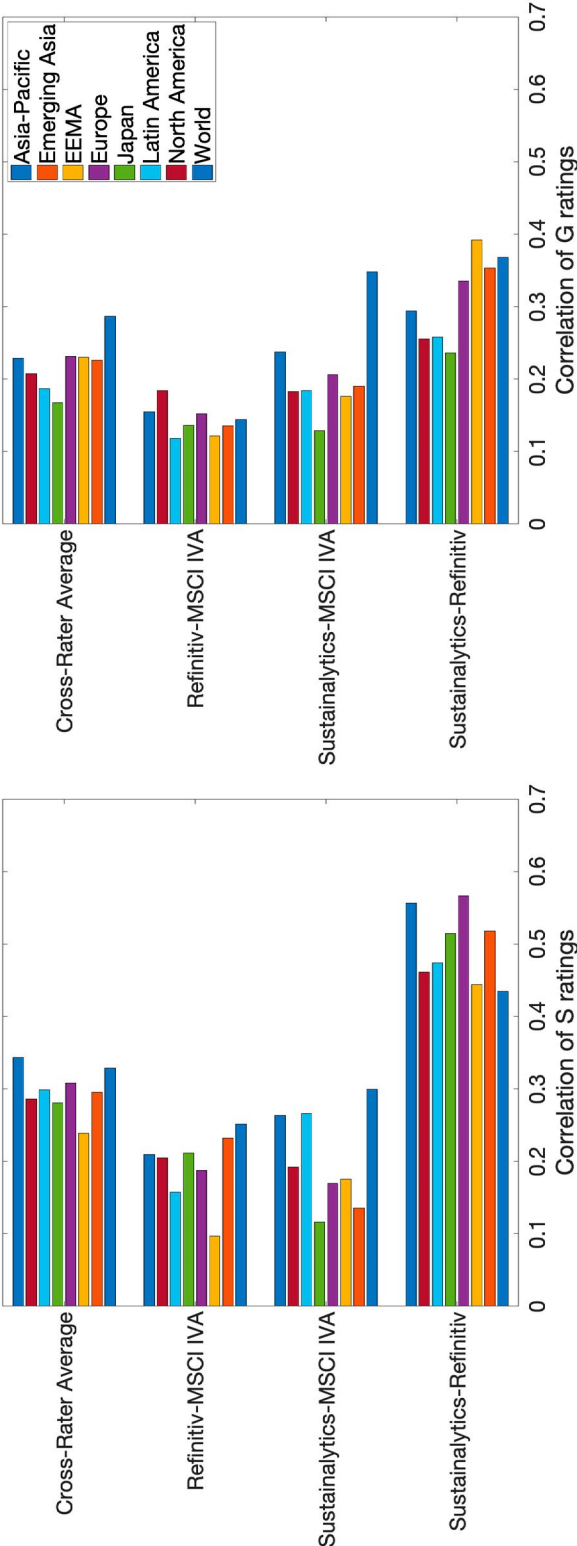


Figure 4. ESG ratings and stock returns: global sample

This figure summarizes the results from running panel regressions of monthly stock returns on lagged ESG ratings using the global sample of stocks. All regressions include all control variables listed in Appendix Table A.1 as well as one of the following fixed effects: (i) month fixed effects, (ii) country-month fixed effects, (iii) industry-month fixed effects, or (iv) industry-month fixed effects. Following Bolton and Kacperczyk (2021), industries are defined based on six-digit Global Industry Classification Standard Codes (GICS) codes. Each of the four plots in the figure shows the results of running regressions using one of the following four types of ESG ratings: environmental (E), social (S), governance (G), and ESG (ESG). We use ratings from four raters: Refinitiv, MSCI IVA, Sustainalytics, and Composite. Composite combines the available ratings of the other three raters by averaging their ratings. We convert the ratings of each of the other three raters at each point in time to percentile ranks before averaging. Each bar represents the regression coefficient on the ESG rating variable used in a given regression. Confidence intervals are depicted as whiskers around the point estimates. The longer (shorter) whiskers represent 95% (90%) confidence intervals. Standard errors are double clustered at the stock and month levels. The sample period is from January 2001 to December 2020.

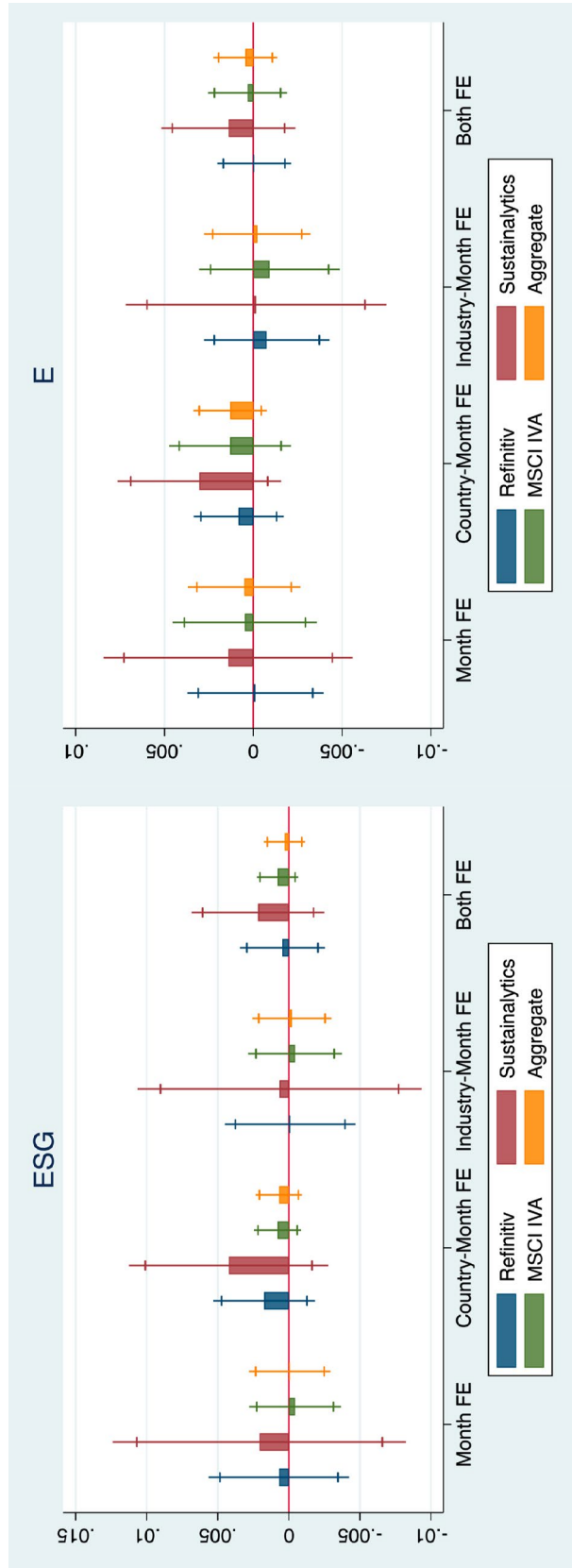


Figure 4. ESG ratings and stock returns: global sample
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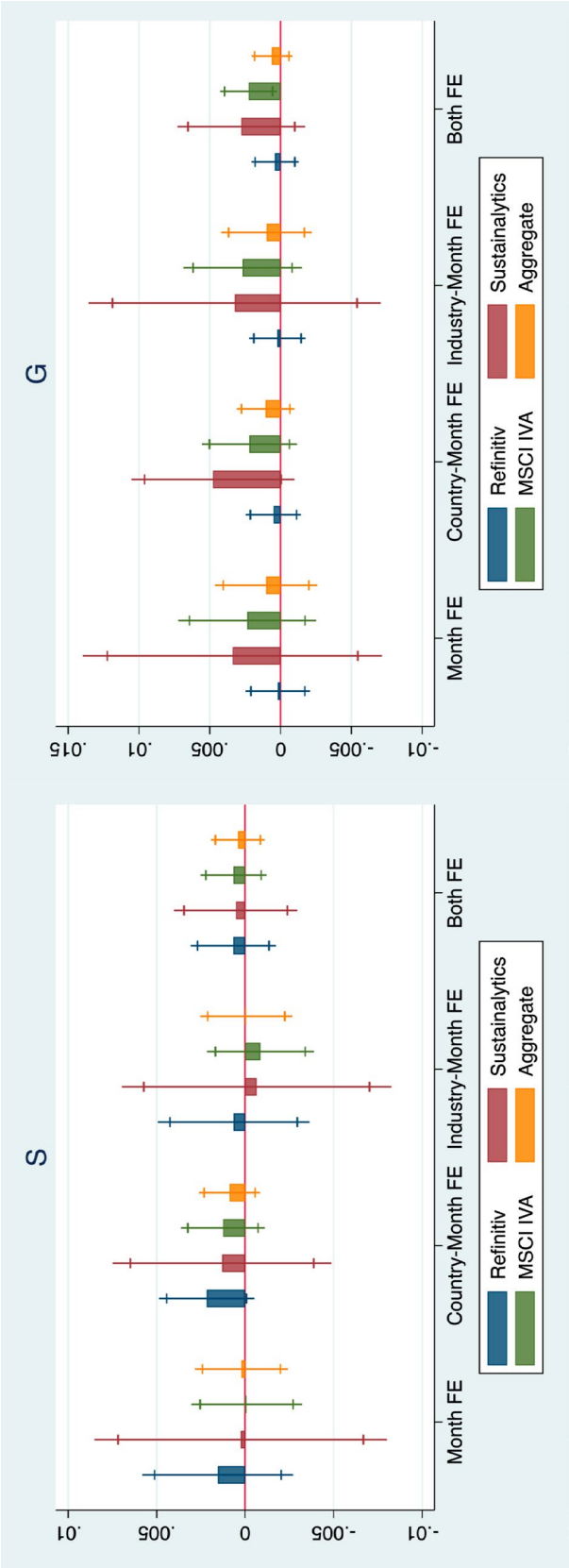


Figure 5. ESG momentum and stock returns: global sample

This figure summarizes the results from running panel regressions of monthly stock returns on lagged ESG momentum using the global sample of stocks. ESG momentum is defined as the year-on-year change in ESG ratings. All regressions include all the control variables listed in Appendix Table A.1 as well as one of the following fixed effects: (i) month fixed effects, (ii) country-month fixed effects, (iii) industry-month fixed effects, or (iv) country-month and industry-month fixed effects. Following Bolton and Kacperczyk (2021), industries are defined based on six-digit Global Industry Classification Standard Codes (GICS) codes. Each of the four plots in the figure shows the results of running regressions using one of the following four types of ESG momentum: environmental (*E*), social (*S*), governance (*G*), and ESG (*ESG*). We use ratings from four raters: Refinitiv, MSCI IVA, Sustainalytics, and *Composite*. *Composite* combines the available ratings of the other three raters by averaging their ratings. We convert the ratings of each of the other three raters at each point in time to percentile ranks before averaging. Each bar represents the regression coefficient on the ESG momentum variable used in a given regression. Confidence intervals are depicted as whiskers around the point estimates. The longer (shorter) whiskers represent 95% (90%) confidence intervals. Standard errors are double clustered at the stock and month levels. The sample period is from January 2001 to December 2020.

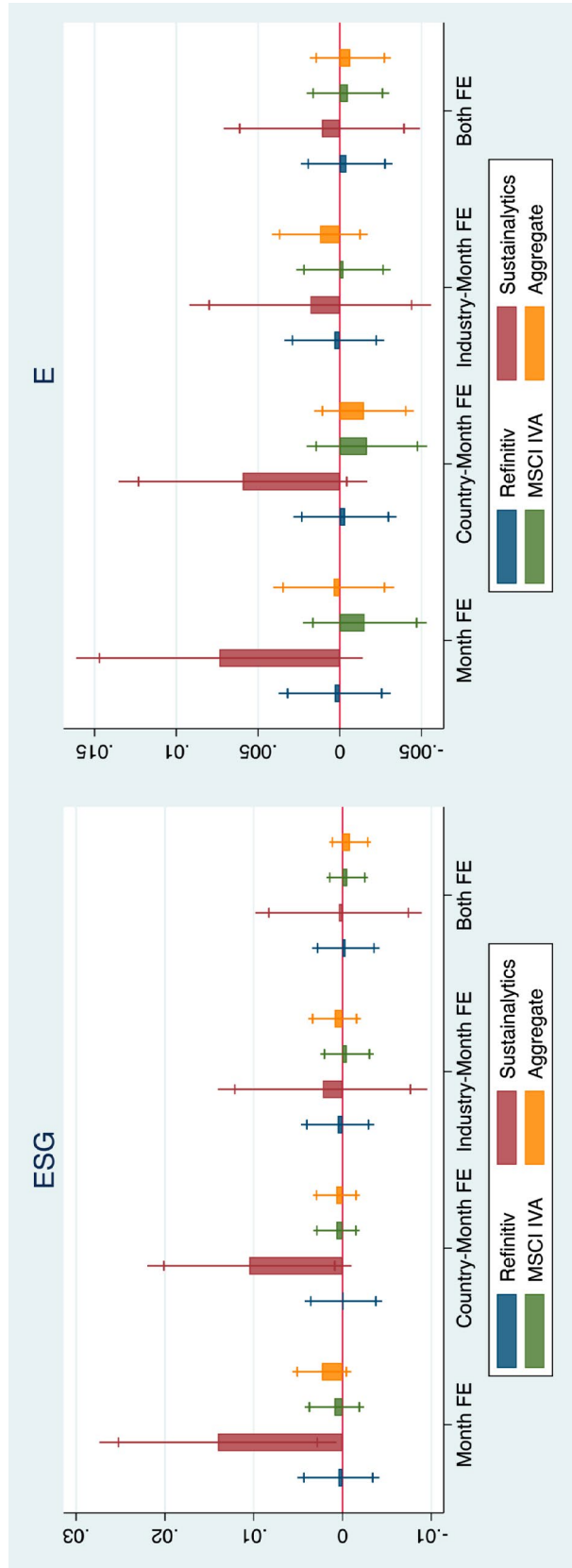


Figure 5. ESG momentum and stock returns: global sample
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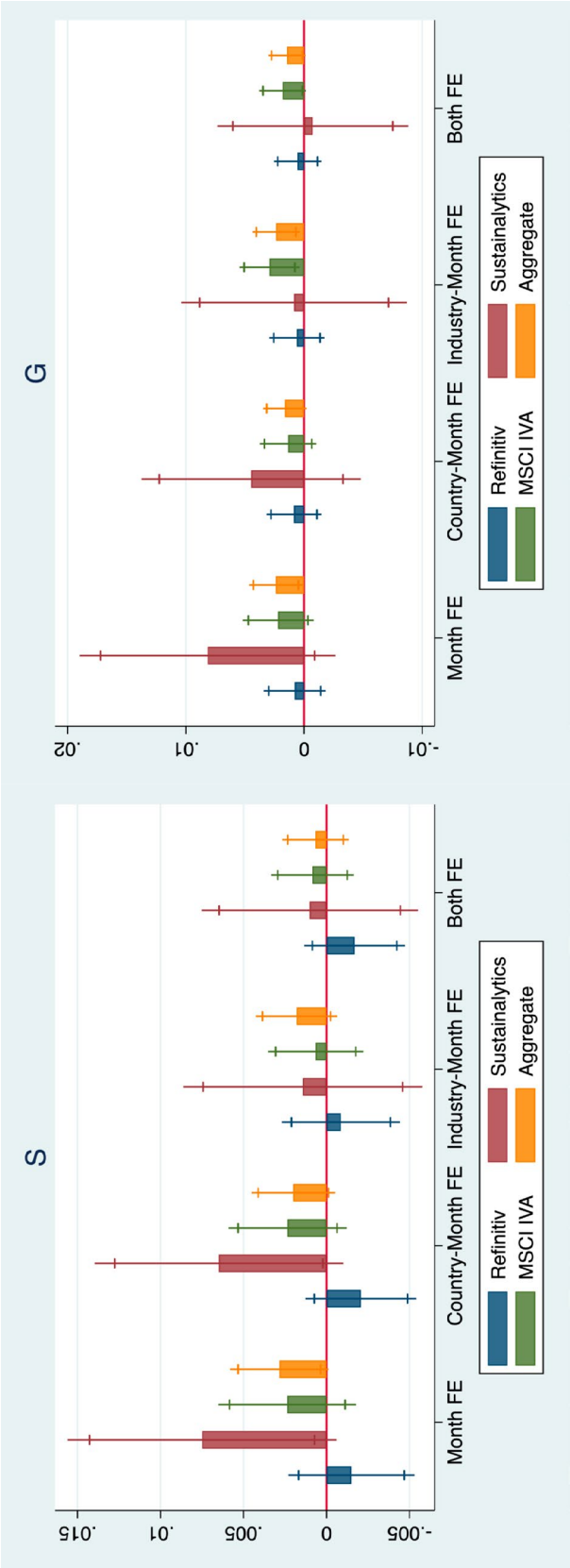


Figure 6. ESG ratings and stock returns: world regions

This figure summarizes the results from running panel regressions of monthly stock returns on the lagged ESG ratings of stocks traded in one of the following regions: Asia-Pacific, Japan, Europe, North America, and Emerging Countries. All regressions include all the control variables listed in Appendix Table A.1 as well as country-month and industry-month fixed effects. Following Bolton and Kacperczyk (2021), industries are defined based on six-digit Global Industry Classification Standard Codes (GICS) codes. The plots on the left (right) show the results of running these regressions over the period January 2001 to December 2012 (January 2013 to December 2020). Each plot in the figure shows the results of running regressions using one of the following four types of ESG ratings: environmental (E), social (S), governance (G), and ESG (ESG). We use ratings from four raters: Refinitiv, MSCI IVA, Sustainalytics, and Composite. Composite combines the available ratings of the other three raters by averaging their ratings. We convert the ratings of each of the other three raters at each point in time to percentile ranks before averaging. Each bar represents the regression coefficient on the ESG rating variable used in a given regression. Confidence intervals are depicted as whiskers around the point estimates. The longer (shorter) whiskers represent 95% (90%) confidence intervals. Standard errors are double clustered at the stock and month levels.

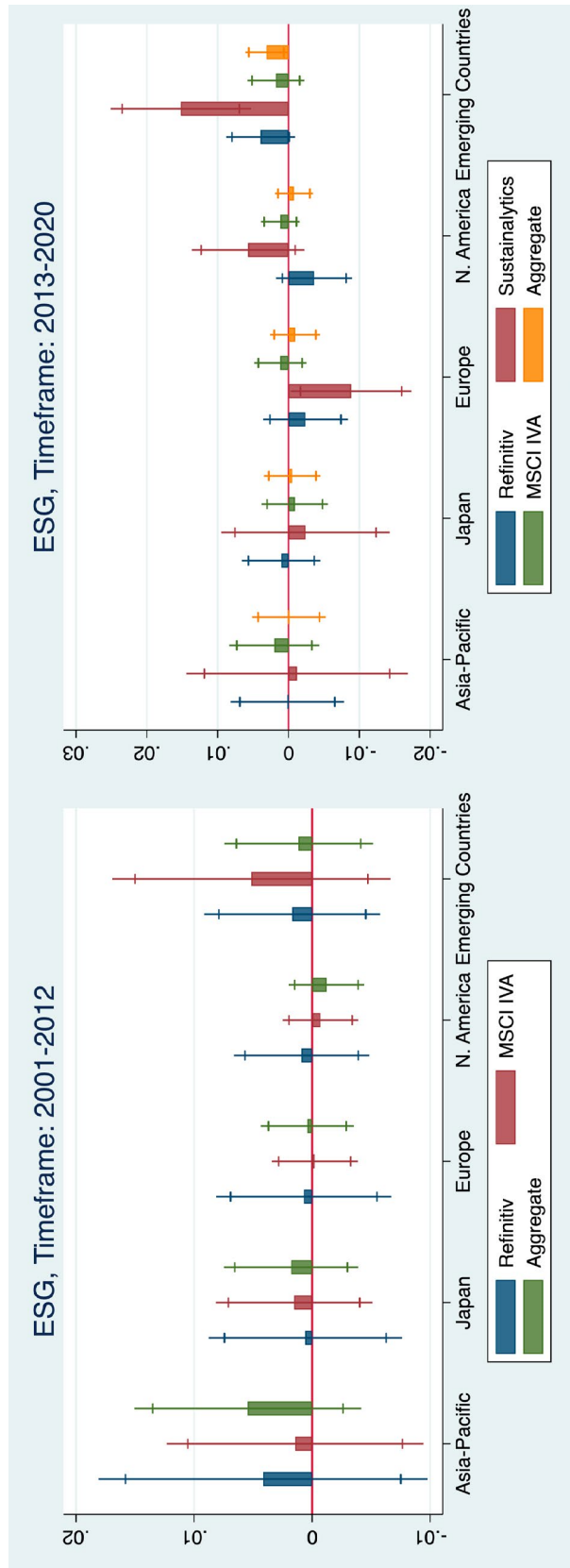


Figure 6. ESG ratings and stock returns: world regions
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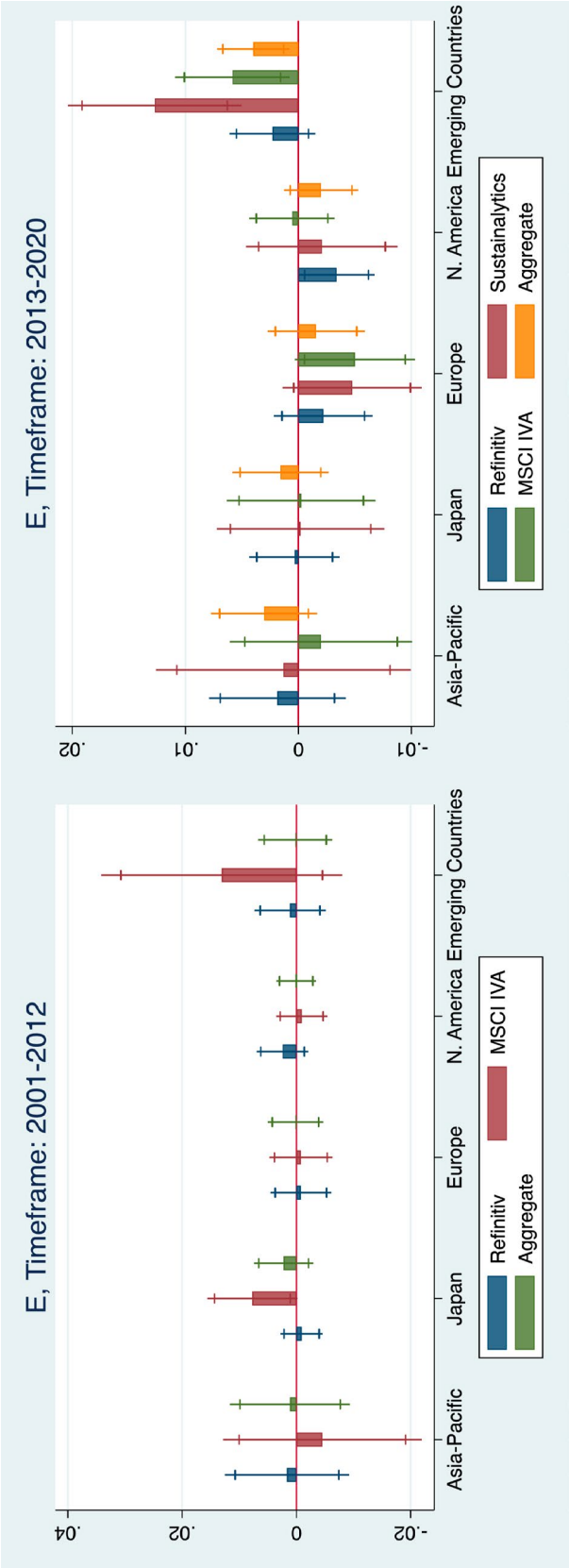


Figure 6. ESG ratings and stock returns: world regions (continued)

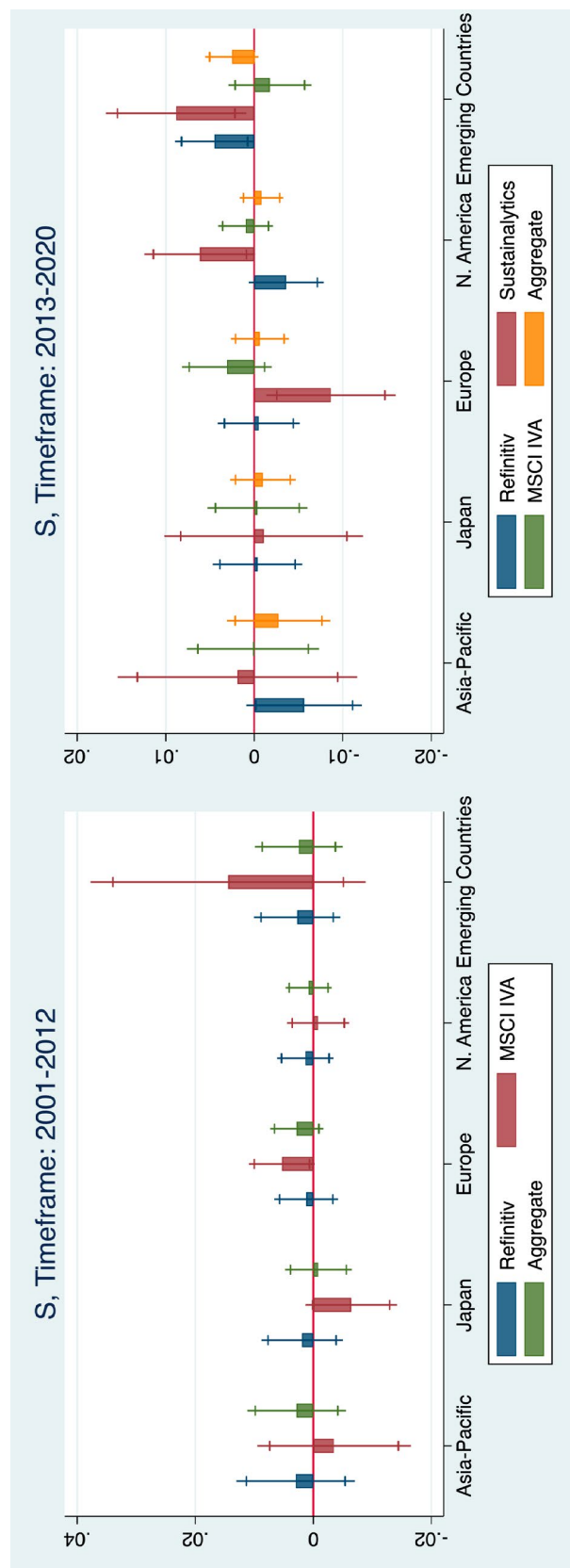
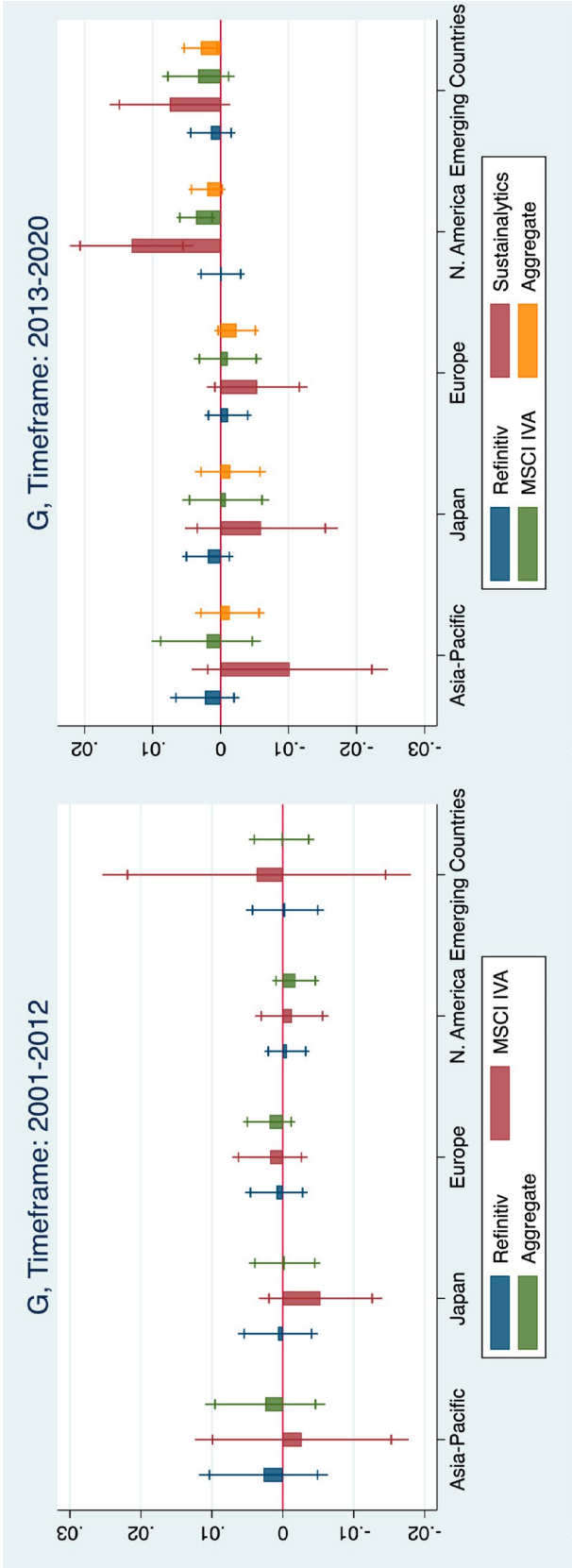


Figure 6. ESG ratings and stock returns: world regions
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