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Pricing Ethics in the Foreign Exchange Market: Environmental, Social and Governance Ratings and Currency Premia

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JEL Classification: F31, G11, G12, G14, G32

Keywords: Environmental, Social, governance, Refinitiv, ESG, Foreign exchange market, Risk premium

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Abstract

We examine the cross-sectional predictive ability of the Refinitiv Environmental, Social and Governance (ESG) score for returns in the foreign exchange market, using ESG scores aggregated at the national level, and find that ESG is a strong *negative* predictor of currency returns. Intuitively, investors require a premium for financing low-ESG countries while high-ESG countries offer lower returns and provide a hedge in the bad state of the world. We show that ESG is priced in the cross-section of currency returns. We also consider the different components of ESG and show that its predictability is driven by the environmental pillar of the ESG ratings. The profitability of the ESG currency strategy is not driven by the carry trade and is robust to transaction costs.

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1. Introduction

We assess the role of the Refinitiv Environmental, Social and Governance (ESG) ratings in the foreign exchange market. There is an increasing interest of individual investors and fund managers (e.g., Riedl and Smeets, 2017) for assets that comply with ESG standards. In theory, firms with high ESG ratings tend to be more stable as they try to capture all the different factors that matter for the long-term sustainable growth of the firm. To this end, in a macro setting, countries with high ESG ratings tend to put more emphasis on long-run growth by imposing regulations which ensure that firms are sustainable. For example, the Securities and Exchange Commission (SEC) in the US in March 2021 began discussing the Sustainable Finance Disclosure Regulation which would require mandatory ESG disclosures for asset managers and other institutional investors.[1]

Our contribution in this paper is to examine the cross-sectional predictive ability of ESG ratings for currency returns and offer a rationale for our findings. To the best of the present authors' knowledge this is the first paper to offer a detailed examination of the role of ESG ratings in the foreign exchange market. Albuquerque, Koskinen, and Zhang (2019) find that more pronounced customer loyalty for ESG firms leads to a lower price-elasticity of demand, which can enhance high-ESG firms' equity performance and resilience. Specifically, they indicate that firms with high ESG scores experience higher stock returns in comparison to firms with low ESG scores during the recent COVID-19 pandemic. This is in line with the notion that high ESG assets are less risky and tend to appreciate in value in bad states of the world, compensating investors for the adverse movement of prices of other assets. Our conjecture is that countries with firms that have higher ESG scores on average tend to be less risky and offer good hedging opportunities. This is also

[1] https://corpgov.law.harvard.edu/2021/05/28/sec-regulation-of-esg-disclosures/

consistent with the findings of Lins, Servaes, and Tamayo (2017), who show a similar positive relation between a firm's rating on corporate social responsibility (CSR) and its stock returns during the global financial crisis. The term CSR is often used interchangeably with ESG in the literature. In other words, firms with high ESG or CSR measures tend to offer downside protection in periods of stress. From a different standpoint, Glossner (2019) highlights that long-term investors recognize the hedging opportunities offered by CSR investing particularly for extreme events.

Employing a cross-sectional approach, we evaluate the predictive ability of ESG scores and their components, namely, the environmental (E), social (S) and governance (G) ratings.[2] The ESG scores are defined as the average scores of all firms with available scores in each country at each point of time. Thus, we allocate currencies into portfolios based on ESG ratings and find a negative relationship between ESG ratings and currency returns. Specifically, high ESG currencies are less risky and offer lower returns while low ESG currencies are riskier and investors require a premium for holding these currencies. We show that a zero-cost portfolio that buys low ESG currencies and sells high ESG currencies offers highly positive, statistically and economically significant returns. Then, we examine the role of each component of the ESG rating in order to assess its contribution in our findings. Thus, we allocate currencies into portfolios based on the Environmental, Social or Governance components. Consistently with the literature (e.g., Albuquerque et al., 2019), we find that only the Environmental pillar offers significant payoffs. The social pillar provides

[2] Recent literature has identified a large number of determinants of currency premia such as global volatility (Menkhoff et al., 2012); international correlation risk (Mueller, Stathopoulos, and Vedolin, 2017); macro risk (e.g., Filippou and Taylor, 2017; Filippou, Rapach, Taylor and Zhou, 2020); political risk (e.g., Filippou, Gozluklu and Taylor, 2018; Filippou, Gozluklu, Nguyen, and Taylor, 2020; Filippou, Gozluklu, Nguyen, and Viswanath-Natraj, 2020); and media sentiment (Filippou, Taylor and Wang, 2021), among others.

economically significant spread portfolios that are not statistically significant and the governance component does not offer significant payoffs in either statistical or economic terms.

Then, we examine the cross-sectional predictive power of ESG spread portfolios for the cross-section of currency returns. We find that ESG is priced in the cross-section of currency returns and this predictability is driven by the environmental component of the measure. In addition, we show that ESG can also explain carry trade profitability. However, we show that the carry trade strategy is disconnected from the ESG strategy. Specifically, even though there is a linear relationship between ESG spread portfolios and carry trade portfolios, carry trades can explain only a very small portion of the variation of the ESG spread portfolios, which offer highly significant alphas in both economic and statistical terms. However, further analysis shows that only the E spread portfolios (i.e. based on the environmental component) offer a significant alpha over and above the carry trade strategy. Finally, we show that the profitability of our strategy is robust to the presence of transaction costs.

The remainder of the paper is organized as follows: Section 2 discusses the data and portfolio construction, Section 3 describes the empirical results, Section 4 offers robustness checks and Section 5 concludes.

2. Data and Portfolio Construction

This section provides a description of the exchange rate data and the ESG ratings. We also provide a detailed analysis of our ESG portfolio construction.

Exchange Rate Data. We collect daily spot and forward exchange rates from Reuters via Datastream. We focus our analysis on 10 currencies against the U.S. dollar. Our monthly data span the period May 2001 to December 2020. We create end-of-month series of daily spot and one-month forward rates (e.g., Burnside, Eichenbaum, Kleshchelski and Rebelo, 2011a). Thus, our dataset is not averaged over each month but consists of spot and forward rates on the last trading day of each month. Our sample includes the following 10 countries (or common currency area, in the case of Europe): Australia, Canada, Denmark, Europe, Japan, New Zealand, Norway, Sweden, Switzerland, United Kingdom.[3]

Currency Excess Returns. We denote by S_t and F_t the level of the spot and one-month forward rate at time *t*. Each currency is expressed in units of foreign currency per U.S. dollar so that an appreciation of the foreign currency relative to the dollar is associated with a decrease in S_t. We denote by RX_{t+1} the payoff of a strategy that buys a foreign currency in the forward market at time *t* and goes short the foreign currency in the spot market the following month (e.g., at time *t+1*). Thus, the log currency excess return is expressed as:

$$rx_{t+1} = f_t - s_{t+1} = f_t - s_t - (s_{t+1} - s_t),$$

Where lower case letters denote logarithmic transformation and rx_{t+1} is the log excess return at time *t+1*. Thus, the currency excess return consists of two parts, namely, the forward discount and the exchange rate return. The forward discount is a good proxy for the interest rate differential, i.e. $f_t - s_t \approx r_t - r_t^{US}$, where r_t (r_t^{US}) denotes the foreign (domestic) riskless nominal interest rate of the foreign country, under the assumption that covered interest-rate parity (CIP) condition holds.[4]

[3] This set of currencies are actually G11 with the US dollar.
[4] Taylor (1987, 1989) and Akram et al. (2008) show that CIP tends to hold for daily or lower frequencies.

The latter component implies that the currency excess return can be expressed as $(r_t - (s_{t+1} - s_t) - r_t^{US})$.

Transaction Costs. We also consider implementation costs of the strategy by using bid and ask spreads. Specifically, using superscripts *a* and *b* to denote ask and bid prices, the net return from entering into a forward contract at time *t* to buy the foreign currency in the forward market using the bid price (f_t^b) and selling the position at maturity in the spot market at time *t+1* at the ask price (s_{t+1}^a) is computed as: $rx_{t+1}^L = (f_t^b - s_{t+1}^a)$. Similarly, the short forward position in the foreign currency will offer a net excess return which is given by: $rx_{t+1}^S = (f_t^a - s_{t+1}^b)$. We show results with and without bid-ask spreads as the inclusion of transaction costs increase the volatility of excess returns giving a higher weight to less traded and illiquid currencies in our portfolio selection.

ESG Ratings. We obtain ESG ratings from Refinitiv. Specifically, we collect the ESG ratings of all firms with available ratings in each country of our sample. Then, the country-level ESG rating is defined as average rating of all firms in a specific country. For Europe, we consider the average of the ratings of all firms in our sample that are in the Euro area. Specifically, the ESG rating for Europe comprises the average ratings of the firms of the following countries: Austria, Belgium, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal and Spain. We also collect the ratings for each component, namely, environmental, social and governance and we apply the same methodology to obtain country-level ratings.[5]

[5] The ratings are lagged by one month in order to allow for publication bias.

Refinitiv computes more than 500 firm-level ESG variable in order to obtain the overall firm rating. These variables are clustered into ten groups that define the three component scores (environmental, social and corporate governance.) and the overall ESG score, which illustrates the firm's ESG performance, commitment and sustainability. Thus, The ESG rating is defined as the relative sum of the group weights. The component weights are normalized to values between 0 and 100. All variables are standardized so as to be comparable across firms. Refinitiv maintains ESG data and calculates ESG ratings for about 9,000 firms around the world.[6] Table 1 shows summary statistics of the ESG ratings and their components for each country. Specifically, we show the mean and the standard deviation of the ESG and the Environmental, Social and Governance ratings of each country in our sample.

[Table 1 about here.]

ESG Portfolios. At the end of each month *t*, we allocate currencies into quintiles base on their ESG ratings obtained at time $t - 1$. The first basket of currencies consists of the lowest ESG currencies and the last portfolio contains the highest ESG currencies. All portfolios are equally weighted. The ESG strategy (LMH_{ESG}) involves a long position in low ESG currencies (i.e. Portfolio 5 or P5) while going short high ESG currencies (i.e. Portfolio 1 or P1). We construct the corresponding strategies for each of the components of the ESG ratings. Specifically, we build spread portfolios for the environmental component (LMH_E), the social component (LMH_S) and the governance component (LMH_G). We also build a marker factor (DOL) which represents the average return across portfolios each month.

[6] For more information, we refer the reader to https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

Carry Trade Portfolios. At the end of each month *t*, we sort currencies into quintiles base on their forward discounts $(f_t - s_t)$ obtained at time $t - 1$, assuming that covered interest rate parity (CIP) holds. Thus, the first portfolio of currencies includes the funding currencies and the last portfolio contains the investment currencies. All portfolios are equally-weighted. The carry trade strategy (CAR) involves a long position in high interest rate currencies (i.e. Portfolio 5, P5) while short-selling low interest rate currencies (i.e. Portfolio 1, P1). We also construct a marker factor (DOL) which represents the average return across portfolios each month.

3. Empirical Results

This section shows descriptive statistics of ESG portfolios as well as its components. We also report results of asset pricing tests.

3.1. Descriptive Statistics for the ESG Strategy

Table 2 offers summary statistics of currency portfolios that are allocated into quintiles based on the previous month's ESG rating and the corresponding long-short portfolios. We report the annualized average currency excess returns, standard deviation, Sharpe ratios, and coefficients of skewness and kurtosis. We also report the significance of the spread portfolios at the 10%, 5% and 1% nominal significance levels, estimated using Newey and West (1987) standard errors with the optimal number of lags. As Table 2 reveals, we find that currency excess returns *decrease* monotonically from low ESG portfolios (P1) to high ESG portfolios (P5) offering a long-short portfolio (e.g., LMH_{ESG}) that buys low ESG currencies and sells high ESG currencies. The strategy offers an annualized average excess return of 3.62% and is statistically significant. This finding implies that investors who allocate their wealth to countries with low ESG ratings require a premium for financing such positions while countries with high ESG ratings offer a hedge in the bad state of the world when low ESG currencies perform poorly. In other words, high ESG countries tend to be more stable and less risky, offering low returns on average but appreciating in value in bad states of the world, offering a hedge to investors involved in such strategies.

[Table 2 about here.]

Table 3 shows results for currency portfolios that are sorted into quintiles based on the different components of the ESG ratings. Specifically, we allocate currencies into quintiles based on its environmental (E), social (S) and Governance (G) pillars. *Panel A* of Table 3 shows results for currencies that are sorted based on the Environmental component. We find a similar pattern as with the ESG-sorted portfolios. Specifically, there is a negative and statistically significant relationship between the Environmental component and future currency returns. The strategy offers an annualized average excess return of 3.57% and is statistically significant. In *Panel B* and *Panel C* we show results of currency portfolios that are sorted into quintiles based on the Social and the Governance components respectively. Even though in both cases we observe a negative association between the Social and Governance components and future currency returns, the spread portfolios are not statistically significant. Figure 1 shows cumulative returns of spread portfolios that are sorted based on ESG or its different components. Shaded areas represent NBER recessions. The vertical line denotes the collapse of Lehman Brothers in September 2008, marking high point of the 2008-2010 global financial crisis (Melvin and Taylor, 2009a, 2009b). We find that the ESG and E strategies perform better than the other strategies and they perform well during crises such as the 2008-2010 financial crisis and the recent Covid-19 crisis.

[Table 3 about here.]

[Figure 1 about here.]

Portfolio Holdings. We also compute the frequency of each currency in low and high ESG portfolios. Figure 2 shows the frequency of each currency, calculated as the total number of times that a currency appears in a specific portfolio over the total number of months. We find that that countries such as Canada, Australia, New Zealand and Denmark are low ESG countries while Sweden and Europe are high ESG countries. We also perform the same exercise in Figure 3 for portfolios that are sorted based on the different components of ESG and find that the E portfolios exhibit the same patterns as with the ESG portfolios but the dominant currencies for S and G portfolios are different. Specifically, we find Japan, Australia, New Zealand and Denmark are low S countries and Sweden and Europe are high S countries. We also find that Norway and Denmark are low G countries and the United Kingdom is a high G country. Thus, it is clear that the proximity of the holdings of E portfolios with the ESG implies that the environmental factor is the most important country characteristic that offers strong predictability for currency returns.

[Figures 2 and 3 about here.]

3.3. Asset Pricing Tests

In this section, we examine the ability of the ESG risk factors to explain the cross-section of currency returns. Thus, our analysis investigates whether a risk-based approach could explain the cross-sectional predictive ability of ESG ratings with currency premia.

Methods. As in Lustig et al. (2011), Menkhoff et al. (2012a) and Filippou et al. (2018), we examine the pricing ability of existing risk factors when considering as test assets the cross-section of currency returns sorted based on ESG ratings. We use excess returns in levels instead of excess returns for all asset pricing tests in order to avoid having to assume joint log-normality of returns and the pricing kernel. The currency excess return of each portfolio j is denoted as RX^j where j takes values from 1 to 5. The risk-adjusted currency excess return, under the no-arbitrage conditions, should be zero and satisfy the Euler equation:

$$E_t\left[M_{t+1}RX_{t+1}^{j}\right] = 0$$

where M_{t+1} represents a linear stochastic discount factor (SDF) in the risk factors ϕ_{t+1}. Specifically, we focus our attention on the SDF of the form below:

$$M_{t+1} = [1 - b'(\phi_{t+1} - \mu_{\phi})]$$

where b is the vector of factor loadings and μ_{ϕ} denotes the vector of expected values of the pricing factors (i.e. $\mu_{\phi} = E(\phi_{t+1})$). The beta representation of the model is calculated as the combination of above equations offering the following beta pricing model:

$$E\left[RX^j\right] = \lambda'\beta^j$$

where $\lambda = \Sigma_\phi b$ denotes the factor risk prices and with $\Sigma_\phi = E[(\phi_t - \mu_\phi)(\phi_t - \mu_\phi)']$ representing the variance-covariance matrix of the risk factors and b the factor loading. The regression coefficients β^j are based on a contemporaneous regression of each currency excess return (RX^j_{t+1}) on the risk factors (ϕ_t).

We apply a Fama and MacBeth (1973) (FMB) two-pass regression, where in the first stage we run contemporaneous time-series regressions of currency portfolio excess returns on the risk factors. In the second stage, we perform cross-sectional regressions of average portfolio returns on factor loadings, calculated in the previous step, so as to obtain the factor risk prices. Our specification allows for common mispricing in currency returns as it includes a constant. We report both Newey and West (1987) *t*-statistics as well as Shanken (1992) *t*-statistics in order to guard against potential errors-in-variables that might arise due to the fact that the regressors are estimated in the second stage of the FMB regression.

ESG Portfolios. Table 4 offers asset pricing results for a two-factor model that consists of the dollar factor (DOL) and the ESG factor. We use as test assets five currency portfolios sorted based on lagged ESG ratings. Thus, we employ an SDF of the form:

$$M_{t+1} = 1 - b_{DOL}(DOL_{t+1} - \mu_{DOL}) - b_F(F_{t+1} - \mu_F),$$

where DOL represents the dollar factor and F is the ESG risk factor (LMH_{ESG}).[7] Table 5 provides results for the second-pass of the FMB regression. We provide estimates for the implied risk factor

[7] Recall that the ESG factor is a low-minus-high portfolio, so a positive price of risk indicates a negative association between ESG and the cross-section of currency returns.

prices (λ) and the corresponding Newey and West (1987) *t*-statistics (in square brackets) or *p*-values (in parentheses) corrected for autocorrelation and heteroskedasticity with Andrews (1991) optimal lag selection, and SH are the corresponding Shanken (1992) *t*-statistics. The cross-sectional performance of the models is also evaluated based on χ^2, root mean square error (RMSE), cross-sectional R^2, and *HJ* distance (following Hansen and Jagannathan, 1997). The χ^2 test statistics test the null hypothesis that all pricing errors in the cross-section are equal to zero. In addition, the cross-sectional pricing errors are estimated as the difference between the realized and predicted excess returns. The *HJ* distance is a model diagnostic that tests whether the distance of the SDF of the candidate model in squared form and a group of acceptable SDFs is different from zero.

First, we examine the statistical significance of the risk price (i.e. λ_F) of the ESG factor as well as its components and the market factor (i.e. λ_{DOL}). In *Panel A* of Table 4, we find that the ESG spread portfolios exhibit strong cross-sectional predictive power. Specifically, the ESG prices of risk are always positive and significant based on both Newey and West (1987) and Shanken (1992) standard errors across ESG-sorted portfolios. In addition, the risk price of average excess return factor (DOL) is not statistically significant because it serves as a level factor implying that all portfolios have a loading close to one with respect to this factor. For this reason, it cannot capture the cross-sectional variation in portfolio returns and serves as a constant in the cross-sectional regression. *Panel B* of Table 4 shows results for the environmental pillar and we observe that a spread portfolio that buys low E currencies and sells high E currencies is priced in the cross-section of currency returns. On the other hand, the S and G spread portfolios that are presented in *Panel C* and *Panel D* do not offer significant predictive power for the cross-section of currency returns.

[Table 4 about here.]

Carry Trade and ESG Portfolios. We also examine the predictive ability of the ESG risk factor for alternative test assets. Table 5 shows asset pricing tests for five carry trade portfolios. We find that the risk price (i.e. λ_F) of the ESG is highly positive and significant, offering a cross-sectional *R*-squared of 97% and we cannot reject the null hypothesis that all pricing errors are jointly equal to zero. We find similar results when we include five carry trade and five ESG sorted portfolios as test assets. This implies a negative association of ESG with carry trade portfolios as the ESG spread portfolio is a low-minus-high portfolio.

[Table 5 about here.]

4. Robustness Checks

In this section we offer additional robustness tests that reinforce our findings.

4.1. ESG Portfolios and Carry Trades

Here we examine the relationship between currency carry trades and ESG portfolios. In the previous sections, we showed that high ESG countries tend to be more stable and less risky while low ESG currencies are riskier and investors require compensation for investing in such currencies. One could argue that low ESG firms tend to be high interest rate currencies and high ESG firms tend on average to be low interest rate currencies, given that in the literature it is documented that high ESG countries tend to be more stable. To examine this, in Table 6 we show the results of contemporaneously regressing the payoff of ESG spread portfolios on the carry trade factor. We find that the ESG portfolio offers a highly economically significant annualized alpha of 2.62% that is statistically significant at 5% significance level. We also find that the adjusted R-squared is very low, indicating the disconnection of carry trade strategies with the ESG strategy. We also offer results for the different components of ESG and find that only the environmental (E) portfolio offers economically and statistically significant alphas; strategies based on the other two pillars do not provide significant alphas and carry trade portfolios cannot explain their variation. Thus, we conclude that even though the carry trade strategy exhibits a linear relationship with the ESG and the E spread portfolios, it can only explain a very small portion of their variation, indicating the disconnection between carry trades and the ESG strategies.

[Table 6 about here.]

4.2. Transaction Costs

Our previous analysis does not take into consideration the implementation cost of the strategies. Table 7 reports descriptive statistics of currency portfolios that are sorted into quintiles based on ESG ratings or Environmental ratings. We do not offer results for the Social and Governance components because those strategies are not significant even before transaction costs. *Panel A* of Table 8 shows results for ESG portfolios and *Panel B* displays results for currencies that are allocated into portfolios based on their Environmental ratings. In both cases we find that a strategy that goes long the low ESG or Environmental ratings portfolio and short the high ESG or Environmental ratings portfolio offers very high annualized returns and Sharpe ratios indicating that the profitability that we observed in Table 2 and Table 3 is robust to transaction costs.

[Table 7 about here.]

4.3. ESG and Crisis Periods

In the previous analysis we show that currencies with low ESG offer a hedge in periods of stress so as to compensate the investors for the downside risk of the high ESG portfolios. In this section, we examine the currency excess returns of the constituents of low and high ESG portfolios during the major financial crises in our sample period, namely, the Global Financial Crisis and the COVID-19 crisis. We set as baseline dates for the two crises the collapse of Lehman Brothers in September 2008 for the Global Financial Crisis and the initiation of the COVID-19 crisis in March 2020. Figure 4 shows currency excess returns of the constituents of ESG portfolios for the period of August 2008 to December 2008. We denote with red the currencies that belong to the low ESG portfolio and the green bars are the currencies for the high ESG portfolio. The currencies with blue bars are allocated in other portfolios. We find that Sweden and Europe are high ESG countries that offered more negative returns in September 2008 in comparison to the returns of Canada and New Zealand which are low ESG countries. Thus, the more negative returns of Sweden and Europe contributed positively in the ESG portfolio as they are short positions compensating the investors for the low returns and the low ESG currencies offered during that period. Figure 4 also shows results for E, S and G portfolios. We find similar results for E, S and G portfolios. However, the constituents of the latter portfolio are different.

[Figure 4 about here.]

Figure 5 shows the corresponding results for the COVID-19 crisis. Specifically, we show results for the months February 2020 to June 2020 and we find that Denmark and Europe were high ESG countries and Canada and New Zealand were low in ESG countries in March 2020. We find that high ESG countries offered lower or negative returns. However, the high ESG currencies did not offer very negative excess returns in comparison to the Global Financial Crisis. Thus, we find that we in the COVID-19 crisis the high ESG currencies offered negative returns in February and March 2020 but they did not drop in value enough so as to compensate the investors for the underperformance of the low ESG currencies. Figure 5 also shows similar patterns when we focus on E, S and G portfolios as we see that high E, S and G currencies offered negative returns.

[Figure 5 about here.]

5. Conclusion

The research reported in this paper is the first to examine the cross-sectional predictive power of ESG ratings for currency returns. While the equities market literature has found that ESG scores are a positive predictor of performance, we find that ESG is a strong *negative* predictor of currency returns at the country level. Specifically, currencies of high ESG countries tend to offer lower returns on average and are less risky while low ESG currencies are riskier and investors require a premium in order to finance long positions in these currencies. Thus, we show that ESG risk is priced in the cross-section of currency returns and high ESG countries provide a hedge against adverse movements of low ESG currencies in the bad state of the world. We also investigate the pricing ability of the Environmental, Social and Governance pillars individually, and find that only the environmental component of ESG exhibits strong predictive ability of currency returns.

Further, examining the relationship with the carry trade strategy, we find that the ESG portfolio offers a highly economically and statistically significant alpha over and above the carry trade, although this is again driven by the portfolio based on the environmental pillar of the ESG rating. We also show that our results are robust to the presence of transaction costs.

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Table 1. Descriptive Statistics of ESG Ratings

This table reports descriptive statistics of ESG Ratings. We report the mean and standard deviation of the ESG rating of each country as well as the corresponding statistics for the Environmental, Social and Governance components. The data span the period 2001:05-2020:12.

	ESG		E		S		G	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std
Australia	38.09	4.75	26.03	9.07	37.27	5.59	48.75	1.92
Canada	36.81	4.44	25.02	6.58	37.1	5.18	48	3.06
Denmark	42.5	10.83	35.17	14.91	42.35	14.54	46.23	3.23
Europe	47.49	8.68	41.56	14.15	49.3	10.03	48.59	3.3
Japan	40.03	5.05	39.9	7.4	32.39	6.93	47.52	1.66
New Zealand	35.08	3.62	23.24	7.23	34.16	3.74	47.09	2.22
Norway	43.6	7.13	36.56	12.08	46.25	8.8	46.51	1.24
Sweden	48.38	9.49	42.55	15.97	51.82	9.79	48.22	6.28
Switzerland	43.64	8.08	36.93	10.72	44.31	9.72	46.72	5.71
United Kingdom	45.52	4.79	37.85	7.72	45.85	5.36	50.97	2.42

Table 2. Descriptive Statistics of ESG Portfolios

This table reports descriptive statistics of payoffs to the ESG strategy. We report descriptive statistics for currency excess returns of portfolios sorted based on the ESG ratings. The portfolios are rebalanced on a monthly basis. Finally, the mean, standard deviation and Sharpe Ratio are annualized (the means are multiplied by 12 and the standard deviation by $\sqrt{12}$) and expressed in percentage points. The superscripts *, **, *** indicate significance of the spread portfolios at the 10%, 5% and 1% level, estimated using Newey and West (1987) standard errors with the optimal number of lags. The data span the period 2001:05-2020:12.

	ESG Portfolios						
	P_1	P_2	P_3	P_4	P_5	DOL	LMH_{ESG}
Mean	4.31	1.32	1.56	0.78	0.69	1.73	3.62***
Std. Dev.	10.08	9.36	9.65	8.94	9.58	8.31	7.03
SR	0.43	0.14	0.16	0.09	0.07	0.21	0.52
Skew	-0.25	-0.67	0.08	-0.50	-0.27	-0.23	-0.14
Kurt	4.36	8.93	3.44	4.66	4.20	4.14	3.02

Table 3. Descriptive Statistics of E, S and G Portfolios

This table reports descriptive statistics of payoffs to the ESG strategy. We report descriptive statistics for currency excess returns of portfolios sorted based on the ESG ratings. The portfolios are rebalanced on a monthly basis. Finally, the mean, standard deviation and Sharpe Ratio are annualized (the means are multiplied by 12 and the standard deviation by $\sqrt{12}$) and expressed in percentage points. The superscripts *, **, *** indicate significance of the spread portfolios at the 10%, 5% and 1% level, estimated using Newey and West (1987) standard errors with the optimal number of lags. The data span the period 2001:05-2020:12.

Panel A: Environmental Pillar						
	P_1	P_2	P_3	P_4	P_5	LMH_E
Mean	3.89	1.98	1.71	0.46	0.32	3.57**
Std. Dev.	10.52	10.30	9.18	8.07	9.48	7.56
SR	0.37	0.19	0.19	0.06	0.03	0.47
Skew	-0.56	-0.22	-0.22	-0.07	-0.33	-0.29
Kurt	5.66	5.52	3.33	3.32	4.20	3.05
Panel B: Social Pillar						
	P_1	P_2	P_3	P_4	P_5	LMH_S
Mean	2.92	1.99	2.11	0.61	0.70	2.21
Std. Dev.	8.84	9.78	10.06	9.49	9.58	7.77
SR	0.33	0.20	0.21	0.06	0.07	0.28
Skew	0.02	-0.57	-0.37	-0.39	-0.31	0.27
Kurt	2.87	7.21	4.70	4.22	4.08	3.61
Panel C: Governance Pillar						
	P_1	P_2	P_3	P_4	P_5	LMH_G
Mean	1.83	2.51	1.78	1.27	0.99	0.84
Std. Dev.	10.48	9.75	7.71	10.16	9.00	7.00
SR	0.17	0.26	0.23	0.13	0.11	0.12
Skew	-0.47	0.14	-0.12	-0.47	-0.42	0.15
Kurt	4.87	3.00	3.30	5.64	4.28	6.59

Table 4. Asset Pricing Tests

This table reports asset pricing results for a two-factor model comprising DOL and ESG risk factors. We use as test assets 5 ESG portfolios. We rebalance our portfolios on a monthly basis. We report Fama and MacBeth (1973) estimates of the factor loadings (b) and factor prices of risk (λ). We also display Newey and West (1987) *t*-statistics (in squared brackets) or *p-values* (in parentheses) corrected for autocorrelation and heteroskedasticity with Andrews (1991) optimal lag selection and Sh are the corresponding values of the Shanken (1992) statistic. The table also shows χ^2, RMSE, cross-sectional R^2, HJ distance following Hansen and Jagannathan (1997). We do not control for transaction costs and excess returns are expressed in percentage points. The data are collected from Datastream via Barclays and Reuters. The superscripts *, **, *** indicate significance of the loadings at the 10%, 5% and 1% level that are estimated using Newey and West (1987) standard errors with 12 lags. The data contain monthly series for the period 2001:05-2020:12.

Panel A: ESG						
	λ_{DOL}	$\lambda_{LMH_{ESG}}$	χ^2	$RMSE$	R^2	HJ
TA = $[PORT_{ESG}]$	0.09	0.29**	0.69	3.36	0.97	0.00
NW	[0.59]	[2.11]	(0.95)			(0.26)
SH	[0.59]	[2.11]				
Panel B: Environmental Pillar						
	λ_{DOL}	λ_{LMH_E}	χ^2	$RMSE$	R^2	HJ
TA = $[PORT_{ESG}]$	0.09	0.34*	0.96	4.54	0.89	0.00
NW	[0.58]	[1.96]	(0.92)			(0.28)
SH	[0.58]	[1.95]				
Panel C: Social Pillar						
	λ_{DOL}	λ_{LMH_S}	χ^2	$RMSE$	R^2	HJ
TA = $[PORT_{ESG}]$	0.09	0.30	2.09	6.08	0.84	0.00
NW	[0.59]	[1.63]	(0.72)			(0.24)
SH	[0.59]	[1.62]				
Panel D: Governance Pillar						
	λ_{DOL}	λ_{LMH_G}	χ^2	$RMSE$	R^2	HJ
TA = $[PORT_{ESG}]$	0.09	0.41	3.53	8.27	0.41	0.00
NW	[0.59]	[1.23]	(0.47)			(0.21)
SH	[0.59]	[1.21]				

Table 5. Asset Pricing Tests: Alternative Test Assets

This table reports asset pricing results for a two-factor model that comprises DOL and the ESG risk factors. We use as test assets 5 carry trade (CAR) portfolios. We also include 10 carry and ESG portfolios. We rebalance our portfolios on a monthly basis. We report Fama and MacBeth (1973) estimates of the factor loadings (b) and factor prices of risk (λ). We also display Newey and West (1987) *t*-statistics (in squared brackets) or *p-values* (in parentheses) corrected for autocorrelation and heteroskedasticity with Andrews (1991) optimal lag selection and Sh are the corresponding values of the Shanken (1992) statistic. The table also shows χ^2, cross-sectional R^2, HJ distance following Hansen and Jagannathan (1997). We do not control for transaction costs and excess returns are expressed in percentage points. The data are collected from Datastream via Barclays and Reuters. The superscripts *, **, *** indicate significance of the loadings at the 10%, 5% and 1% level, estimated using Newey and West (1987) standard errors with 12 lags. The data contain monthly series for the period 2001:05-2020:12.

	Factor Prices					
	λ_{DOL}	$\lambda_{LMH_{ESG}}$	χ^2	$RMSE$	R^2	HJ
TA = $[PORT_{CAR}]$	0.10	0.47	0.54	2.76	0.97	0.00
NW	[0.61]	[1.82]	(0.97)			(0.09)
SH	[0.61]	[1.78]				
TA = $[PORT_{CAR}, PORT_{ESG}]$	0.10	0.34	2.73	5.44	0.97	0.00
NW	[0.61]	[2.23]	(0.97)			(0.01)
SH	[0.61]	[2.22]				

Table 6. ESG Portfolios and Other Investment Strategies

This table reports contemporaneous regressions of ESG portfolios on carry trade portfolios. The table also show results for portfolios of the Environmental, Social and Governance components. The alphas are annualized and expressed in percentage points. We report *t*-statistics in squared brackets and adjusted R-squares ($\bar{R}^2$) The alphas are annualized. The superscripts *, **, *** indicate significance of the spread portfolios at the 10%, 5% and 1% level that are estimated using Newey and West (1987) standard errors with 12 lags. The data span the period 2001:05-2020:12.

ESG Portfolios and Carry Trades				
	LMH_{ESG}	LMH_E	LMH_S	LMH_G
α_{CAR}	2.62**	2.15*	2.37	0.30
	[1.99]	[1.67]	[1.14]	[0.19]
β_{CAR}	0.25**	0.36***	-0.06	0.11
	[2.44]	[4.37]	[-0.37]	[1.33]
$\bar{R}^2$ $(in$ %)	13.09%	23.49%	0.13%	2.01%

Table 7. Robustness: Descriptive Statistics of ESG Portfolios with Transaction Costs

This table reports descriptive statistics for currency excess returns of portfolios sorted based on the ESG ratings (*Panel A*) and Environmental Ratings (*Panel B*). The portfolios are rebalanced on a monthly basis and take into consideration transaction costs. Finally, the mean, standard deviation and Sharpe Ratio are annualized (the means are multiplied by 12 and the standard deviation by $\sqrt{12}$) and expressed in percentage points. The superscripts *, **, *** indicate significance of the spread portfolios at the 10%, 5% and 1% level that are estimated using Newey and West (1987) standard errors with the optimal number of lags. The data span the period 2001:05-2020:12.

	P_1	P_2	P_3	P_4	P_5	LMH_{ESG}
			Panel A: ESG			
Mean	3.96	0.99	1.16	0.48	0.94	3.01**
Std. Dev.	10.08	9.36	9.65	8.94	9.58	7.03
SR	0.39	0.11	0.12	0.05	0.1	0.43
Skew	-0.26	-0.69	0.08	-0.51	-0.27	-0.14
Kurt	4.36	9.02	3.44	4.69	4.2	3.02

	P_1	P_2	P_3	P_4	P_5	LMH_G
			Panel B: Environmental Pillar			
Mean	3.52	1.62	1.32	0.19	0.57	2.95**
Std. Dev.	10.52	10.3	9.18	8.08	9.48	7.57
SR	0.33	0.16	0.14	0.02	0.06	0.39
Skew	-0.56	-0.29	-0.22	-0.08	-0.32	-0.29
Kurt	5.69	5.54	3.33	3.31	4.2	3.06

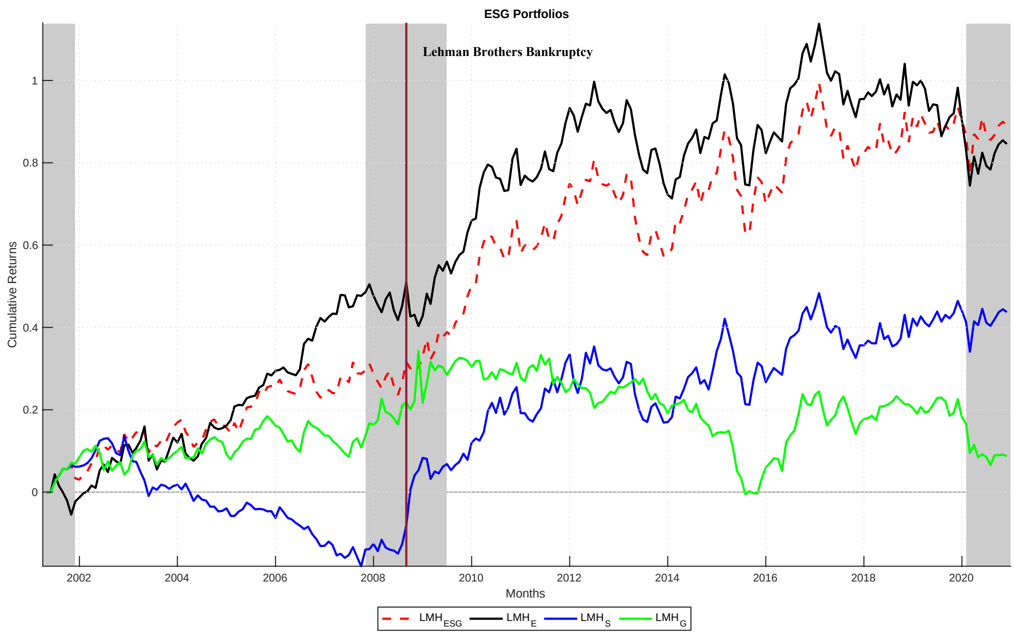


Figure 1. Cumulative Returns

This figure displays cumulative returns of the ESG Strategy as well as the individual Environmental (E), Social (S) and Governance (G) spread portfolios. Shaded areas represent NBER recessions. The vertical line denotes the collapse of Lehmann brothers in September 2008. The data span the period 2001:05-2020:12.

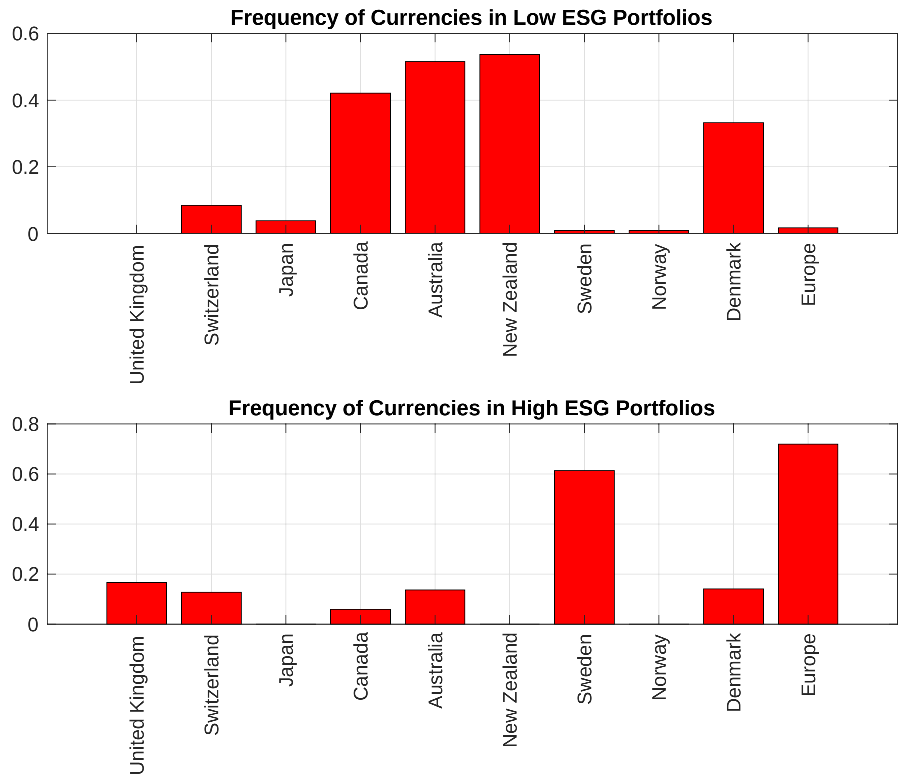


Figure 2. Holdings of ESG Portfolios

This figure displays the holding of ESG portfolios. The holdings are calculated as the frequency of each currency in low and high ESG portfolios over the sample. The data span the period 2001:05-2020:12.

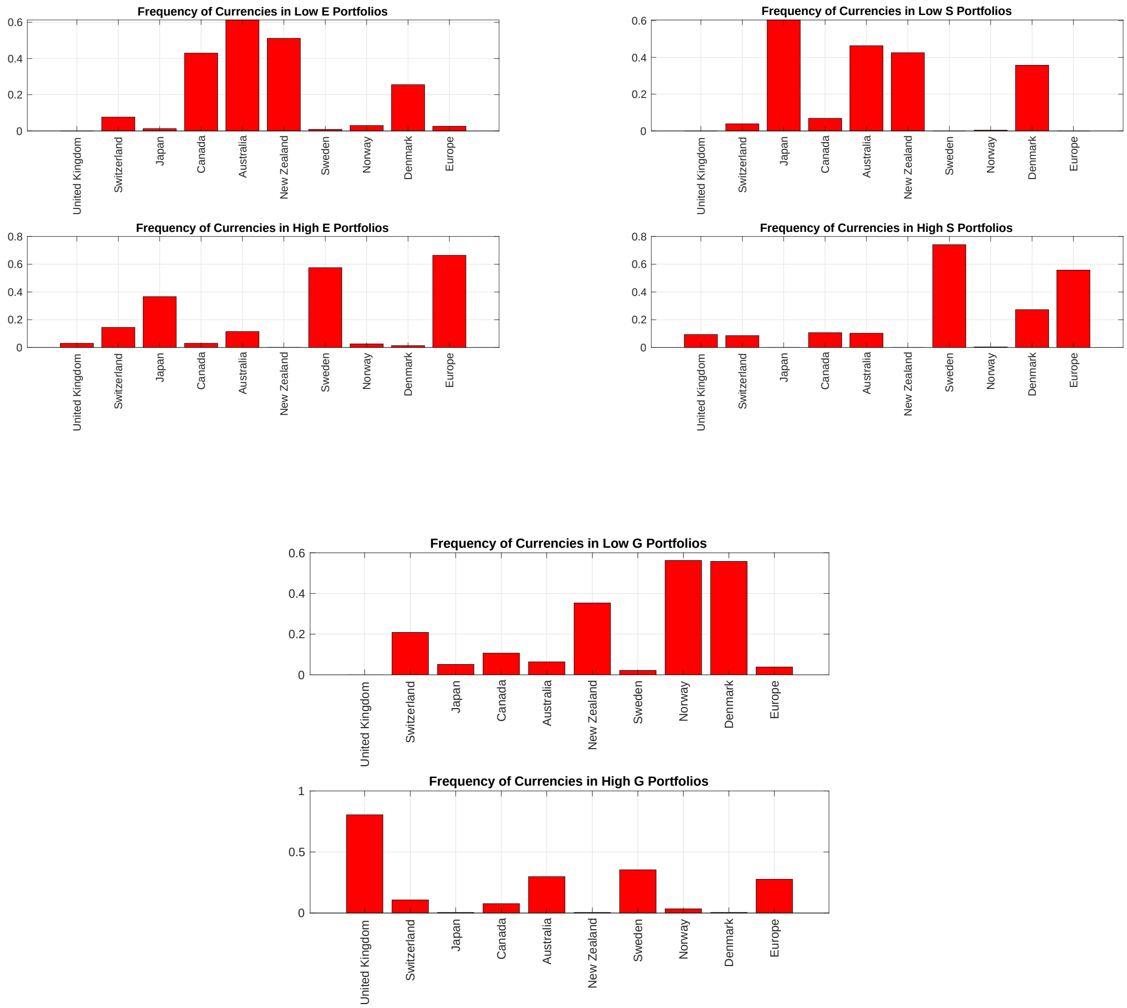
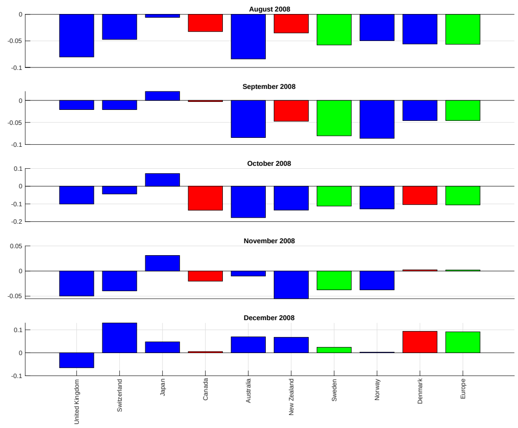
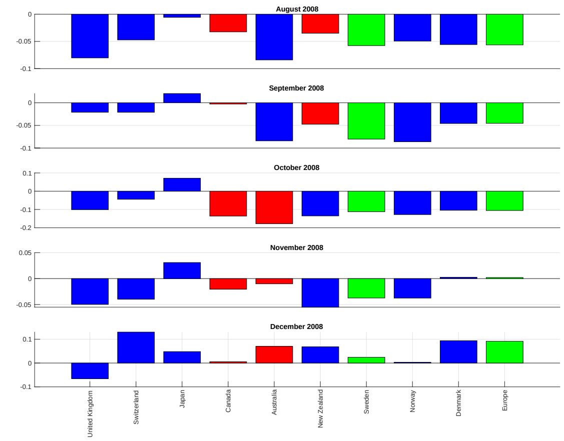


Figure 3. Holdings of E, S and G Portfolios

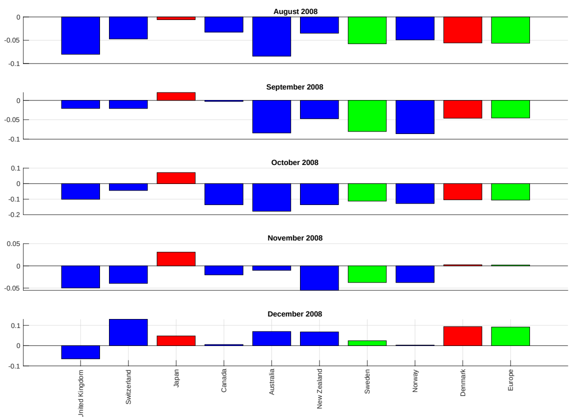
This figure displays the holding of E, S and G portfolios. The holdings are calculated as the frequency of each currency in low and high E, S and G portfolios over the sample. The data span the period 2001:05-2020:12.



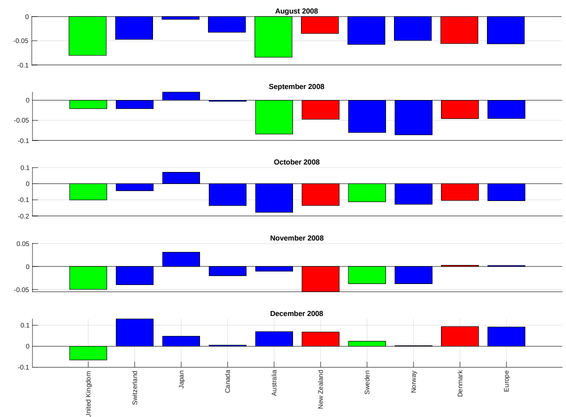
Graph A: ESG Portfolios



Graph B: E Portfolios



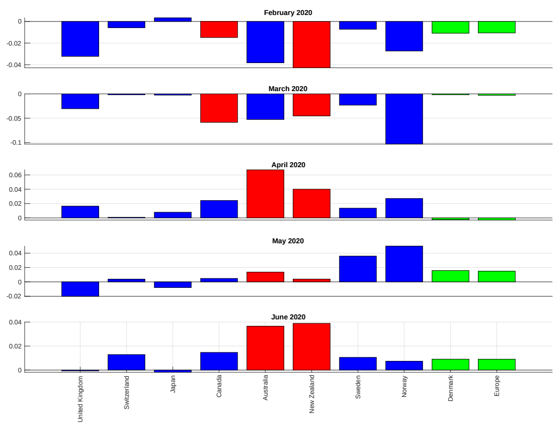
Graph C: S Portfolios



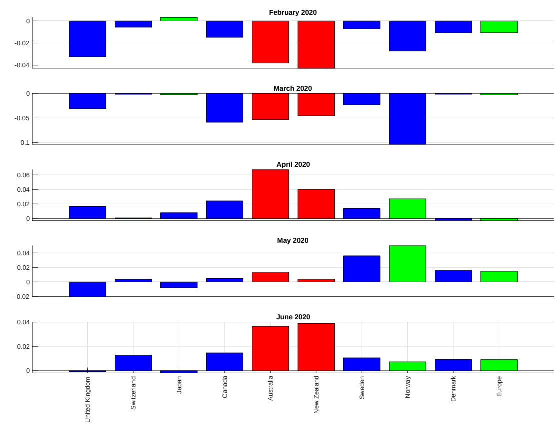
Graph D: G Portfolios

Figure 4. ESG and the Global Financial Crisis

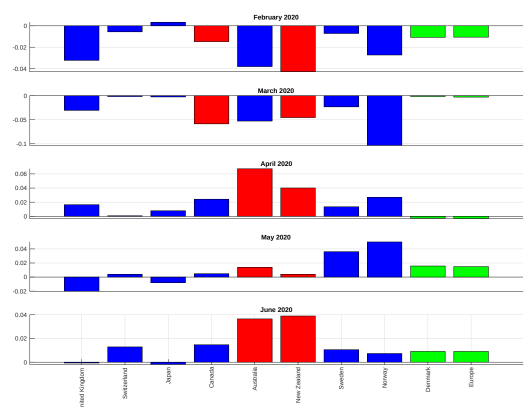
This figure displays currency excess returns of the constituents of ESG portfolios. We also show results for E, S and G portfolios. The currencies that belong in high ESG portfolios are in green and those in low ESG portfolios are in red. All the other currencies are in blue. The figure shows portfolio currency excess returns of the constituents of ESG portfolios for the period of August 2008 to December 2008.



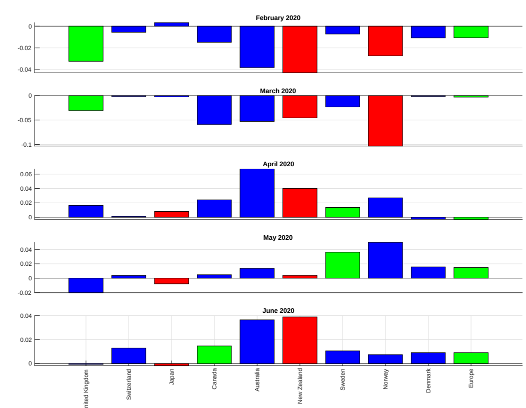
Graph A: ESG Portfolios



Graph B: E Portfolios



Graph C: S Portfolios



Graph D: G Portfolios

Figure 5. ESG and the COVID-19 Crisis

This figure displays currency excess returns of the constituents of ESG portfolios. We also show results for E, S and G portfolios. The currencies that belong in high ESG portfolios are in green and those in low ESG portfolios are in red. All the other currencies are in blue. The figure shows portfolio currency excess returns of the constituents of ESG portfolios for the period of February 2020 to June 2020.