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Do ESG Considerations Matter for Emerging Market Sovereign Spreads?

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ABSTRACT: This paper aims to investigate the determinants of sovereign spreads for a panel of 79 emerging markets and development economies (EMDEs) over the period 2001-2021, with a particular focus on the role of Environmental, Social, and Governance (ESG) factors. Using panel fixed-effect regressions, our results show that improvements in ESG factors tend to reduce sovereign spreads, alongside domestic variables capturing growth, fiscal and external balances, and global factors such as U.S. interest rates and changes in global risk sentiment. In particular, we find that governance is a key factor in explaining movements in sovereign spreads, including perceptions of government effectiveness, regulatory quality, and the control of corruption. Social and environmental aspects, proxied by population purchasing power and greenhouse gas emissions, respectively, also play significant roles. Our contribution to the literature is threefold: first, we confirm the results of previous papers on the relevance of ESG in explaining emerging market spread movements; second, we delve deeper by unpacking the elements that matter most within ESG factors; and third, we construct an aggregate ESG indicator using principal components analysis to summarize its overall impact.

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WORKING PAPERS

Do ESG Considerations Matter for Emerging Market Sovereign Spreads?

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Contents

Introduction

Ensuring sustainable debt levels is an important policy priority for Emerging Market and Developing Economies (EMDEs). This has become even more critical in the current environment of elevated debt vulnerabilities. Public debt surged during the COVID-19 pandemic as governments implemented expansionary policies to bolster demand. The heavy debt burden, combined with a tightening of monetary policy in major economies post-COVID-19, has sparked concerns over debt affordability, prompting policymakers to explore measures to mitigate high borrowing costs.

Borrowing costs reflect investors' perception of the borrower's credit risk, taking into account both the ability and willingness to pay. This perception is influenced by country-specific factors (pull factors), such as economic activity and the fiscal position, as well as global factors like risk perception and demand shocks (push factors). Given its significance for debt sustainability, there has been a proliferation of research on the determinants of sovereign borrowing costs. While much of this research has focused on economic and financial drivers, there is a growing literature on non-economic and non-financial determinants, including Environment, Social, and Governance (ESG) factors.

ESG considerations have gained popularity in recent years due to growing concerns about climate change and global warming, as well as global calls for ethical investment decisions. Supported by the United Nations, various initiatives such as the Principles for Responsible Investment (PRI), established in the mid-2000s, and the Sustainable Development Goals, formalized in 2015, have helped drive the integration of ESG factors into investment decision-making[2]. While initially concentrated on corporate investments, this paradigm shift has now permeated into the sovereign realm. Major banks have introduced new investment frameworks incorporating ESG factors as key drivers of long-term strategy, and rating agencies have adjusted their methodologies accordingly.[3] Previously, market participants considered governance and social factors in their assessment but not as a distinct group of factors. Environmental factors were often implicitly accounted for in extreme cases such as small countries or those prone to natural disasters. What is new, therefore, is the systematic inclusion of the 'E' in risk assessments and the explicit consideration of an ESG element alongside macroeconomic fundamentals. The rationale for including those factors in sovereign risk assessment is that they are perceived as affecting the ability of the government to generate durable revenues.

The objective of this paper is to investigate the determinants of sovereign borrowing costs across, with a specific focus on the role of ESG factors. The central research question is: To what extent do ESG subcomponents influence sovereign borrowing costs in EMDEs? We address this by conducting a panel regression analysis for a panel of 79 EMDEs using a fixed effects model. In addition to traditional macroeconomic determinants of spreads, we include measures of the individual ESG components in the main model. This approach is novel as previous studies have looked at the relevance of aggregated ESG indicators instead of their subcomponents.

In recent years, there has been a rise in interest in understanding the impact of ESG on sovereign spreads, and the positive impact of ESG on investors' pricing of sovereign risk has been demonstrated for both advanced economies and EMDEs (see Margaretic and Pouget, 2016; Capelle-Blancard et al., 2019). This paper builds on these existing results and investigates which ESG subcomponents matter most for investors, providing policymakers with a ranked list of ESG areas to address to reduce their country's funding costs. Additionally, we

[2] As part of the United Nations-supported Principles for Responsible Investment (PRI) initiative, Anna Georgieva and Justin Sloggett published *A Practical Guide to ESG Integration in Sovereign Debt* in 2019.

[3] See relevant documentation from Moody's and Fitch.

construct an ESG index using principal component analysis on these factors, similar to Capelle-Blancard (2019). Our contribution to the literature is threefold: First, we find that an improvement in ESG performance tends to lower sovereign spreads for EMDEs; second, we delve deeper by unpacking which ESG elements matter most and find that "S" and "G" are the most important drivers – contributing even more than global financial conditions; and third, we construct an indicator to summarize the overall impact of ESG factors. This paper also offers policy insights that can guide policymakers in implementing targeted ESG reforms to reduce borrowing costs and enhance fiscal sustainability.

This paper is connected to three growing strands of literature.

- *Debt Sustainability:* Sovereign spreads play a crucial role in debt sustainability by influencing both liquidity and solvency risks, as well as interest rate-growth differentials. Understanding the dynamics of these spreads is essential for assessing a country's ability to manage and repay its debt.
- *Climate Change:* Climate change represents one of the most significant global challenges, with wide-ranging effects on the environment, economy, and society. Rising global temperatures, more frequent extreme weather events, and biodiversity loss pose serious threats to ecosystems and human well-being.
- *Environmental, Social, and Governance (ESG) Factors:* In response to the growing impact of climate change and the need to address key developmental challenges related to social and governance issues, the financial sector is integrating ESG criteria as a crucial component of investment analysis. The economics literature has also started to investigate the role of these factors in the movement of sovereign spreads (Capelle-Blancard et al., 2019).

Our paper is organized into five sections. Section 1 will elaborate on the impacts of domestic and global macroeconomic factors and ESG variables on sovereign spreads. Section 2 will present the related literature on determinants of sovereign spreads. Section 3 will detail the methodology. Section 4 will present the results, and Section 5 will provide our conclusions.

I. What Drives Sovereign Spreads? The Critical Role of ESG Factors

Sovereign bond spreads reflect the market's perception of a sovereign's risk, which depends on the country's ability and willingness to meet its debt obligations. Investors pay close attention to the sovereign's ability to generate resources through economic activity or fiscal policy, as well as its track record on payments. These perceptions are shaped by both global and domestic factors, which can be broadly categorized into macroeconomic and non-macroeconomic determinants.

Global factors

Sovereign bond spreads can be influenced by global factors, including shocks to demand or supply, prices, or investor sentiment. For example, global demand or supply shocks can affect the country's external and fiscal revenues, thereby reducing the resources available to the sovereign to repay its debt. Price shocks can also be disruptive. For instance, a decrease in export prices (e.g., a decrease in oil prices, unrelated to domestic production) can lead to a reduction in external revenues and thus the fiscal resources available to the government. In the context of weaker global demand, currency depreciation can increase inflationary pressures through higher import costs, ultimately weighing on consumption and reducing the fiscal base.

Shocks to global sentiment can lead to reduced capital flows to emerging markets, decreased investment in these economies, and lower output, all of which would negatively impact fiscal revenues. Additionally, monetary policy in advanced economies, particularly in the U.S., can influence capital flows and risk appetite. For example, an increase in the Fed Funds rate may attract capital to the U.S. and increase borrowing costs for emerging markets, as risk premia rise. However, empirical studies have shown that in certain conditions—such as when liquidity is abundant— this positive relationship between the Fed Funds rate and spreads may not emerge. For instance, a low Fed Funds rate could incentivize increased emerging market debt issuances which, due to a lack of coordination, may lead to an excess supply of such bonds and thus higher spreads (Eichengreen and Mody, 2000; Comelli, 2012).

Country specific factors

Domestic factors influencing sovereign bond spreads can be divided into macroeconomic and non-macroeconomic categories. *Macroeconomic factors* include indicators related to economic activity, fiscal, and external positions, all of which affect the sovereign's ability and willingness to pay. A deterioration in these macroeconomic factors can worsen investors' risk perception by negatively impacting the country's ability to raise resources to repay its debt and increase spreads. Payment track record—whether related to defaults, arrears, or restructurings—also plays a significant role, as past behavior influences the willingness of creditors to lend. As demonstrated by Borensztein and Panizza (2008) and Das et al. (2012), sovereign defaults can have long-lasting impacts on spreads.

Non-macroeconomic factors include Environment, Social and Governance considerations. These factors can have long-term adverse effects if not properly mitigated. For instance, environmental shocks such as natural disasters can have disruptive impacts on output and strain fiscal resources. One extreme example is the case of a hurricane leading to large human and infrastructure losses. In addition to output and capital losses, medical costs and rebuilding efforts may lead to a surge in public debt and higher risk of default (e.g., Grenada in 2005). Social disturbances can also disrupt economic activity. For instance, periods of prolonged social unrest could lead to heightened uncertainty and reduced demand. Lack of access to basic services such as education and health can impact long-term growth by depressing human capital. Governance factors, including political stability and institutional quality, are also crucial, as they provide strong foundations for sound and effective macroeconomic policies (e.g., solid fiscal and monetary governance) and a healthy business environment.

Caveats

It is important to acknowledge that there is not always a clear distinction between macroeconomic and non-macroeconomic factors. For instance, income per capita is widely used as a measure of human and social development but is also clearly a direct indicator of economic growth. Similarly, indicators related to political stability can be linked to both governance and social performance.

Moreover, certain variables may carry multiple layers of information. For example, public debt, not only reflects fiscal strength but may also signals past payment behavior if arrears have been incurred. Similarly, strong governance may provide information about fiscal policy through fiscal governance. In other words, a country with good governance may have strong institutions preventing it from payment incidents thus demonstrating a strong payment track record and reputation.

The distinction we have used in this paper has been informed by the literature and by the indicators used by institutional investors. Non-macroeconomic factors have been selected using the literature linking ESG factors and spreads (e.g. Capelle-Blancard et al., 2019; Margaretic and Pouget, 2016). Our investigation centers on the

sub-components of the most commonly used indicators for the “E” (Environmental Performance Index of Yale), the “S” (UNDP Human Development Index) and the “G” (Worldwide Governance Indicators).[4]

II. Literature Review

Earlier research has investigated the impact of macroeconomic conditions on sovereign spreads and disentangled the effects of country-specific factors from global variables. Traditionally, measures of fiscal and external performance would be expected to be key determinants of external borrowing costs. Akitoby and Stratmann (2008) find that the effect of fiscal consolidation on spreads depends on the composition of the change. Markets prefer revenue-based adjustments, cuts to current spending (as opposed to public investment) and revenue- (rather than debt-) financed spending. Comelli (2012) tests several regression models for their performance in forecasting emerging market spreads and confirms that strong economic fundamentals, especially with respect to external stability, are associated with lower borrowing costs. After controlling for macroeconomic factors, Jaramillo and Tejada (2011) find that a sovereign rating upgrade to “investment grade” lowers spreads by 36 percent. Hadzi-Vaskov and Ricci (2022) compare the relevance of gross debt and net debt in driving spreads for emerging market countries, finding that the latter measure, which is adjusted for government financial assets, is more informative. In some contexts, global financial developments may be a more powerful driver of sovereign spreads than country-specific factors, especially when spreads move together. Arora and Cerisola (2002) found that, while country-specific fundamentals influence emerging market sovereign bond spreads, the U.S. monetary policy stance and predictability also play a key role in stabilizing capital flows and market conditions. Kodres, Hartelius, and Kashiwase (2008) find that fundamentals, as measured by sovereign credit ratings and outlooks, and global liquidity conditions each account for roughly half of the explained compression in emerging market spreads from 2002 to 2007. In a similar vein, Bellas, Papaioannou, and Petrova (2010) and Csonto and Ivaschencko (2013) find that fiscal and external measures are important for spreads in the long term, but global factors such as financial stress explain more of the short-term variation. Senga, Cassimon and Essers (2018) differentiate between push (global) and pull (domestic) factors as determinants of secondary market sovereign yields for sub-Saharan Africa (SSA) Eurobonds, finding that commodity prices, VIX, and U.S. Treasury yields are important push factors while debt, GDP growth, and inflation are important pull factors.

In addition to macroeconomic indicators, political factors can also be an informative indicator of the government’s willingness to pay. Block and Vaaler (2004) find that sovereign spreads increase in the run-up to elections, consistent with political business cycle theory whereby governments pursue more expansive fiscal policies to increase the chances of winning the vote. Eichler (2014) considers a broad set of political determinants of emerging market spreads and finds evidence that countries with presidential (as opposed to parliamentary) political systems and stronger governance have lower spreads. This corroborates the result in Akitoby and Stratmann (2008) that political institutions, including ideological positioning and the electoral system, can shape the market perception of changes in fiscal stance. Baldacci, Gupta, and Mati (2011) build a political risk index and find that lower political risk reduces spreads, especially during episodes of financial stress.

More recently, investor interest in environmental, social and governance considerations has raised the possibility that these may affect borrowing costs. On environmental and climate-related risks, Cevik and Jalles (2022) and Boitan and Marchewka-Bartkowiak (2022) provide evidence that higher exposure to physical

[4] Another indicator that has been widely used in the literature is the Notre Dame Global Adaptation Index. We investigate the sub-component of this indicator in our robustness analysis.

climate risk increases sovereign spreads. Margaretic and Pouget (2016), using aggregated indicators for ESG, find using a GMM approach that while social and governance measures influence spreads for emerging markets, there is no evidence of an effect of environmental factors. Capelle-Blancard et al. (2019) combine 18 different ESG measures into a single performance index and find that stronger ESG performance lowers spreads in a sample of OECD countries. When disaggregating the effects of the different components, they also find that governance has a larger impact than social or environmental factors. Crifo, Diaye, and Oueghlissi (2017) also conclude that ESG performance is important for OECD borrowers but much less so than credit ratings. Pineau, Le, and Estran (2022) show that ESG factors impact sovereign credit ratings for advanced economies, but for emerging and developing economies the effect is smaller, especially since the global financial crisis. Hübel (2022) uses credit default swap (CDS) rates as a measure of credit risk and concludes that stronger ESG performance lowers CDS spreads and flattens the term structure of the implied credit risk. We build on this work by considering a larger sample of emerging market countries and introduce a disaggregated list of ESG variables. We then use the results to develop an index of ESG performance.

III. Methodology and Data

Methodology

To study the determinants of sovereign spreads, we estimate the following equation using a panel regression with fixed effects in line with the literature (see Bellas et al., 2010; Csonto et al., 2013; Capelle-Blancard et al., 2017). This specification accounts for unobservable, time-invariant heterogeneity across countries, which may contribute to the cross-sectional difference in sovereign spreads and can be written as follows:

$$Spreads_{i,t} = \alpha + \beta_1 GDP\ Growth_{i,t} + \beta_2 Reserves_{i,t-1} + \beta_3 Debt_{i,t-1} + \beta_4 VIX_{i,t} + \beta_5 FFR_{i,t} + \beta_6 \Delta GHG\ Emissions\ per\ Capita_{i,t} + \beta_7 GNI\ per\ Capita_{i,t-1} + \beta_8 WGI_{i,t-1} + \eta_i + \varepsilon_{i,t} \quad (1)$$

where $Spreads_{i,t}$ denotes the J.P. Morgan Emerging Market Bond Index Global (EMBIG) spreads (in log terms) of country *i,* at time *t.* As explained in the previous section, the explanatory variables can be divided into two groups, (i) domestic and global macroeconomic factors and (ii) ESG indicators. η_i and ϵ_{it} are the country fixed effect and the idiosyncratic error term, respectively.

The global factors include the volatility index (VIX), which serves as proxy for global risk sentiment, and the U.S. Federal Funds Rate, which measures global financing conditions. A rise in VIX would signal a deterioration of global sentiment and thus increase spreads. As argued in Section 1, the expected sign on the coefficient of the Fed Funds rate is ambiguous. Both global variables are included in the baseline model in log terms.

For domestic factors, we include real GDP growth, the stock of international reserves as a share of GDP, and the public debt to GDP which proxy economic activity, and the external and fiscal strength of the country. Higher economic activity, as well as stronger fiscal and external positions, would reduce the risk of default and thus sovereign risk perception. To help mitigate concerns regarding the potential reverse causality between public debt, reserves, and spreads, we have lagged debt and reserves by one year.

To analyze the role of "extra-financial" factors determining sovereign spreads, we disaggregate ESG into its subcomponents. The selection of the ESG components is motivated by the literature (see Margaretic and Pouget, 2016) while also considering the prevalence and relevance of the indicators to market actors. For capturing environmental factors, greenhouse gas (GHG) emissions per capita is used as it is a widely recognized metric of climate vulnerability. Here, we use the year-on-year change in per capita GHG emissions to proxy for an economy's progress towards reducing GHG intensity or dependence. Gross real PPP national income per capita

is used as the “S” indicator to measure a country’s standard of living and purchasing power. We select this variable as it is one of the key components of the UNDP Human Development Index, a commonly used metric of social development. Government effectiveness, regulatory quality, and control of corruption, as measured by the Worldwide Governance Indicators (WGI), a widely used metric of governance risk, are used to capture “G” factors.[5] The social and governance variables have been lagged by one year to reduce the risk of endogeneity with spreads (see Margaretic and Pouget, 2016; Hübel, 2022). We have also applied this lag to reflect data availability as social and governance data are usually made available to market participants with at least a one-year lag.[6] The GHG emissions per capita is not lagged given that it is included as the year-on-year variation.

Data and Stylized Facts

To measure sovereign spreads, we use J. P. Morgan’s Emerging Market Bond Index Global spreads. EMBIG spreads, weighted based on market capitalization, are the “stripped” spreads on U.S. dollar denominated bonds issued by emerging market sovereigns and quasi-sovereign entities that are entirely owned or guaranteed by the government. This index is widely referenced in the literature for measuring sovereign risk and spreads. For our analysis, we calculate the annual average of the daily EMBIG spreads at market close. We use an unbalanced panel dataset of 79 countries over the period 2001-2021.[7] The countries included in this panel reflect all sovereigns covered by the J. P. Morgan EMBIG. The other variables in our model, as well as their description and sources, are summarized in Table 1.

[5] We use the estimate of the Worldwide Governance Indicators in our regression. These variables are denoted in units of a standard normal distribution, ranging between -2.5 and 2.5.

[6] Additional model specifications with other ESG indicators, beyond our baseline model, are presented in the robustness analysis.

Table 1. Variables and Data Sources[8]

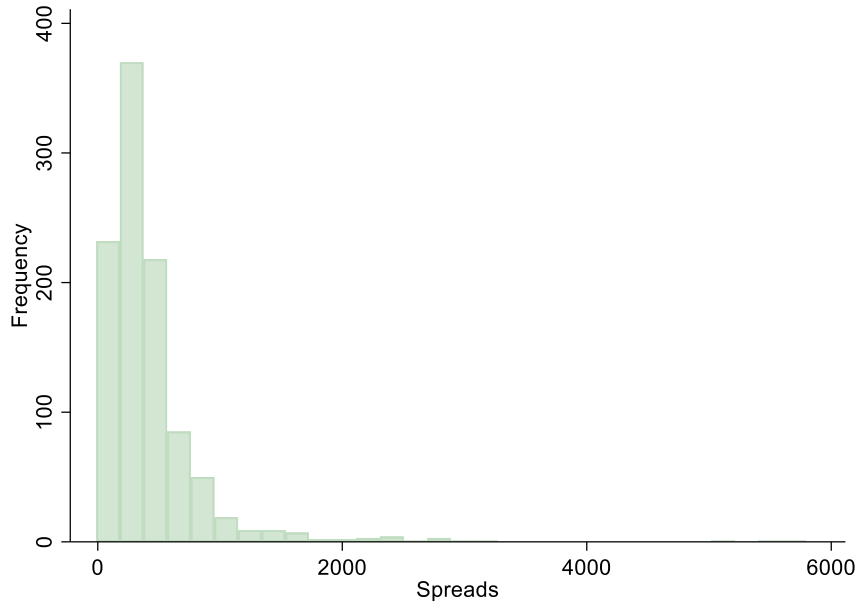
Variable	Description	Model Specification	Expected Sign	Data Source
DEPENDENT VARIABLE				
Sovereign spread	"Stripped" spread of dollar-denominated emerging market sovereign debt	Log terms		J.P. Morgan Emerging Market Bond Index Global via DataQuery
INDEPENDENT VARIABLES				
	Macroeconomic Factors			
Domestic Factors				
Real GDP	Annual growth in percent		-	WEO
International reserves	Total reserve assets, including the reserve position to the IMF, in percent of GDP	Lagged by one year	-	WEO
Public Debt	Total public debt in percent of GDP	Lagged by one year	+	WEO
Global Factors				
VIX	Index measure of expected volatility in the U.S. stock market in units	Log terms	+	Cboe Volatility Index via Haver Analytics
Federal Funds Rate	Measure of global liquidity conditions in percent	Log terms	+/-	Federal Reserve Board via Haver Analytics
	ESG Factors			
Greenhouse gas emissions per capita	Measure of environmental risk in gigagram of carbon dioxide (CO2) equivalent	Year-on-year difference	+	Environmental Performance Index
Gross National Income per capita	Measure of standard of living in 2017 PPP$	Log terms	-	UNDP HDI
Government effectiveness	Measure of governance risk (i.e., aggregate indicator of the perceived quality of public services, quality and independence of the civil service, quality of policy development and implementation, and government credibility)	Lagged by one year	-	WGI
Regulatory quality	Measure of governance risk (i.e., aggregate indicator of the perceived capacity for the government to develop and implement policies and rules that enable and facilitate private sector development)	Lagged by one year	-	WGI
Control of corruption	Measure of governance risk (i.e., aggregate indicator of the perceived	Lagged by one year	-	WGI

[8] Other world governance indicators, Voice and Accountability and Rule of Law, have not been included in the main regression because of limited significance. They have been added in the robustness checks section below. The former captures perceptions of the extent to which country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.

control of corruption which captures the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.)

Figure 1 presents the distribution of sovereign spreads in the sample. The distribution is skewed to the right with most observations falling below 1000 basis points (bps). However, the data includes several episodes of sovereign debt crisis as illustrated by the histogram (e.g., Argentina's sovereign debt default in 2001 in which average annual spread levels surpassed 5000 bps).

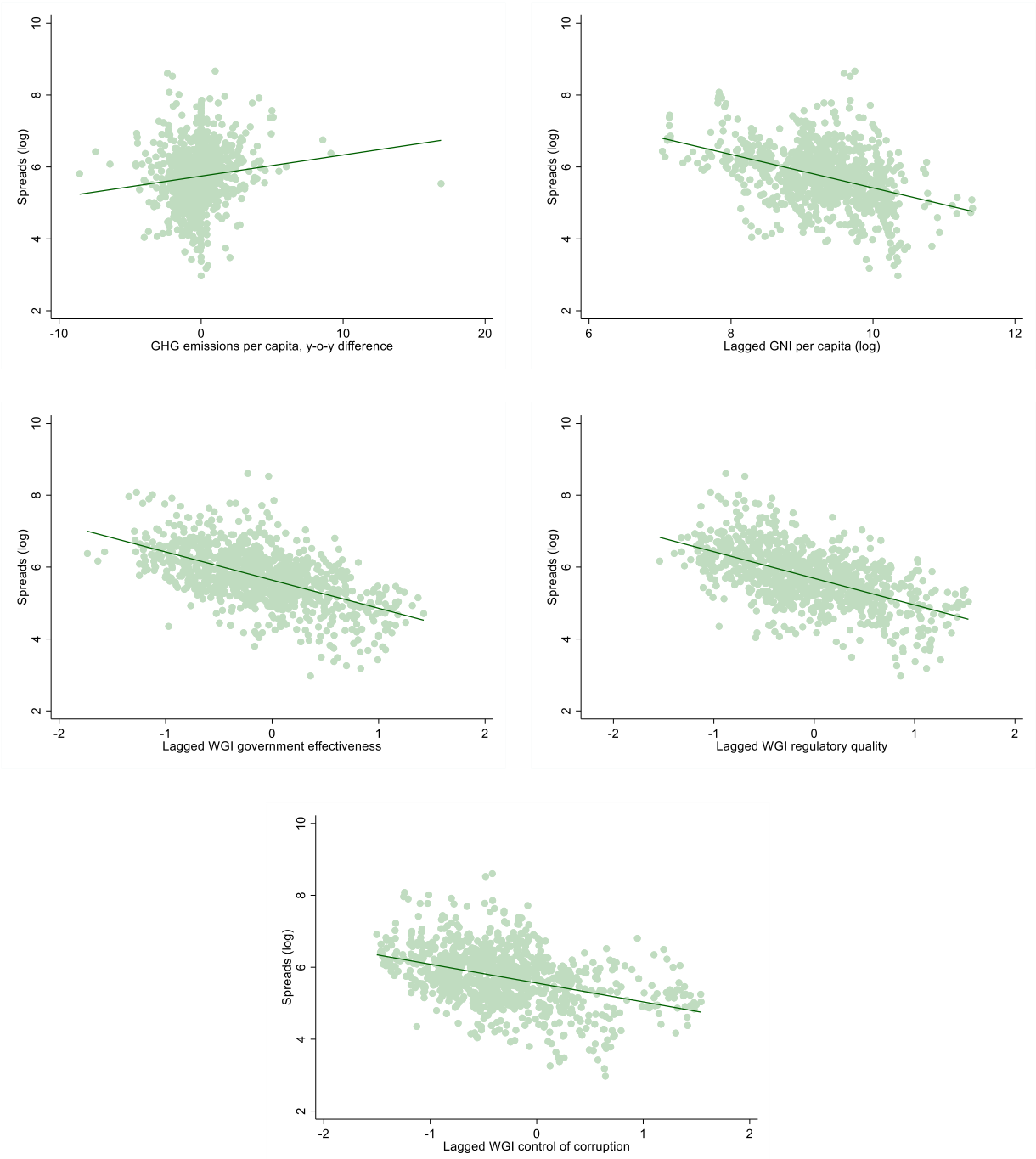
Figure 1. Distribution of Sovereign Spreads in the Sample



Authors' calculations.

Correlations between sovereign spreads and the various ESG indicators used in the baseline model are shown in Figure 2. EMBIG spreads are positively correlated with GHG emissions and negatively correlated with social and governance performance. This suggests that countries with greater ESG risks tend to have higher perceived sovereign risk. Amongst the individual ESG components, the correlation with spreads is strongest for government effectiveness and regulatory quality. In fact, these correlations are even stronger than those found with domestic and global macroeconomic factors (Table 2). Our empirical model will further examine the relationship between these variables to provide a more comprehensive analysis of the determinants of sovereign spreads.

Figure 2. Correlation between Spreads and ESG Indicators



Authors' calculations.

Table 2. Correlation Matrix

	Spreads	Real GDP Growth	International Reserves to GDP	Debt to GDP	VIX	Federal Funds Rate	GHG Emissions per Capita, yoy change	GNI per Capita	WGI Government Effectiveness	WGI Regulatory Quality	WGI Control of Corruption
Spreads	1.00										
Real GDP Growth	-0.20	1.00									
International Reserves to GDP	-0.29	0.01	1.00								
Debt to GDP	0.26	-0.05	0.01	1.00							
VIX	0.22	-0.31	0.04	-0.01	1.00						
Federal Funds Rate	-0.16	0.06	-0.10	0.05	-0.16	1.00					
GHG Emissions per Capita, yoy change	0.11	-0.25	-0.06	0.05	-0.01	-0.03	1.00				
GNI per Capita	-0.42	-0.23	0.23	-0.12	0.04	-0.02	0.03	1.00			
WGI Government Effectiveness	-0.57	-0.07	0.21	-0.02	0.03	0.01	-0.03	0.59	1.00		
WGI Regulatory Quality	-0.58	-0.08	0.14	-0.13	0.04	0.00	0.00	0.57	0.85	1.00	
WGI Control of Corruption	-0.41	-0.08	0.09	0.02	0.02	0.02	-0.01	0.47	0.83	0.79	1.00

Results

Baseline Model

The results of estimating Equation (1) are presented in Table 3, Column (8). We find statistical significance across the four categories of indicators (macroeconomic, E, S, and G). Below, we summarize the results.

Our model indicates that global risk sentiment and global liquidity conditions are important determinants of EM spreads. A one percent increase in the VIX index is predicted to increase spreads by 0.36 percent. This suggests that the market's perception of EMDE sovereign debt risk is sensitive to international volatility and risk sentiment. In addition, a tightening of U.S. monetary policy is predicted to reduce sovereign spreads. Here, spreads are predicted to fall by 0.09 percent following a one percent increase in the Federal Funds Rate.

The coefficients on the macroeconomic fundamental variables corroborate the existing literature's findings on domestic variables. A one percentage point increase in real GDP growth is anticipated to reduce spreads by approximately 3.6 percent, while a deterioration in the debt-to-GDP ratio is found to increase spreads by 0.8 percent. Moreover, the coefficient on foreign exchange reserves confirms that a stronger external position corresponds to lower spreads, all else equal.

The model results align with the findings of previous literature with regards to "extra-financial performance", as measured by the various ESG indicators. All ESG indicators are statistically significant and their impact on spreads varies.

The relationship between governance and spreads is strong. Regulatory quality, control of corruption, and government effectiveness play a significant role in explaining spreads. The reduction in spreads following a one-point improvement in governance varies between 22 to 29 percent depending on the indicator.

Social and environmental aspects also play an important role. The statistically significant relationship on the coefficient estimate for GNI signals that a country's standards of living have a positive impact in reducing the perceived sovereign risk of a country. Finally, we find that environmental risk is a driver of sovereign spreads. Although the integration of environmental considerations in investment decisions is nascent, our model illustrates that rising GHG emissions per capita tend to be associated with higher spreads. This finding supports similar

results in the literature which finds a statistically significant and economically important relationship between the sovereign cost of borrowing and a country's climate change vulnerability (e.g., Cevik and Jalles (2022)).

Table 3. Baseline Regression Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) Equation 1 Model
Real GDP Growth	-0.043***	-0.029***	-0.028***	-0.026***	-0.040***	-0.037***	-0.037***	-0.036***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
International Reserves to GDP (lagged)	-0.008	-0.009	-0.014*	-0.014*	-0.012*	-0.011*	-0.011*	-0.012*
	(0.008)	(0.008)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)
Debt to GDP (lagged)	0.008***	0.008***	0.009***	0.009***	0.009***	0.008***	0.008***	0.008***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
VIX (in log terms)		0.526***	0.483***	0.492***	0.346***	0.347***	0.361***	0.363***
		(0.049)	(0.053)	(0.053)	(0.050)	(0.049)	(0.050)	(0.049)
Federal Funds Rate (in log terms)			-0.069***	-0.068***	-0.098***	-0.094***	-0.095***	-0.093***
			(0.017)	(0.017)	(0.014)	(0.014)	(0.015)	(0.015)
Greenhouse Gas Emissions per Capita, yoy change				0.018*	0.019**	0.017*	0.017*	0.017*
				(0.009)	(0.009)	(0.010)	(0.010)	(0.009)
Gross National Income per Capita (in log terms, lagged)					-0.982***	-0.726***	-0.693***	-0.691***
					(0.206)	(0.222)	(0.218)	(0.218)
WGI Government Effectiveness (lagged)						-0.535***	-0.370**	-0.294*
						(0.153)	(0.147)	(0.153)
WGI Regulatory Quality (lagged)							-0.349**	-0.293*
							(0.140)	(0.154)
WGI Control of Corruption (lagged)								-0.223*
								(0.124)
Constant	5.633***	4.062***	4.189***	4.158***	13.758***	11.309***	10.975***	10.893***
	(0.187)	(0.223)	(0.228)	(0.229)	(1.963)	(2.124)	(2.073)	(2.058)
Observations	986	986	986	986	986	961	961	961
R-squared	0.184	0.276	0.308	0.311	0.395	0.410	0.420	0.424
Number of countries	79	79	79	79	79	79	79	79
Inclusion of country fixed effects? (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Inclusion of time fixed effects? (Yes/No)	No	No	No	No	No	No	No	No

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Robustness Analysis

In Table 4, we present the results of other model specifications used to test the robustness of our baseline results.

Table 4. Robustness Checks

	(1) Including Time Fixed Effects	(2) Removing Outliers	(3) Winsorization	(4) 3-Year Averages
Real GDP Growth	-0.035***	-0.030***	-0.048***	-0.055***
	(0.007)	(0.004)	(0.005)	(0.011)
International Reserves to GDP (lagged)	-0.008	-0.011**	-0.013***	-0.006
	(0.006)	(0.005)	(0.003)	(0.008)
Debt to GDP (lagged)	0.010**	0.005**	0.010***	0.009**
	(0.004)	(0.002)	(0.001)	(0.003)
VIX (in log terms)		0.399***	0.377***	0.161**
		(0.043)	(0.048)	(0.066)
Federal Funds Rate (in log terms)		-0.083***	-0.097***	-0.129***
		(0.012)	(0.010)	(0.020)
Greenhouse Gas Emissions per Capita, yoy change	0.013*	0.018**	0.027**	0.057**
	(0.007)	(0.008)	(0.011)	(0.022)
Gross National Income per Capita (in log terms, lagged)	-0.588*	-0.464**	-0.756***	-0.613***
	(0.352)	(0.203)	(0.090)	(0.208)
WGI Government Effectiveness (lagged)	-0.330**	-0.396***	-0.423***	-0.445***
	(0.140)	(0.142)	(0.095)	(0.151)
WGI Regulatory Quality (lagged)	-0.344**	-0.325**	-0.233**	-0.470**
	(0.150)	(0.136)	(0.094)	(0.180)
WGI Control of Corruption (lagged)	-0.194	-0.011	-0.207**	-0.043
	(0.132)	(0.123)	(0.095)	(0.159)
Constant	12.743***	8.839***	11.396***	10.680***
	(2.703)	(1.902)	(0.892)	(1.993)
Observations	961	910	961	771
R-squared	0.546	0.428	0.452	0.516
Number of countries	79	79	79	74
Inclusion of country fixed effects? (Yes/No)	Yes	Yes	Yes	Yes
Inclusion of time fixed effects? (Yes/No)	Yes	No	No	No

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Time fixed effects

First, we augment our baseline model by controlling for unobservable effects that change across years but remain constant across countries by including time fixed effects. These results are presented in Column (1) and support our findings above. ESG factors contribute significantly to spread levels when controlling for country-specific and time-specific factors. The impact of the variables remains generally unchanged, except for the Federal Funds Rate which is now found to have a positive coefficient. This can be explained by the ability to account for global shocks, such as the global financial crisis, which trigger a reduction in the Fed Funds Rate and increase sovereign spreads at the same time. The resulting negative correlation between the interest rate and spreads causes the coefficient on the Fed Funds Rate to be biased downwards if we cannot control for these events.

Testing the sample by removing outliers

Second, we test the robustness of our baseline results by running the regression while excluding outliers. In Column (2), we use a sub-sample in which observations with spreads levels that are beyond two standard deviations from the mean spread level are excluded. In addition, we apply a 5 percent winsorization on each tail of our sample data to re-run the baseline model in Column (3). This replaces all extreme values below the 5th percentile and above the 95th percentile with the 5th and 95th percentile value, respectively. These results illustrate

that the main conclusions from the baseline model hold. Regardless of the inclusion of sovereign debt crises and economic shocks, ESG dimensions have a statistically significant relationship with spreads.

Testing with averages

We also ran the regression using the three-year average of all variables in the model to smooth out volatility in the data (Column 4). Our findings corroborate the baseline results from estimating Equation (1). In fact, the coefficients and statistical significance of GHG emissions per capita, government effectiveness, and regulatory quality increase when running the model on these averages. This suggests that, beyond a one-year lag, recent environmental and governance performance are important drivers of spreads. This may also indicate that investors look to recent *trends* in environmental and governance performance to make investment decisions, which is to be expected as the positive impacts of environmental and governance policies require more time to be observed and assessed.

Table 5. Robustness Check: Augmenting the Baseline Model to Test the Importance of ESG Over Time

	(1) Testing ESG's Importance Over Time
Real GDP Growth	-0.034***
	(0.004)
International Reserves to GDP (lagged)	-0.010***
	(0.003)
Debt to GDP (lagged)	0.007***
	(0.001)
VIX (in log terms)	0.369***
	(0.046)
Federal Funds Rate (in log terms)	-0.089***
	(0.011)
Greenhouse Gas Emissions per Capita, yoy change	0.023***
	(0.009)
Gross National Income per Capita (in log terms, lagged)	-0.617***
	(0.129)
WGI Government Effectiveness (lagged)	-0.361***
	(0.105)
WGI Regulatory Quality (lagged)	-0.219**
	(0.101)
WGI Control of Corruption (lagged)	-0.280***
	(0.101)
Time Dummy	0.581
	(0.509)
Greenhouse Gas Emissions per Capita, yoy change * Time Dummy	-0.035*
	(0.019)
Gross National Income per Capita (in log terms, lagged) * Time Dummy	-0.062
	(0.054)
WGI Government Effectiveness (lagged) * Time Dummy	0.059
	(0.109)
WGI Regulatory Quality (lagged) * Time Dummy	-0.263***
	(0.092)
WGI Control of Corruption (lagged) * Time Dummy	0.052
	(0.088)
Constant	10.152***
	(1.243)
Observations	961
Number of countries	79
R-squared	0.441
Inclusion of country fixed effects? (Yes/No)	Yes

Inclusion of time fixed effects? (Yes/No)	No

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Testing the importance of ESG over time

To further test the robustness of the baseline results and to test if ESG factors have become more important throughout the sample period, we run Equation (1) with an additional dummy variable to distinguish between two time periods: 2001-2015 and 2016-2021. These two time periods are selected given that the Paris Agreement, a legally binding treaty aiming to control the rise in global average temperatures, came into force in 2016.[9] Here, the dummy variable takes a value of one for the period of 2016-2021, and interaction terms have been introduced for all ESG variables (Table 5). The coefficient estimates on our main regression indicators are generally aligned with those found in the baseline model. That is, countries with better ESG performance tend to experience lower sovereign spreads. However, we do not find evidence to suggest that ESG factors have become more important with time. This may suggest that the integration of ESG risks into sovereign debt investing is still emerging.

Testing with additional explanatory variables

In Table 6, we present alternative model specifications that include supplementary explanatory variables.[10] Overall, our baseline model results hold, and the regression results indicate that the inclusion of these additional explanatory variables provides little additional predictive power.

To supplement the analysis of environmental drivers of spreads, we include tree cover loss and the Notre Dame Global Adaptation Initiative's (ND-GAIN) measure of adaptive capacity (Columns 2-4). GHG emissions per capita, the initial "E" variable, generally loses its statistical significance when these additional variables are included. However, many of these supplementary environmental indicators also do not have a statistically significant relationship with spreads, which may indicate that they contain similar information about environmental performance. The results on the "S" and "G" variables remain robust; social and governance performance continue to have a negative, statistically significant relationship with spreads.

We also expand our baseline model to include additional components of the HDI (i.e., life expectancy and mean years of schooling) as well as the full set of WGI variables (i.e., political stability, voice and accountability, and rule of law). The model specifications in Columns 5-11 confirm the baseline findings that ESG factors play a statistically significant role in determining sovereign spreads. In other words, these robustness checks underscore that environmental risks have a detrimental impact on a sovereign's risk profile while stronger social and governance performance help reduce a country's cost of borrowing.

Finally, in addition to the ESG variables, we include a dummy variable for the presence of external arrears to model a country's repayment behavior (Column 12). Countries with arrears that amount to more than one percent of GDP tend to face higher spreads, though we do not find a statistically significant relationship.[11] This may be explained by the fact that arrears are included within government debt, which is already controlled for in the regression. Overall, these results indicate that a country's ability and willingness to pay its external debt obligations drives investors' perceptions of its sovereign risk while also underscoring that our baseline model results are robust.

[9] Other time periods were tested but these also did not yield material results.

[10] Data descriptions and sources for the additional variables are provided in Annex III.

[11] We used the threshold of one percent of GDP for arrears as a benchmark. This level is inspired by the threshold adopted in the World Bank-IMF low-income countries Debt Sustainability Analysis (LIC DSA) framework to classify countries in debt distress.

Table 6. Additional Explanatory Variables

	(1) Baseline Model	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Real GDP Growth	-0.036***	-0.034***	-0.035***	-0.032***	-0.037***	-0.035***	-0.036***	-0.035***	-0.035***	-0.036***	-0.035***	-0.032***
	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
International Reserves to GDP (lagged)	-0.012*	-0.012*	-0.009	-0.009	-0.011*	-0.012*	-0.011*	-0.011*	-0.011*	-0.011*	-0.010	-0.011**
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)
Debt to GDP (lagged)	0.008***	0.007***	0.007**	0.007**	0.008**	0.007**	0.007**	0.007***	0.008***	0.008***	0.007***	0.010***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
VIX (in log terms)	0.363***	0.377***	0.316***	0.330***	0.354***	0.367***	0.358***	0.366***	0.367***	0.356***	0.365***	0.379***
	(0.049)	(0.050)	(0.049)	(0.049)	(0.054)	(0.049)	(0.053)	(0.050)	(0.051)	(0.050)	(0.053)	(0.050)
Federal Funds Rate (in log terms)	-0.093***	-0.101***	-0.101***	-0.110***	-0.093***	-0.089***	-0.089***	-0.092***	-0.093***	-0.092***	-0.090***	-0.079***
	(0.015)	(0.013)	(0.015)	(0.014)	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)	(0.014)	(0.014)	(0.013)
Greenhouse Gas Emissions per Capita, yoy change	0.017*	0.016*	0.015	0.014	0.016*	0.017*	0.017*	0.016*	0.017*	0.016*	0.016*	0.022**
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.008)
Gross National Income per Capita (in log terms, lagged)	-0.691***	-0.677***	-0.618***	-0.595**	-0.608**	-0.858***	-0.768**	-0.669***	-0.705***	-0.640***	-0.636***	-0.382
	(0.218)	(0.228)	(0.230)	(0.248)	(0.276)	(0.234)	(0.302)	(0.217)	(0.223)	(0.218)	(0.222)	(0.243)
WGI Government Effectiveness (lagged)	-0.294*	-0.280*	-0.330**	-0.321**	-0.282*	-0.305*	-0.292*	-0.248*	-0.265*	-0.232	-0.127	-0.337**
	(0.153)	(0.150)	(0.142)	(0.139)	(0.149)	(0.154)	(0.151)	(0.139)	(0.146)	(0.163)	(0.136)	(0.130)
WGI Regulatory Quality (lagged)	-0.293*	-0.313**	-0.348**	-0.366**	-0.318**	-0.252*	-0.279*	-0.252*	-0.316*	-0.217	-0.207	-0.470***
	(0.154)	(0.154)	(0.152)	(0.152)	(0.153)	(0.151)	(0.154)	(0.148)	(0.164)	(0.166)	(0.164)	(0.150)
WGI Control of Corruption (lagged)	-0.223*	-0.158	-0.230*	-0.156	-0.220*	-0.196	-0.191	-0.228*	-0.289**	-0.164	-0.275**	-0.179
	(0.124)	(0.116)	(0.129)	(0.118)	(0.122)	(0.120)	(0.119)	(0.121)	(0.129)	(0.116)	(0.123)	(0.135)
Tree Cover Loss (lagged)		-0.004		-0.004								
		(0.003)		(0.003)								
ND-GAIN, Vulnerability Adaptive Capacity (lagged)			-1.220	-1.294								
			(1.335)	(1.407)								
Life Expectancy (lagged)					-0.013		-0.015					
					(0.029)		(0.027)					
Mean Years of Schooling (lagged)						0.071	0.074					
						(0.068)	(0.067)					
WGI Political Stability								-0.126			-0.106	
								(0.082)			(0.072)	
WGI Voice and Accountability									0.152		0.278*	
									(0.211)		(0.162)	
WGI Rule of Law										-0.314	-0.382**	
										(0.199)	(0.161)	
External Arrears												0.127
												(0.139)
Constant	10.893***	10.835***	10.940***	10.812***	11.063***	11.878***	12.102***	10.650***	11.015***	10.346***	10.247***	7.746***
	(2.058)	(2.129)	(2.518)	(2.705)	(2.072)	(2.047)	(1.957)	(2.071)	(2.110)	(2.076)	(2.123)	(2.253)
Observations	961	924	938	902	961	961	961	961	961	961	961	699
R-squared	0.424	0.415	0.420	0.415	0.424	0.428	0.429	0.429	0.426	0.430	0.440	0.504
Number of countries	79	73	79	73	79	79	79	79	79	79	79	56
Inclusion of country fixed effects? (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Inclusion of time fixed effects? (Yes/No)	No	No	No	No	No	No	No	No	No	No	No	No

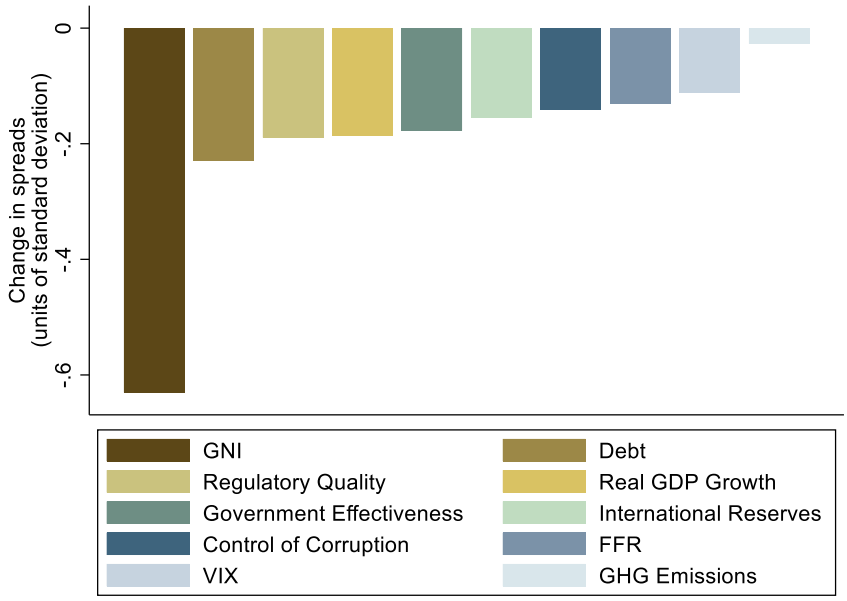
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Practical Implications for Policymakers and Investors

A Ranked List of Policy Priorities: Insights for Policymakers

To illustrate the practical policy implications of these results, Figure 3 presents the reduction in spreads brought about by a one standard deviation "improvement" in each independent variable. By standardizing the explanatory variables, we provide a ranked list of policy priorities for policymakers to undertake in aims of reducing their country's sovereign cost of borrowing. Among the variables included in the baseline model, (i) GNI per capita, (ii) debt to GDP, and (iii) regulatory quality have the greatest impact on reducing sovereign spreads. This suggests that, in addition to fiscal consolidation and prudent debt management, policy efforts to improve social and governance conditions are of the utmost importance in reducing perceived country risk, and thus, sovereign borrowing costs.

Figure 3. Change in Spreads From a One Standard Deviation "Improvement" in Drivers



Authors' illustration.

The ranked list of policy options highlights the importance of ESG in determining sovereign spreads. We find that traditional measures of macroeconomic risk (i.e., government debt and GDP growth) are important policy options for reducing sovereign spreads. However, social and governance factors dominate the list of the top five policy levers, underscoring the importance of standards of living and the robustness of public institutions in decreasing spreads. That is, investors' decisions are particularly sensitive to "S" and "G" conditions and EMDEs pay a premium for poor performance in these categories. Although a country's fiscal position is critical, the perceived risks arising from social unrest, low human capital development, and poverty, as well as weak institutional capacity and poor public administration, adversely impact sovereign borrowing costs. Weak social and governance conditions can adversely impact a country's growth prospects vis a vis economic activity disruption, a lack of skilled labor, and an inability for country authorities to develop sound and effective policies and to foster

a health business environment. Therefore, it is critical for EMDEs to improve their social and governance conditions to enhance their ability to stimulate growth and repay their sovereign debt, and to moderate investors' risk perceptions and concerns on creditworthiness.

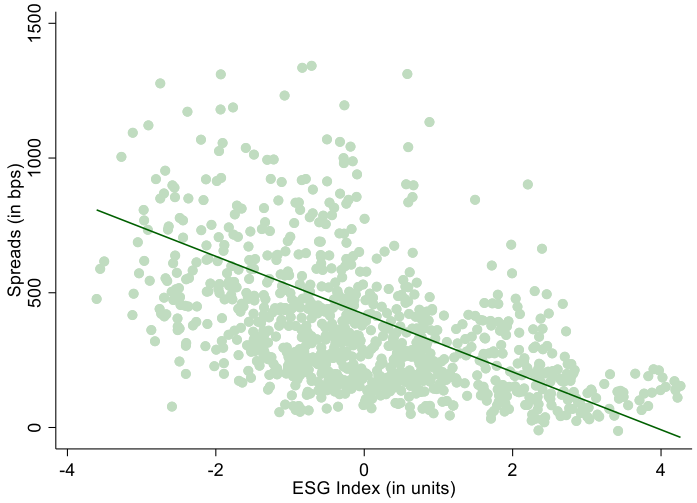
Although GHG emissions per capita rank the lowest among the list of determinants, this finding may result from the novelty of environmental considerations in investment decisions and indicate that investors are in the early stages of integrating "E" into their metrics of sovereign risk. Investors' ability to measure and understand environmental risk is still in its early stages. Historically, countries with a higher likelihood of experiencing extreme weather events, such as small island states, have had their country risk affected by environmental considerations. The evaluation of countries' climate risks *more broadly* is still novel. Despite this low ranking, the statistical significance we found throughout the ESG variables in our empirical model and the high policy ranking of the "S" and "G" components showcase that ESG factors do indeed matter for sovereign spreads.

A New ESG Index

The empirical results presented in the previous section indicate that "extra-financial" performance is an important determinant of sovereign spreads. To further analyze this relationship, we create an ESG index using principal components analysis (PCA), a methodology that identifies the linear combinations of a group variables which capture the greatest common variation among them as done by Capelle-Blancard (2019). That is, we combine the five ESG variables of the baseline model (i.e., GHG emissions per capita, GNI per capita, government effectiveness, regulatory quality, and control of corruption) to construct one single indicator to model a country's overall ESG performance. Figure 4 illustrates the constructed ESG index and spreads, along with their correlation.[12]

Figure 4. ESG Index and Sovereign Spreads

(units as indicated, outliers in spreads have been excluded)



Authors' illustration.

Note: A higher ESG index indicates better ESG performance.

[12] Figure 4 excludes all observations of sovereign spreads that fall outside two standard deviations from the mean of the sample. Annex IV includes the same figure across the entire sample (i.e., not excluding outliers).

To further test the relevance of ESG factors in determining sovereign borrowing costs, we run our baseline model regression and replace the disaggregated ESG components by the ESG index (Table 7). We find a negative and statistically significant relationship between sovereign spreads and the ESG index. In other words, these results suggest that our constructed ESG index may provide valuable information to investors when determining the overall risk of a country by taking factors beyond macroeconomic fundamentals and global financial conditions into account.

Table 7. Baseline Model: Replacing ESG Components with an ESG Index

Real GDP Growth	-0.032***
	(0.005)
International Reserves to GDP (lagged)	-0.012*
	(0.006)
Debt to GDP (lagged)	0.007***
	(0.002)
VIX (in log terms)	0.374***
	(0.045)
Federal Funds Rate (in log terms)	-0.091***
	(0.016)
ESG Index (lagged)	-0.351***
	(0.060)
Constant	4.539***
	(0.215)
Observations	936
Number of countries	79
R-squared	0.374
Inclusion of country fixed effects? (Yes/No)	Yes
Inclusion of time fixed effects? (Yes/No)	No

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Conclusion

This paper investigates the determinants of sovereign borrowing costs across a panel of 79 EMDEs with a focus on the role of ESG factors over the period 2001-2021. In addition to the statistical significance of macroeconomic country-specific factors – GDP growth, reserves, and public debt to GDP in particular – global market uncertainty, plays a role in affecting sovereign spreads as highlighted by the literature.

ESG indicators also prove statistically significant. Governance has a strong impact on sovereign spreads through government effectiveness, regulatory quality, and the control of corruption. Our proxy for the social indicator - the level of real income per capita in PPP – is meaningful for investors as population purchasing power provides a barometer of social tensions, that could potentially disrupt countries' ability to borrow and repay their debt. Environmental factors have also recently been garnering interest among investors, and our results highlight the negative relationship between spreads and GHG emissions. That is, worsening environmental factors lead to higher spreads.

Robustness checks, including the removal of outliers, tests for time fixed effects, and the inclusion of additional ESG-related variables, confirm the validity of our findings. Beyond traditional fundamentals, there is a significant relationship between ESG performance and market perceptions of sovereign creditworthiness. All else being equal, countries with lower climate change risks, better social outcomes and living standards, and stronger public institutions and governance enjoy lower sovereign spreads. This suggests that reducing borrowing costs for EMDEs requires more than just improving macroeconomic conditions.

The policy implications are clear: In addition to enhancing macroeconomic fundamentals—such as promoting growth and strengthening fiscal and external positions—authorities should intensify efforts to improve ESG performance. Given the sensitivity to sub-components of ESG indicators, policy makers should consider prioritizing selected reforms to help lower the premium for poor performance in these categories. Doing so would not only improve creditworthiness but also provide essential buffers against external shocks.

Annex I. Summary Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Spreads (in log terms)	1017	5.735	.789	2.971	8.664
Real GDP Growth	1680	4.134	5.164	-33.5	81.787
International Reserves to GDP (lagged)	1621	18.136	13.247	.231	108.955
Debt to GDP (lagged)	1653	46.613	29.901	1.562	344.317
VIX (in log terms)	1680	2.936	.309	2.407	3.486
Federal Funds Rate (in log terms)	1680	-.461	1.41	-2.079	1.619
Greenhouse Gas Emissions per Capita, yoy change	1680	-.195	1.643	-8.56	16.9
Gross National Income per Capita (in log terms, lagged)	1680	9.272	.912	6.411	11.552
WGI Government Effectiveness (lagged)	1600	-.114	.603	-1.963	1.563
WGI Regulatory Quality (lagged)	1600	-.071	.646	-2.243	1.536
WGI Control of Corruption (lagged)	1600	-.288	.632	-1.502	1.718

Annex II. Sample Countries

The following countries are included in the baseline model (i.e., estimation of Equation (1)). This list includes all the countries covered by the J. P. Morgan EMBIG during the sample period.

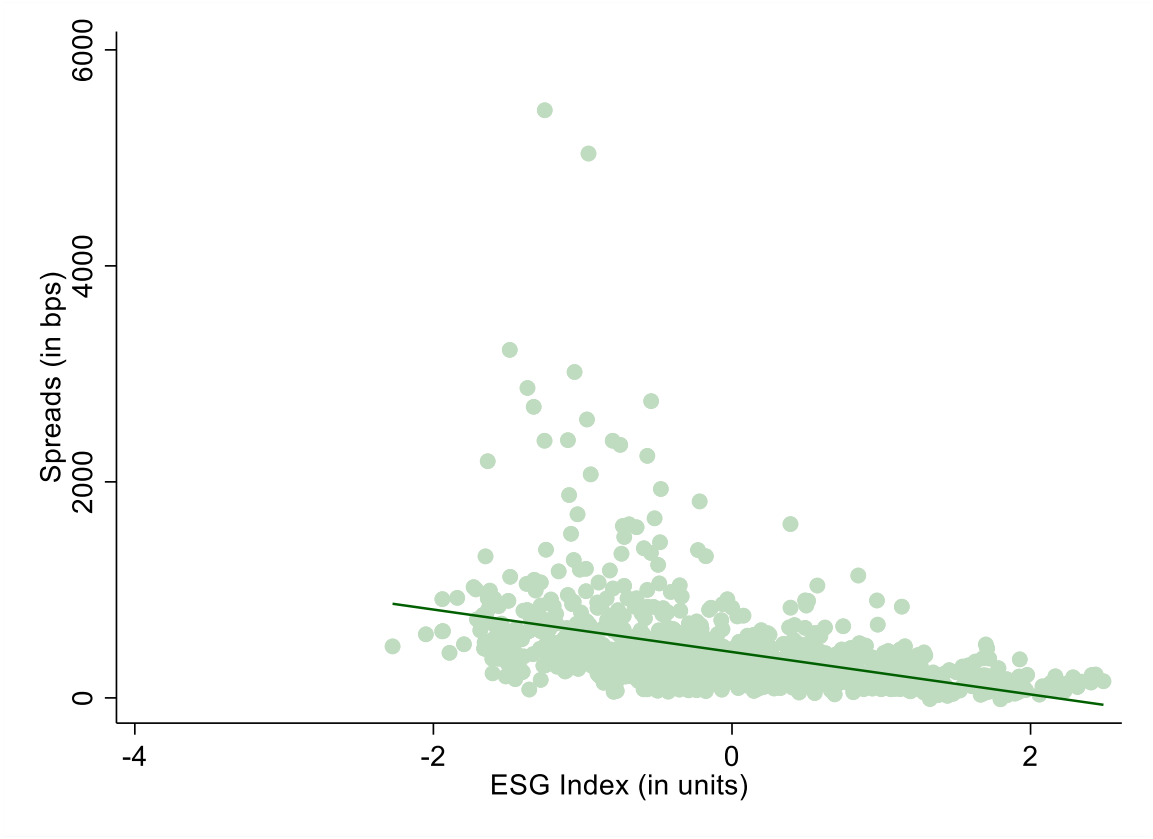
Algeria	Lithuania
Angola	Malaysia
Argentina	Maldives
Armenia	Mexico
Azerbaijan	Mongolia
Bahrain	Morocco
Barbados	Mozambique
Belarus	Namibia
Belize	Nigeria
Bolivia	Oman
Brazil	Pakistan
Bulgaria	Panama
Cameroon	Papua New Guinea
Chile	Paraguay
China	Peru
Colombia	Philippines
Costa Rica	Poland
Croatia	Qatar
Côte d'Ivoire	Romania
Dominican Republic	Russia
Ecuador	Rwanda
Egypt	Saudi Arabia
El Salvador	Senegal
Ethiopia	Serbia
Gabon	Slovak Republic
Georgia	South Africa
Ghana	Sri Lanka
Guatemala	Suriname
Honduras	Tajikistan
Hungary	Tanzania
India	Thailand
Indonesia	Trinidad and Tobago
Iraq	Tunisia
Jamaica	Türkiye
Jordan	Ukraine
Kazakhstan	United Arab Emirates
Kenya	Uruguay
Korea	Uzbekistan
Kuwait	Vietnam
Latvia	
NUMBER OF COUNTRIES: 79	

Annex III. Additional ESG Variables

Variable	Description	Data Source
Tree Cover Loss (lagged)	Measure of environmental risk in the percentage of forest lost since 2000	Environmental Performance Index
ND-GAIN, Vulnerability Adaptive Capacity (lagged)	Measure of environmental risk vis a vis a country's capacity to adapt and react to adverse climate events	Notre Dame Global Adaptation Initiative
Life Expectancy (lagged)	Measure of health outcomes in number of years of life expectancy	UNDP HDI
Mean Years of Schooling (lagged)	Measure of human capital in number of years of schooling	UNDP HDI
WGI Political Stability and Absence of Violence/Terrorism	Measure of governance risk (i.e., aggregate indicator of the perceived likelihood of political instability, violence, and terrorism)	WGI
WGI Voice and Accountability	Measure of governance risk (i.e., aggregate indicator of perceived freedom and fairness of elections, as well as freedom of expression, association, and freedom of press)	WGI
WGI Rule of Law	Measure of governance risk (i.e., aggregate indicator of perceived confidence in and adherence to rules and laws, including confidence in judicial and police enforcement)	WGI
External Arrears	Dummy variable to indicate the presence of arrears that are greater than one percent of GDP	World Bank International Debt Statistics

Annex IV. ESG Index

The figure below presents the correlation between the ESG Index and spreads on the full sample (i.e., no outliers removed).



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