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ESG Performance at the Firm-Level: The Effects of Economic Conditions and Sovereign Capital Flows

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Abstract:

This paper analyzes whether macroeconomic conditions and sovereign capital flows contribute to ESG performance at the firm-level. We hypothesize that indicators of efficient monetary and fiscal policies are beneficial to ESG performance. Moreover, we assess whether there is a difference between financing options, specifically using the most predominant financial instruments, Debt Securities (F3) and Equity and Investment Fund Shares or Units (F5). Using a fixed effects panel data regression on a sample of eight market indices (US, France, UK, Germany, Japan, Brazil, Mexico, and India), from 2013 – 2019, we find that, in general, the current form of economic growth as measured by GDP Growth is harmful to ESG performance. Monetary policy responsiveness as measured by Reserves-to-Imports is effective for ESG performance while efficient fiscal policy, using Debt-to-GDP, and a government budget surplus, using Primary Balance-to-GDP, can be beneficial. Additionally, elevated levels of economic activity as represented by Current Account-to-GDP and Trade Openness are not effective towards generating sustainable change. While the results between ESG and ENV are similar, there are differences with regards to inflation and fiscal condition, but these effects are not fully significant. As for the type of financing, higher priced debt securities e.g., bonds can do more harm than good whereas higher priced equity results in better ESG performance. The different approaches to sustainability are clearer upon investigating each country separately. While more research is necessary for specific country policy differences, the results offer insights to investors, policymakers, and central banks to encourage greater involvement and alignment through monetary policies, fiscal policies, and distinct forms of financing, while presenting an intersection between sovereign and sustainability risk.

Highlights:

- We study how macroeconomic factors and sovereign capital flows affect sustainability.
- We find that, in general, countries have not been growing in a sustainable way and that higher economic activity can be detrimental to sustainability.
- We show that monetary and fiscal policy responsiveness are key to sustainability performance.
- We find higher pricing of debt securities tend to result in weaker sustainability scores, while a country's growth in equity price tend to result in a positive change in sustainability scores.

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1. Introduction

Sustainability and climate change mitigation are no longer questioned as to what it is or why does it matter – the topic has shifted to how we do it, how much it will cost, and how much value it will generate. Since the start of the UN Framework Convention on Climate Change (UNFCCC) in 1992, the Kyoto Protocol in 1997, the Paris Agreement in 2015, EU Green Deal in 2019, and the Glasgow Climate Pact of 2021 (COP26[1]), these commitments and agreements have not changed the current direction of GHG emissions levels or rises in global temperature (IPCC[2], 2021). Thus far, this supranational entity, as well as similar institutional planning and policy efforts, lacks adequate effectiveness to resolve climate change (Hermwille et al., 2015; Tompkins et al., 2008). Nevertheless, these are policy signals that are changing corporate behavior and the direction of investments. An example of these investments is through Environmental, Social, and Governance (ESG) scores, risk ratings, and assets (whether debt or equity), that have driven the main movements toward sustainability-related financing. Global assets under management (AUM) have shifted towards ESG investments, reaching $17.5 trillion AUM, and growing across most regions (OECD, 2020) e.g., the compound annual growth rate (CAGR) of sustainable investing assets from 2014 to 2020 increased by 1% for Europe, 17% for the US, and 168% for Japan (GSIA[3], 2020). Likewise, the number of responsible investor and service provider signatories grew 143% (UNPRI, 2020) in the same period.

This growth in sustainable investments is promising; however, considerable frictions exist due to the lack of cohesive standardization (Cornell et al., 2020; Jebe, 2019; Sangiorgi et al., 2021), whether these investments improve sustainability, i.e., "greenwashing," or if they are more costly and dissuade investors, i.e., "*greenium*[4]." These frictions may have facilitated the disconnect between actual changes in climate change (i.e., GHG/CO_2 emissions) as noted by the IPCC and "sustainable" investments (i.e., ESG). A few studies have found either a zero (Larcker et al., 2020) or negative (Alessi et al., 2019) *greenium* in the US and Europe, respectively. Nevertheless, the case of developed countries is different to emerging and developing nations who are expected to face greater *greeniums* due to disparate economic conditions and thus, succumbing to a climate investment trap (Ameli et al., 2021). It is evident that the financial sector continues to impact sustainability in some way. However, the role of finance and the financial system in sustainability is an ongoing development. The current incompatibility between profitability and sustainable impact is still a persistent challenge (Ameli et al., 2021; Kedward et al., 2021) and capital has the power to minimize these frictions and challenges. Investigating these relationships begins with understanding the composition and considerations that contribute to tangible, climate change-mitigating financing.

These relationships have been investigated through the performance of specific financial instruments, like bonds and equity. For example, constructing a composite ESG index based on multiple sources (Capelle-Blancard et al., 2019; Margaretic et al., 2018) or using preexisting ESG and social responsibility indicators (Drut, 2010; Vargas et al., 2012) can shield against sovereign risk while maintaining the risk-return relationship in sovereign bonds and related portfolios. Thus, highlighting ESG as a signal of stability (Margaretic et al., 2018). Likewise, corporate bonds benefit from higher credit ratings and lower yield spreads due to strong environmental profiles, lower carbon footprints (Seltzer et al., 2020), and corporate social performance (CSP) (Stellner et al., 2015). Moreover, issuing corporate green bonds have improved environmental rating and signaled a firm's commitment to sustainability (Flammer, 2021) while also influencing its equity (Tang et al., 2020). Several studies have found ESG as an influencing or mediating factor in firm-level performance for both operational and equity performance with contentious outcomes. Material ESG issues, corporate social responsibility (CSR) strategies, and other forms of ESG have been found to increase future stock performance (Berg

[1] COP26 – 26th Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC); 2021 United Nations Climate Change Conference (UNFCCC, 2021)

[2] IPCC - The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change. (IPCC, 2021)

[3] GSIA - The Global Sustainable Investment Alliance (GSIA). The GSIA's mission is to deepen the impact and visibility of sustainable investment organizations at the global level. (GSIA, 2021)

[4] *Greenium* – A '*greenium*' is a green premium, "or the premium that green assets trade to otherwise identical non-green securities" (Larcker et al., 2020)

et al., 2021; Dai, 2021; Drempetic et al., 2020; Khan et al., 2015; Lagoarde-Segot, 2011) whereas other studies identify the opposite response, a negative influence on stock performance (Duque-Grisales et al., 2021; Sahut et al., 2015).

While those studies focused on bonds and equity, a small, but growing field is the direct intersection between firm-level ESG performance and country-level macroeconomic performance. One study mentioned previously used a macroeconomic composition of sovereign risk, represented by sovereign bond yield spreads, as a channel between sovereignty and sustainability (Capelle-Blancard et al., 2019). Some studies considered economic systems, industry characteristics, and firm-level financial performance as contributing factors to ESG with conflicting results (Cassely et al., 2020; Orlitzky et al., 2017). Many studies investigated ESG scores' influence only on GDP and GDP per capita and confirmed ESG as a signal of stability by finding a positive relationship (Diaye et al., 2021; Hafner et al., 2021; Zhou et al., 2020). However, most of these studies considered ESG as an explanatory variable while a gap exists for empirical studies that use ESG scores as the response variable. The types and effectiveness of capital that result in sustainable change is also a gap in the literature (Prado et al., 2019). Cassely et al. (2020) somewhat covers this gap by investigating macroeconomic characteristics, i.e., economic system as a categorical variable, as well as mesoeconomic and microeconomic indicators to explain CSP, but did not use quantitative measures for macroeconomic conditions.

To our knowledge, this paper is the first empirical, quantitative study to examine the effect of macroeconomic performance in conjunction with the pricing of financial instruments on firm-level ESG performance for developed and emerging markets. Moreover, it is imperative to understand whether these supranational and national climate commitments have translated to actual sustainable financing and thus, sustainable performance. For the period of 2013 to 2019, we use a fixed-effects, panel data regression to control for time-invariant, unobserved country biases. The objective of this paper is to investigate the underlying economic contributors to ESG performance at the country level using aggregated company level data with a focus on the most material factor, Environmental (E), and examine whether economic performance coincides with sustainability performance.

We find that an increase in GDP growth can decrease ESG performance which underlines that economic performance has not aligned with sustainable performance. Additionally, we exhibit that inefficient fiscal policy, i.e., excessive leverage that does not generate economic value, hampers ESG performance, and a government budget surplus can positively impact ESG. A responsive monetary policy in the face of depreciation can also be beneficial to ESG performance. We show that indicators of economic activity decrease firm-level ESG performance. Lastly, the pricing of financial instruments results in a significant negative impact for debt securities (e.g., bonds) and a significant positive impact for equity and investment fund shares. These relationships are consistent between ESG and ENV only, except for fiscal condition and inflation. Then, we investigate each of the five developed and three emerging countries in the sample. We find that the variations of country-specific monetary and fiscal policies have a differential effect on firm-level sustainability performance across nations of which present no regional or economic status consistency. The implications of these results are that a country's ability to finance, manage, and facilitate sustainability activities significantly influences its performance. Expanding on previous ESG research, we provide evidence of the effects of macroeconomic performance and sovereign risk, based in monetary and fiscal policies, to explain corporate sustainability performance.

For the rest of the paper, Section 2 evaluates the literature on economic and financial mechanisms, sovereign capital flows, and ESG materiality in financial instruments, and then develops the hypotheses. Section 3 presents the data, methodology, and descriptive statistics. Section 4 describes the empirical results and robustness. Section 5 discusses the interaction between economic and financial mechanisms, sovereign capital flows, and ESG performance. Section 6 concludes by outlining practical implications, addressing data and methodological limitations, and identifying topics outside the scope of the current study for future research. In addition, for clarification and consistency, the terms, ESG, ESG materiality, sustainability, sustainable finance, capital flows, debt securities, equity, and investment fund shares will follow the definitions found in Table 1.

Table 1: Standard Definitions for Commonly Used Terms

Term	Definition	Source
ESG	'*ESG*' is an acronym that stands for Environmental, Social, and Governance. "**Environmental** considerations might include climate change mitigation and adaptation, as well as the environment more broadly, for instance the preservation of biodiversity, pollution prevention and the circular economy. **Social** considerations could refer to issues of inequality, inclusiveness, labour relations, investment in human capital and communities, as well as human rights issues. The **governance** of public and private institutions – including management structures, employee relations and executive remuneration – plays a fundamental role in ensuring the inclusion of social and environmental considerations in the decision-making process."	European Commission (EC)
ESG Materiality	'*ESG Materiality*' refers to "issues that are reasonably likely to impact the financial condition or operating performance of a company and therefore are most important to investors (Lydenberg, Rogers, and Wood, 2010)."	Sustainability Accounting Standards Board (SASB)
Sustainability	'*Sustainability*' is defined as "corporate activities that maintain or enhance the ability of the company to create value over the long term."	Sustainability Accounting Standards Board (SASB)
Sustainable Finance	'*Sustainable Finance*' is defined as "the process of taking environmental, social and governance (ESG) considerations into account when making investment decisions in the financial sector, leading to more long-term investments in sustainable economic activities and projects"	European Commission (EC)
Capital Flows	'*Capital Flows*' are transactions (acquisitions or disposals) of financial assets and liabilities, which are classified as F1 to F8[5]. This paper will focus on Debt Securities, F3, and Equity and Investment Fund Shares, F5.	System of National Accounts (SNA), 2008
Debt Securities	'*Debt Securities*' are "negotiable instruments serving as evidence of a debt . . . [including] bills, bonds, negotiable certificates of deposit, commercial paper, debentures, asset-backed securities, and similar instruments normally traded in the financial markets."	System of National Accounts (SNA, 2008, p. 228).
Equity	'*Equity*' "comprises all instruments and records acknowledging claims on the residual value of a corporation or quasi-corporation after the claims of all creditors have been met." Examples are listed shares, unlisted shared (private equity/venture capital), and other equity (branches, trusts, limited liability, and other partnerships).	System of National Accounts (SNA, 2008, p. 230)
Investment Fund Shares	'*Investment fund shares or units*' "are collective investment undertakings through which investors pool funds for investment in financial or non-financial assets." Examples are mutual funds, unit trusts, money market funds, and asset-focused investment funds.	System of National Accounts (SNA, 2008, p. 231)

[5] F1 = Monetary Gold and SDRs; F2 = Current and Deposits; F3 = Debt Securities; F4 = Loans; F5 = Equity and Investment Fund Shares; F6 = Insurance, Pension and Standardized Guarantee Schemes; F7 = Financial Derivatives and Employee Stock Options; F8 = Other Accounts Receivable/Payable (UN, EC, IMF, OECD, & WB, 2009; SNA, 2008, p. 225)

2. Literature Review

2.1 The Role of Finance and the Financial System: Economic & Financial Mechanisms

Traditionally, economics and finance have not been tailored to sustainability or climate. For example, neoclassical economics explains market forces, such as production, pricing, and consumption, as a function of supply and demand. Neoclassical finance contends that markets are efficient, and prices are rational (Ross, 2005). Neoclassical economics and finance have governed conventional thought as they fit the norms of the period. However, climate change emerges as a global, market altering force insofar that the current classical forms of thought or financial analysis may not be applicable (Monasterolo, 2021). The most recent theory of integrated economics is the Ecological Finance Theory (Lagoarde-Segot et al., 2021). This theory reframes the position of the financial system and market as an internality of the ecological spheres as opposed to an externality (see Figure 1). Aspects of this theory is reflected in literature regarding the role of the financial system and sovereignty in harmful business activities and the climate investment trap (Kedward et al., 2021; Ameli et al., 2021). Catalysts to "harmful activities" and "low investment in low-carbon technologies" can be found in the financial system and cost of capital. These catalysts exacerbate the damage to the biosphere and fuel climate change, which further weakens governments and communities, resulting in greater financially material risk and premiums (Ameli et al., 2021). The current impact of policy, both monetary and fiscal, and thus, the climate investment trap, contextualizes historical trends and explains the interactions between the macro and microspheres as seen in Figure 1. The primary mechanisms of interest are monetary policy, fiscal policy, and cost of financing.

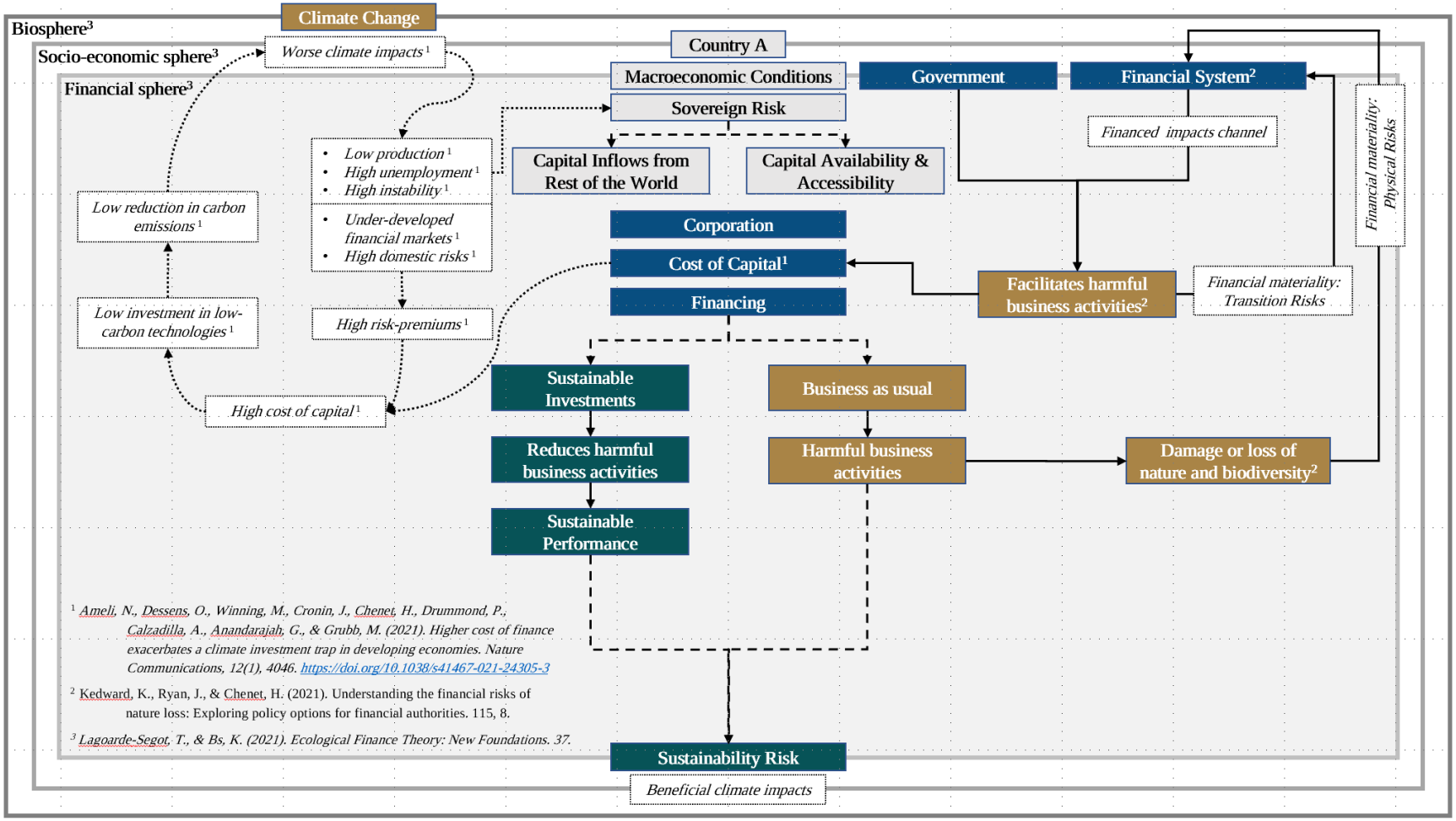
Economic Mechanism: Monetary Policy

Price stability controls (e.g., interest rates), circulation of the money supply (e.g., collateralization or asset purchasing programs), and institutional regulations are highly influential, far-reaching factors (consequences or incentives) to facilitate growth in particular investments and shape markets. The advent of "climate-related financial risks (CRFR)" or "nature-related financial risks (NRFR)" by organizations, like NGFS[6] and TCFD[7], are attempts to integrate climate and sustainability factors into these standard central bank operations. Nevertheless, as these attempts have succeeded to the extent that CRFR is considered material (ECB, 2021), the neoclassical approach to policy has its limitations with regards to sustainability and may not achieve price efficiency without more market engagement and preventative measures by the financial system (Chenet et al., 2021; Kedward et al., 2021; Diaku et al., 2021).Climate finance scenarios, e.g., Integrated Assessment Models (IAMs), TIMES Integrated Assessment Models (TIAM), have been developed (Battison et al., 2021; Ameli et al., 2021) to determine whether the financial system supports or hinders climate change mitigation during orderly or disorderly transitions. "Financial system enabling" scenarios, based on investors' expectations, reveal a more gradual change in financial asset value along similar energy outputs. Financial system inaction or "hampering" creates future shocks and subsequent short-term corrections in value (Battison et al., 2021).

[6] Network of Central Banks and Supervisors for Greening the Financial System (NGFS) – The NGFS "helps strengthening the global response required to meet the goals of the Paris agreement and to enhance the role of the financial system to manage risks and to mobilize capital for green and low-carbon investments in the broader context of environmentally sustainable development." (NGFS, 2019)

[7] Task Force on Climate-Related Financial Disclosure (TCFD) – The TCFD "develops recommendations for more effective climate-related disclosures that could promote more informed investment, credit, and insurance underwriting decisions and, in turn, enable stakeholders to understand better the concentrations of carbon-related assets in the financial sector and the financial system's exposures to climate-related risks." (TCFD, 2021)

Figure 1: Sovereign & Corporation-Level Sustainability Risk Diagram, including the Ecological Finance Theory, Financial System & Climate-Related Financial Risk Feedback Loop, and Climate Investment Trap



Climate change impacts sovereignty (a country's capabilities, production, workers, and value), macroeconomic factors, and capital availability. Those macroeconomic factors and capital flows are used to facilitate corporate financing, investments, and both economic and sustainable development. Reducing the impact of climate change on sovereignty through capital flows may be possible through appropriate climate change mitigating investments and initiative. This relationship showcases a point in which sustainability performance can be evaluated through a sovereign's capital flows. Given the urgency of climate change, it is crucial to identify whether global financing translates to sustainable performance and which financial instruments are best to facilitate sustainable change.

Assessing the impact of potential climate-relevant monetary policy from Central Banks is crucial for recognizing whether the financial system is obligated to stabilize prices in terms of climate risk. Therefore, the previously held convention of "market neutrality" by Central Banks must shift to include sustainability risk and vice-versa, the climate risk models must include the financial system.

For example, the European Central Bank (ECB) announced options to incorporate climate indicators into its asset purchasing programs, macroeconomic models, collateral framework, and stress tests (speech by Isabel Schnabel, Member of the Executive Board of the ECB, 14 June 2021). Shortly after, the ECB Governing Council officially committed to advancing climate change considerations within its monetary policy, specifically along "areas of disclosure, risk assessment, collateral framework and corporate sector asset purchases" (ECB, 2021). While these programs are developing, a Eurosystem modelling experiment suggested that their collateral framework did not coincide with the EU climate objectives (Oustry et al., 2020). The exposure to transition risk is worth considering as relevant to monetary policy and related indicators e.g., GDP Growth, Inflation Rate, and Reserves-to-Imports. GDP Growth is the change in wealth and Inflation Rate is the change in the value of wealth. Central Banks use monetary policy to alter interest rates, control inflation, and stabilize prices. Reserves-to-Imports, for example, focuses on Balance of Payments (BoP) equilibrium. Reserves decrease when currency depreciation occurs which results in more expensive imports, and thus, a lower ratio. However, if monetary policy is responsive, then there is a balanced ratio (approximately 1.00 to be adequately responsive). There are varying effects based on procyclical or countercyclical country-specific economic policies. As the most recent and most tangible commitments were created after 2019, they will not be reflected historically in this sample; however, since the creation of the UNPCC in 1994, it is evident that climate-related policies are not new and thus, it is appropriate to evaluate performance over time. This research's dataset begins from COP19, 2013 to COP25, 2019 and the EU Green Deal, 2019. These national commitments and monetary policies influence financing to some extent. Regardless, it is through nations and their monetary system's capacity and ease to finance that facilitates spending and can result in a change in sustainable projects and performance which leads to the following hypotheses:

H1: *There is a positive relationship between aggregate ESG performance and economic performance i.e., GDP Growth, while there is a negative relationship between aggregate ESG performance and Inflation Rate.*

H2: *There is a positive relationship between aggregate ESG performance and monetary policy responsiveness i.e., Reserves-to-Imports.*

Economic Mechanism: Fiscal Policy

Taxes and government spending, whether through infrastructure investments, sectoral subsidies, tax breaks, or grants, are the main components to fiscal policy. A nation's fiscal policies and comparative advantages influence the direction of its capital and its corporations' behavior. This behavior would be reflected in a representation of their main means of economic production, or their market index. Through a country's fiscal condition, one can evaluate the effectiveness of its spending in relation to the expected economic growth e.g., Debt-to-GDP and Primary Balance-to-GDP. Likewise, economic activity and trade can be evaluated using Current Account-to-GDP and Trade Openness. These macroeconomic indicators represent more traditional economic analysis in which the efficient use of capital generates economic growth. As climate change becomes more integrated into economic and financial analysis, tax and spending plan proposals have begun to include climate considerations e.g., global carbon tax/price, EU Green Deal, US Green New Deal, UK Climate Change Act, and Japan's Carbon Tax. Since the Glasgow Climate Pact of 2021, it is expected that the medium-to-long term climate-related infrastructure spending will increase. Assessing whether efficient use of capital, economic growth, and ESG growth is crucial to understanding if countries have been growing in a sustainable manner and if capital is being used efficiently and sustainability. Sovereign and sustainability/climate risk will inevitably become coupled and tangibly material – both change how businesses currently operate and will operate in their country. Corporations are subsequently reacting differently to these climate-relevant monetary and fiscal policy changes. Since climate has been the

primary policy target, a firm's market performance could already reflect their ESG performance, particularly Environmental. Due to these proactive measures, a corporation's ability to mitigate against preexisting sustainability mandates, larger future policy shocks, and potential volatility is viable to measure (Gregory, 2021; Diaku et al., 2021). The hypotheses that focus on fiscal policy and macroeconomic activity are:

H3: *There is a positive relationship between aggregate ESG performance and fiscal condition i.e., Debt-to-GDP and Primary Balance-to-GDP.*

H4: *There is a positive relationship between aggregate ESG performance and macroeconomic activity i.e., Current Account-to-GDP and Trade Openness.*

Monetary and fiscal policies are inputs in the cost of financing and its overall value. These policy mechanisms fundamentally change how much capital is invested into projects, what type of capital is used, how many projects are invested in, and to what extent a corporation is willing to take on the project as a value-add. The role of the financial system is to manage the market and facilitate spending. Thus, it is through these transactions and cost of these transactions that corporations can tangibly impact sustainability and climate change mitigation. A macroeconomic financing framework is in place; however, translating economic mechanisms to financial mechanisms results in a continued disparity, especially for emerging and developing nations.

Financial Mechanisms: Cost of Financing

The standard inputs for a valuation are revenue, cost of goods sold (COGS), tax rate, and weight average cost of capital (WACC) (cost of debt (interest rate, tax), cost of equity (market risk/beta, risk free rate, market premium), % of leverage vs equity). Not only are general policies considered, systemic inputs of the WACC are necessary risk-return drivers of valuing projects, firms, and financial instruments. Monetary policy (interest rate, risk-free rate), fiscal policy (tax rate), overall sovereign conditions (country/market risk premium, beta), and financing accessibility (debt or equity) compose the WACC. These components reflect macroeconomic conditions and sovereign capital flows (particularly, debt and equity). Ameli et al. (2021) presents a study on the interaction of WACC on financing accessibility for the green transition. Correa et al. (2021) evaluate climate risk and corporate borrowing costs finding those with more exposure to climate change and least ability to combat against extreme weather shocks face the greatest increases in rates. Margaretic et al., (2018) uses sovereign bond spreads with extra-financial performance for emerging markets and found that social and governance performance decreases cost of capital and signals long-term economic commitments. Less economically developed countries experience higher premiums and restricted access to finance as well as are more climate vulnerable. Often this results in higher sovereign and climate risk, thus, their cost of debt increases which extends the difficulty to access effective financing for green investments for preventative measures (Ameli et al., 2021; Correa et al., 2021; Margaretic et al., 2018).

Meso and micro-level financing decisions are sensitive to changes in monetary and fiscal policy. The financial system has the capability to influence the direction, size, and flow of capital to maintain long-term price stability – who should be financed, what should be financed, how much should be financed, and at what rate and price should be set for this type of financing. Reducing the financial frictions of green investments fosters long-term lower-emitting, sustainable growth (Ameli et al., 2021; Forstater et al., 2016). However, disproportionate pricing, between developed and emerging markets, forces nations into a climate investment trap, e.g., Ameli et al. (2021) and Correa et al. (2021). In this case, "supporting the growth of local green bond markets could be a promising way to target low-carbon investment in developing economies, especially if backed by institutional support (and potentially labels) from both local governments and international development banks" (Ameli et al., 2021). Especially as extreme weather events become more frequent, in many cases completely halting economic activity and forcing a reconstruction period, it is necessary to stabilize financing methods in a more equitable way (Correa et al., 2021). Furthering their argument, fundamental differences in financing, especially through specific financial instruments, e.g., sovereign (Margaretic et al., 2018) or

green bond markets (debt securities) and its pricing, controls whether a country has a choice to invest in climate change mitigation or not.

While the economic framework lays out the relationships between climate change, the financial system, and its economic mechanisms (Lagoarde-Segot et al., 2021; Monasterolo, 2021; Chenet et al., 2021; Kedward et al., 2021), the structuring and pricing of financial instruments directly contribute to whether a nation and its corporations can invest in R&D and advancements in climate change mitigating technologies. As a result, its sovereign sustainable performance is at risk due to capital (Oustry et al., 2020; Battison et al., 2021; Ameli et al., 2021; Correa et al., 2021; Gregory, 2021). Sovereign capital flows showcase the direction, size, and rate of financing, and this research seeks to investigate specific instruments and their relations to sustainable performance.

2.2 Sovereign Capital Flows

Sovereign capital flows are financial instruments, include but not limited to bonds, loans, and foreign direct investment (FDI), used between the public and private sectors to facilitate growth and spending. In the System of National Accounts (2008), capital flows are designated under "Transactions in Financial Assets and Liabilities" and recorded as F1 to F8. The literature on sovereign capital flows covers sovereign risk, credit ratings, and debt. For financing economic development, especially in emerging markets, international capital flows are necessary. One form of financing is sovereign bonds, a liability of the issuing government. The sovereign bond spread is the market-based risk premium, or yield, considering any anticipated loss from default compared to a similar "risk-free" bond (i.e., issued by a government with a high credit rating). As an indicator of sovereign default risk, it is important to know which factors influence it. For example, fundamental macroeconomic metrics influence sovereign bond spreads (Capelle-Blancard et al., 2019; Dachraoui et al., 2020; Margaretic et al., 2018). Additionally, capital flight and demand may influence the price of this financial instrument (Dachraoui et al., 2020; Pandolfi et al., 2019; Konopczak et al., 2017). Sovereign credit ratings, particularly long-term, are crucial for valuation and capable of stimulating capital flows as well (Kim et al., 2007).

As more capital is funneled into emerging and developing nations for sustainability-related investments and corporations' green initiatives, the value and triggers of sovereign-based financing should be evaluated with relation to sustainability performance – similarly to traditional economic development. The continuation and longevity of both a nation's economic and sustainable development, like its corporations, are facilitated by sovereign capital flows and its components. As capital inflows are stimulated, there is significantly higher economic growth, especially for developing nations (Combes et al., 2017). Chen et al. (2010) found that macroeconomic variables (e.g., GDP growth, real short-term interest rate, government budget deficit, credit spread, private credit, and corporate tax rate) directly and indirectly impact corporate cash holdings and corporate liquidity. Wong (2020) notes that macroeconomic factors like exchange rates, asset prices, and capital movements are highly related, arguing that real exchange rate (RER)/RER misalignment is a predictor of stock market return and economic performance due to speculative capital shocks. Similarly, Pandolfi, et al. (2019) identified a spillover effect from unbiased capital flows onto exchange rates. These four studies highlight the influence of macroeconomic factors and capital flows on market and corporate-level behavior.

The onset of climate change highlights the importance of climate vulnerability and its relations to sovereign risk. With climate change, the frequency of natural disasters rises and the stock of replenishable natural resources decreases. Natural disasters, extreme weather, resource loss, and pandemics weaken economies and societies requiring additional spending for repairs and stimulation to prevent a complete economic collapse. Climate-based sovereign risk is a developing field as environmental factors are integrated and priced into lending, credit accessibility, and borrowing costs (Mallucci, 2020; Dunz et al., 2021). An economic recovery is likely to face material consequences from climate change. Mallucci (2020) lays out the logic that natural disasters lead to fiscal vulnerabilities and potentially sovereign defaults because natural disaster risk weakens a government's debt issuance capabilities and borrowing conditions for the Caribbean region. Dunz et al. (2021) touches on compounding macroeconomic effects of disasters and its influence on bank lending compared to the effectiveness of government policies. Their results show that credit market constraints will limit firms'

recovery and magnify losses for an economic recovery, banks' risk, and public debt sustainability. Understanding how climate change will influence specific capital flows is crucial for more climate-resilient financing.

2.3 ESG Materiality in Financial Instruments & Economic Performance

The use of ESG factors as a proxy for sustainability is now, more than commonplace in the literature. Its growing use has sparked the interest of investors, institutions, and rating agencies as sustainability demands rose alongside climate agreements e.g., the Paris Agreement in 2015, the announcement of the EU Green Deal 2020 (passed), the UK Green New Deal 2019 & Green Recovery Act 2020 (passed), US Green New Deal 2019 (not passed), and the Glasgow Climate Pact in 2021. ESG scores, from various rating agencies, have been used primarily in the literature as a contributing factor to asset pricing in bonds, and rate of returns and financial performance in corporate equity. Mostly, ESG has been perceived as a signal of stability (Margaretic et al., 2018; Capelle-Blancard et al., 2019). However, ESG performance as a result of changes in macroeconomic indicators and sovereign capital flows has been sparsely studied. The next subsections will further investigate ESG and CSR with regards to *Bonds*, *Equity*, and *Sovereignty*.

Bonds

Debt securities are "negotiable instruments serving as evidence of a debt" covering "bills, bonds, negotiable certificates of deposit, commercial paper, debentures, asset-backed securities, and similar instruments normally traded in the financial markets" (SNA, 2008). These debt securities, especially bonds, are common instruments used to commit to and finance the long-term development of a project or country. Including sovereign or corporate bonds, debt securities compose of the second largest financial instrument flows (see Figure 2 e.g., in the US for 2020, the F3 stock, asset and liability as a percentage of GDP is 67% and 25%, respectively). The yields, or returns, and yield spread (difference between the yield of a bond and another bond) operate on the risk-return relationship, the higher the return, the greater the risk (Remolona et al., 2007).

There is growing literature stating that investing in sustainability and ESG i.e., more long-term investments (especially for climate change mitigation and various degree scenarios assessing the current state until 2100) can lower sovereign bond yield spreads and thus, sovereign risk (Capelle-Blancard et al., 2019; Margaretic et al., 2018). Moreover, sovereign bond portfolios may benefit from increased socially responsible performances without significantly harming the risk-return relationship (Drut, 2010; Vargas et al., 2012). The reasoning is that positive ESG and extra-financial performance, particularly governance and social indicators, are signals for positive long-term commitments acting as a buffer against future negative shocks e.g., inflated cost of capital, potential debt repayment default, and extreme weather events, in countries (Capelle-Blancard et al., 2019; Margaretic et al., 2018). Nevertheless, while less risk may be involved, there may not be a significant loss of return or competitiveness within a portfolio (Drut, 2010; Vargas et al., 2012). These studies showcase that sustainability performance, to some extent, has a material signal of stability for sovereigns.

For corporate bonds, a similar story can be told. Corporate bonds benefit from higher credit ratings and lower yield spreads due to stronger environmental profiles, lower carbon footprints, and CSP (Seltzer et al., 2020; Stellner et al., 2015). Persistent uncertainty in regulations may force investors to already price in exposure to climate risk through firms' bonds; however, commitments, such as the Paris Agreement, 2015 only had a temporal effect (Seltzer et al., 2020). Any additional, similar commitments can expect to face the reaction, especially, if material regulations nor new monetary or fiscal policies are not probable. Not only are these effects seen with traditional corporate bonds, the issuance of corporate green bonds has also improved environmental rating performance and became a signal of a firms' commitment to sustainability (Flammer, 2021). Investor demand for such assets have exceeded the current supply, especially from non-financial corporations and sovereigns; however, weak, ambiguous reporting e.g., the definition of 'green,' remans an immense friction for mass acceptance (Sangiorgi et al., 2021). Nevertheless, issuing corporate green bonds have a market impact and influence stock prices and stock liquidity (Tang et al., 2020). These financial instruments are

trending towards “greenness,” while sustainability and ESG factors are signaling stability. Both are generating material market effects (Flammer, 2021; Sangiorgi et al., 2021; Seltzer et al., 2020; Tang et al., 2020) showcasing a one-way direction in which sustainability influences corporate performance; as such, an inverse relationship may exist in which the direction and effective use of capital should generate sustainable change as well.

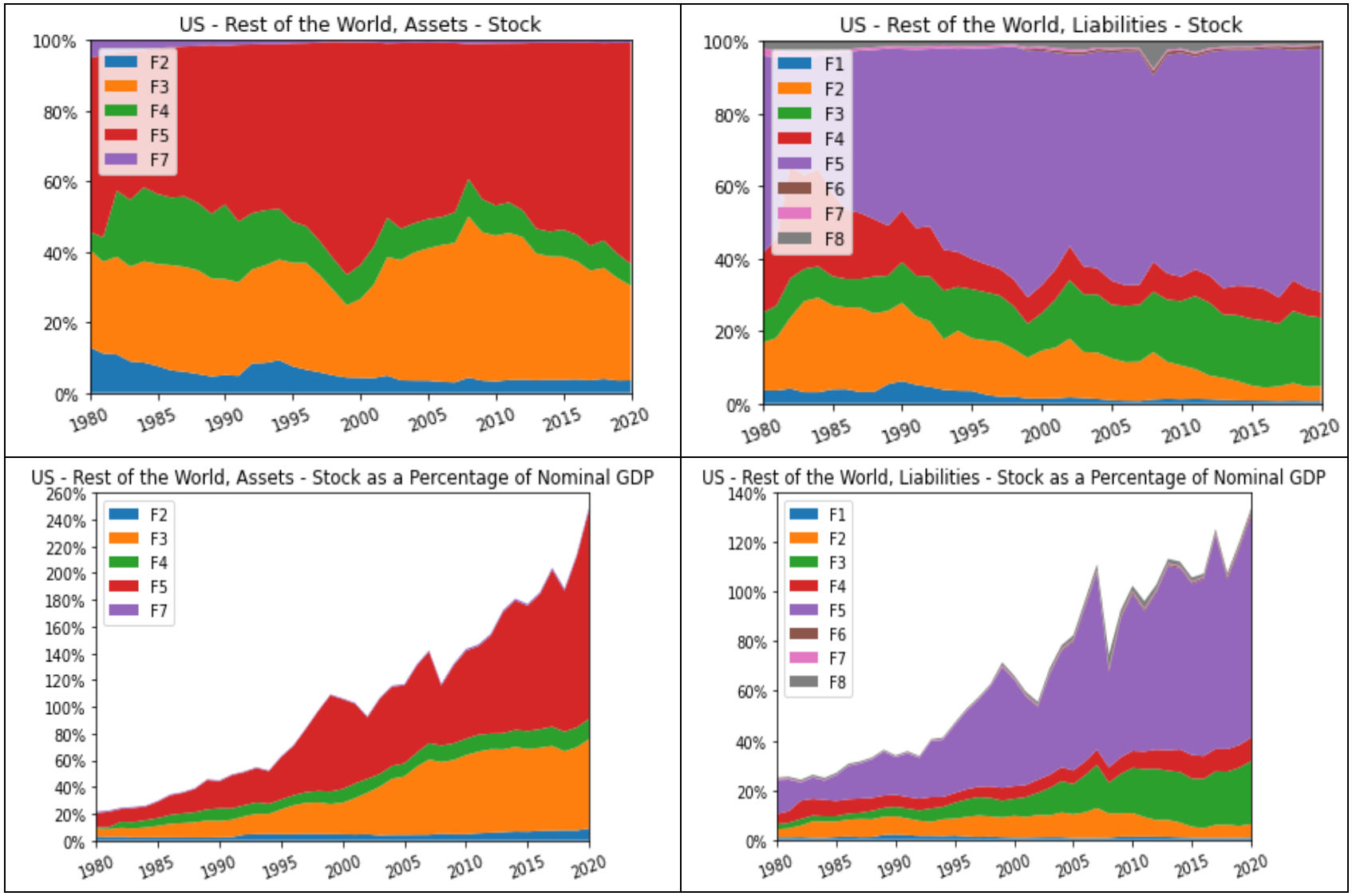
From a micro-perspective, corporate bonds and other similar debt securities are impacted by sustainability and climate risk (Flammer, 2020; Seltzer et al., 2020). Aggregating these trends in bonds is expected to reflect ongoing sustainability performance that are evident at the microlevel. Not only are these relationships evident in bonds, the sustainable finance and ESG materiality related to equity literature is also pronounced.

Equity

Equity is “all instruments and records acknowledging claims on the residual value of a corporation or quasi-corporation after the claims of all creditors have been met” (SNA, 2008). Investment fund shares “are collective investment undertakings through which investors pool funds for investment in financial or non-financial assets” (SNA, 2008). Both financial instruments collectively represent the F5 accounts in the financial accounts. The largest financial instrument flows have been through this account (see Figure 2 e.g., in the US for 2020, the F5 stock, asset and liability as a percentage of GDP is 156% and 90%, respectively). The literature on ESG materiality and equity is vast and growing, primarily due to the importance of corporate financial and market performance in the financial sector. Nevertheless, while the most material sustainability factor is environmental, there is no consensus on the empirical materiality of general sustainability or ESG.

Previous literature has noted that proactive CSR strategies can contribute to global competitiveness and economic performance, particularly for emerging markets (Lagoarde-Segot, 2011). At the corporate level, Khan et al. (2015) and Drempetic et al. (2020) investigated whether firm characteristics e.g., size, market-to-book ratio, return-on-assets (ROA), leverage, R&D expenses, advertising expenses, and institutional ownership, and available resources were material to ESG.

Figure 2: Sovereign Capital Flows, Stock & % of GDP for US-to-Rest of the World (RoW)



A positive relationship between ratings on material sustainability issues (based on US SASB and SEC standards) and future performance for listed US firms whereas there was no significant relationship for immaterial issues (Khan et al., 2015). Drempetic et al. (2020) finds a similar positive relationship and highlights the influence of organizational legitimacy and questions whether there is a resource advantage for larger firms and their ESG performance. Controlling sovereign and financial risk establishes legitimacy and allows for consistent development.

This relationship is not consistent across regions, however. In Latin America, Duque-Grisales et al. (2021) indicated a negative relationship between ROA and ESG using financial slack and geographic international diversification as moderating effects. In China, ESG equity index investments could increase risk-adjusted returns and improve portfolio diversification (Dai, 2021). In Europe, Mikołajek-Gocejna (2018) highlights the existence of information differences between sustainability indices and European countries noting SRI is a "higher-order need" that is related to a high GDP per capita and stronger attachment to core EU values. In the UK, ESG-related news and scores potentially hamper stock performance (Sahut et al., 2015). The key commonality between these studies is a potential interconnectedness between corporate-level sustainability and financial performance, capital, macroeconomic characteristics, and a nation's approach to sustainability e.g., standardization, geographic differences, or structural economic differences.

In contrast, these positive relationships may not be stable or persistent due to inconsistent standards or simply a lack of standardization e.g., the convergence of SASB and SEC (Jebe, 2019). For example, the Eurostoxx50's performance may not be affected by their ESG commitments (La Torre et al., 2020). It is the previous and current state of ESG value and materiality that results in skepticism. The standardization, reporting, public policies, regulations, and legal framework may not facilitate sustainable performance even though the use of ESG is paramount (Cornell et al., 2020). Moreover, amongst rating agencies, there are significant inconsistencies and noise that changes the validity of ESG scores (Berg et al., 2020) yet after stripping away the noise, there appears to be a strong positive relationship between ESG performance and expected returns (Berg et al., 2021).

Across the ESG materiality literature and modelling, ESG is being included as a factor in pricing, valuation, and performance with mixed results (Gillan et al., 2021; Pedersen et al., 2021). However, changing standards and regulations are making ESG materiality more relevant to corporations and investors. Materiality remains a challenging topic given the current state of standardization and reporting consistency. Nevertheless, its importance and market impact remain relevant as the state of materiality continues to develop alongside the rising adoption of sustainability practices and investments. Hence it is through sovereign actions (monetary, fiscal, or regulatory), commitments (Kyoto Protocol 1997, Paris Agreement 2015, and Glasgow Climate Pact 2021), and thus, capital that could facilitate tangible change and whether that has occurred requires further investigation, which establishes the following hypothesis:

H5: *There is a positive relationship between aggregate ESG performance and the capital profitability of financial instruments i.e., pricing of debt securities, F3 and equity, F5*

Like bonds, the presence and magnitude of equity with regards to ESG value is immense from both a micro and macro-perspective even though the relationship may be inconclusive. It is across these financial instruments that represent the main sovereign capital flows. Using factors of sovereignty allows us to evaluate whether national commitments lead to financing and result in sustainable change.

Sovereignty

The previous sections focused on aspects of sovereignty and sustainability from a macro and micro-level, separately. Understanding the relationships between monetary and fiscal policy, specific financial flows, and sustainability is the basis for the integration of macro and micro. This section focuses on the intersection between the two and evaluates the most relevant literature for this study.

As forms of long-term evaluation, sovereign and sustainability risk are inherently intertwined. Previous studies have evaluated corporate social performance (CSP) with relation to macro, meso, and micro-factors with mixed results. Macroeconomic factors e.g., national business/economic system, or the conceptual approach to operate an economy, can be considered to influence how business is conducted. Moreover, mesoeconomic i.e., industry or sectoral differences can also shift CSP (Cassely et al., 2020). On the other hand, microeconomic factors e.g., "availability of slack resources," could have more explanatory power on CSP compared to macro and meso factors (Orlitzky et al., 2017). Both studies touch on the state of the economy, whether noting comparative advantage or financing, as an explanation for corporate-level CSP. Sovereign risk may be the underlying factor influencing spending behavior and the accessibility of financial resources for sustainability.

For example, noting Capelle-Blancard, et al. (2019), sovereign bond yield spreads, GDP Growth, Inflation Rate, Debt-to-GDP, Primary Balance-to-GDP, Current Account-to-GDP, Trade Openness, and Reserves-to-Imports can represent sovereign risk and the state of the economy. Good ESG performance, lower default risk, and lower sovereign bond yield spreads highlight the effect of sustainability investments on sovereign risk. While this negative relationship showcases ESG as a signal of economic stability, sustainability performance may not necessarily be only a cause of excessive costs and available resources (Orlitzky et al., 2017), but driven by how the capital is used.

The indicators that are most central to economic success are measurements of wealth and social prosperity, or GDP and GDP per capita. Factors, like ESG, that promote the longevity of wealth should be positively related. Diaye et al. (2021) finds ESG and GDP per capita are positively related in the long run emphasizing that natural resources are a critical component for economic activity and growth. Likewise, Zhou et al. (2020) identify increases of micro-ESG performance can result in increasing GDP per capita, specifically firm-level social performance for both developed and emerging economies; environmental and governance performance only significantly affects emerging markets. Moreover, Hafner et al. (2021) highlight reducing the green finance gap and carbon intensity of the power sector results in a positive impact on GDP, and reductions in power system costs and unemployment. However, current green and energy policies e.g., EU Energy Roadmap 2050 with hopes to decouple GDP growth and energy use, have been perceived as insufficient to instigate substantial change (Nieto et al., 2020). The previous and current policies of countries may result in a negative relationship between sustainability and GDP implying that countries are not using their resources efficiently (Vargas et al., 2012). These studies showcase the importance and economic relevance of green and ESG-related policies at the corporate and national levels. Investing in the green transition and ESG can result in positive economic impacts and gains in GDP depending on how capital is used. The relationships between sustainability, economics, and finance are becoming clearer; however, unlike sovereign risk, a gap exists in understanding the types and effectiveness of capital toward generating sustainable change (Prado et al., 2019).

These aspects of sovereignty, alongside macroeconomic indicators, and their relation to sustainability performance is the gap that we seek to explore. The rise of ESG investments and ongoing green transition across the world have substantially grown in the past decade (GSIA, 2020) so it is reasonable to assume that ESG performance should increase. However, have these transfers of capital and changes in economic activity resulted in sustainable improvements? Have countries been growing in a sustainable way? The intent of this research is to investigate whether macroeconomic performance, effective use of capital, and sovereign capital flows contributes to sustainability performance. While ESG may be a signal of economic stability according to previous literature, the underlying ability to invest in ESG is based on whether a nation can focus on matters in excess of basic needs as well as finance them. To expand on the current literature, we seek to respond to the following research question:

Research Question:

To what extent do the capital flows and effective use of capital of a country influence its sustainability performance? Comparison between the market indices of Brazil, France, Germany, India, Japan, Mexico, the UK, and the US.

- ***H1:*** *There is a positive relationship between aggregate ESG performance and economic performance i.e., GDP Growth, while there is a negative relationship between aggregate ESG performance and Inflation Rate.*
- ***H2:*** *There is a positive relationship between aggregate ESG performance and monetary policy responsiveness i.e., Reserves-to-Imports.*
- ***H3:*** *There is a positive relationship between aggregate ESG performance and fiscal condition i.e., Debt-to-GDP and Primary Balance-to-GDP.*
- ***H4:*** *There is a positive relationship between aggregate ESG performance and macroeconomic activity i.e., Current Account-to-GDP and Trade Openness.*
- ***H5:*** *There is a positive relationship between aggregate ESG performance and the capital profitability of financial instruments i.e., pricing of debt securities, F3 and equity, F5*

3. Data and Methodology

3.1 Data

3.1.1 Country Focus

We used a panel dataset from 2013 to 2019 (7) and 8 countries: Brazil, France, Germany, India, Japan, Mexico, United Kingdom (UK), and United States (US) (see Table 2 for details on the sample).

Table 2 – Summary of observations

Timeframe	2013 – 2019
# of Periods	7
# of Companies	1 025
# of Observations (estimated)*	10 829
# of Observations (actual)*	12 248
# of Clean Observations (actual)	6 556
**prior to data cleaning*	

First, we identified the countries with the largest market indices, sorted by countries from different regions and economic statuses, and chose countries with the most available company-level ESG data from S&P Global Capital IQ. The intent was to use a diversified set of indices and companies that best represented each country's source of production and economic growth. Due to the partially manual data collection process, we limited the number of countries to the current list of eight (see Table 3).

Table 3: List of Countries in Sample

Country	Region[8]	World Bank Region[9]	Status[10]	Index
Brazil	Latin America and Caribbean	Latin America & Caribbean	Emerging	IBOVESPA
France	Europe	Europe & Central Asia	Developed	CAC 40
Germany	Europe	Europe & Central Asia	Developed	DAX
India	Asia-Pacific	South Asia	Emerging	NIFTY 500
Japan	Asia-Pacific	East Asia & Pacific	Developed	NIKKEI 225
Mexico	Latin America and Caribbean	Latin America & Caribbean	Emerging	IPC
UK	Europe	Europe & Central Asia	Developed	FTSE 100
US	United States and Canada	North America	Developed	S&P 500

The country-level data sources and variable descriptions can be found in Table 4 and Table 5.

Table 4: List of Data Sources per Country for Sovereign Capital Flows

Country	Data Source
Brazil	Banco Central do Brasil (BCB-DSTAT)
France	Banque de France
Germany	Eurostat
India	Reserve Bank of India – Database on Indian Economy
Japan	Bank of Japan – Flow of Funds (Stats Search)
Mexico	INEGI – Institutional Sectors, Flujo de fondos detallados de activos & Balance de activos y pasivos
UK	Eurostat
US	Federal Reserve, Z.1-Financial Accounts (fredapi)

[8] Categorization of regions is designated by S&P Global Capital IQ
[9] Categorization of regions is designated by the World Bank. Missing Regions: Middle East & North Africa; Sub-Saharan Africa (https://data.worldbank.org/country)
[10] Categorization of economic status is designated by MSCI (https://www.msci.com/our-solutions/indexes/market-classification)

Table 5: Description of Variables

Variable Name	Code	Description	Source
		Dependent Variable	
ESG / E	ΔESG / E	Difference between ESG and Environmental scores from each company, year-over-year	S&P Global Capital IQ
		Independent Variables	
F3 – Debt Securities, Price, BaseYr 2015	ΔF3Price	Change in Price of Debt securities are the differences in price of "negotiable instruments serving as evidence of a debt [including] bills, bonds, and negotiable certificates of deposit. (SNA, 2008, p. 228). Indicator of capital profitability.	• Banque de France • Federal Reserve • Eurostat (UK, Germany) • INEGI (Mexico) • Banco Central do Brasil • Reserve Bank of India • Bank of Japan
F5 – Equity & FDI, Price, BaseYr 2015	ΔF5Price	Change in Price of Equity are the differences in price of "all instruments and records acknowledging claims on the residual value of a corporation or quasi-corporation after the claims of all creditors have been met" (SNA, 2008, p. 230). Investment fund shares or units "are collective investment undertakings through which investors pool funds for investment in financial or non-financial assets" (SNA, 2008, p. 231). Indicator of capital profitability.	
GDP Growth	ΔGDP/GDP	Annual percentages of constant price GDP changes	WB
Inflation Rate	ΔP/P	CPI; Annual percentages of average consumer price changes	WB
Debt-to-GDP	Debt/GDP	Fiscal Condition: All liabilities that require payment or payments of interest and/or principal by the debtor to the creditor at a date	IMF
Primary Balance-to-GDP	PB/GDP	Fiscal Condition: Primary net lending/borrowing plus net interest payable/paid	IMF
Current Account-to-GDP	CA/GDP	Liquidity Ratio: All transactions other than in financial and capital items	WB
Reserves-to-Imports Ratio	Reserves/Imports	Total reserves are holdings of monetary gold special drawing rights, and holdings of foreign exchange under the control of monetary authorities	WB
Trade Openness	(X + M)/GDP	The sum of exports and imports of goods and services measured as a share of gross domestic product	WB

3.1.2 ESG Performance using S&P Global Capital IQ

As a representation of each country's ESG performance, we used firm-level ESG scores from each country's respected index as the dependent variable. The scores and primary industry classifications were extracted from S&P Global Capital IQ (previously S&P Trucost). The rating agency uses their own ESG scoring methodology (100-point overall ESG Evaluation score based on an ESG Profile and Preparedness opinion, which results in a discrete value) and industry classification system (S&P Global & MSCI Industry Classification, 1999). To measure ESG, the rating agency conducts a voluntary questionnaire, S&P Global Corporate Sustainability Assessment (CSA), to companies with the responses evaluated by their rating analysts. The ESG score is comprised of numerous factors per indicator; the weights of each E, S, and G are determined by its relevancy and materiality to the company (see Figures 3 and 4).

Figure 3: ESG & ENV Scores for Aggregate Sample

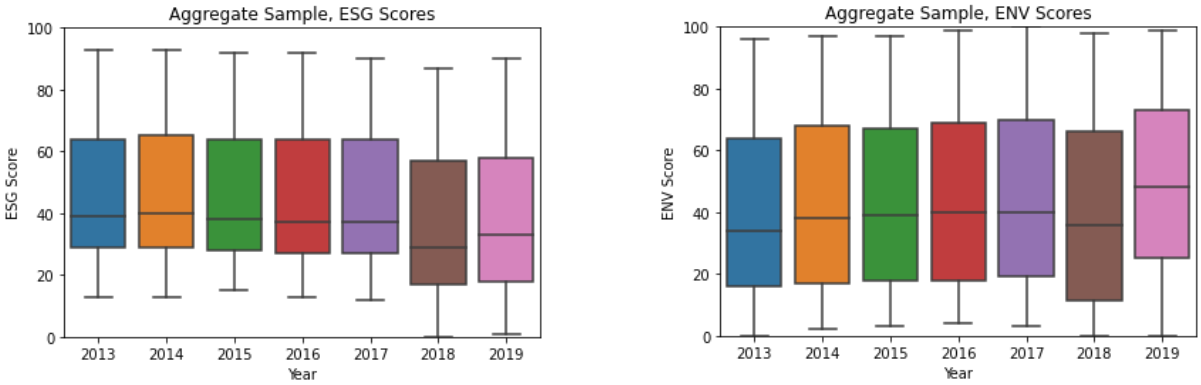
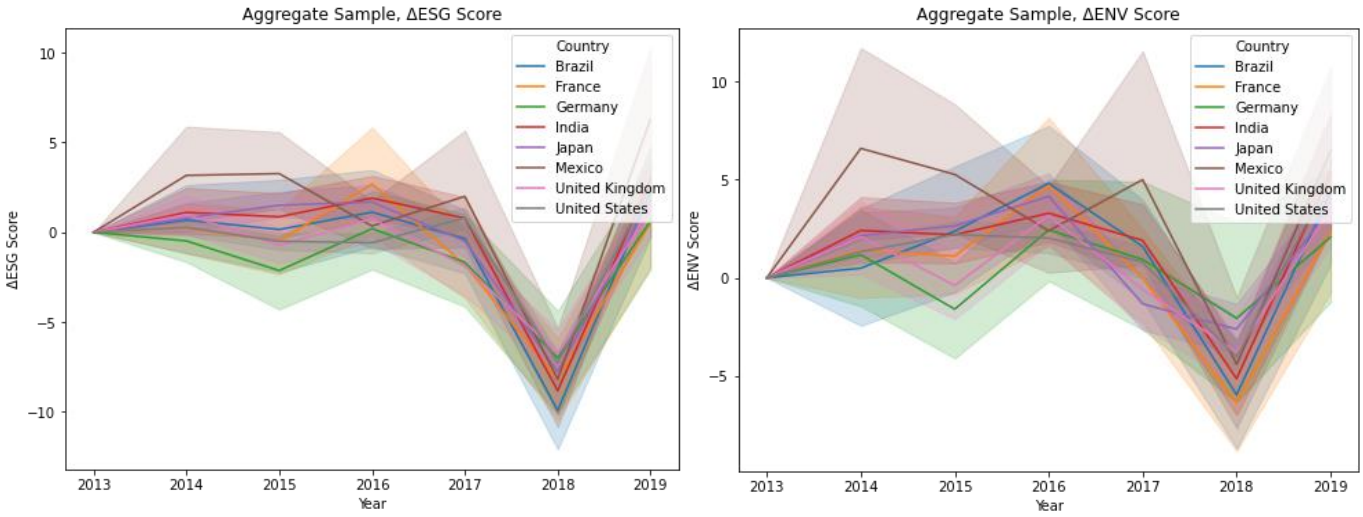


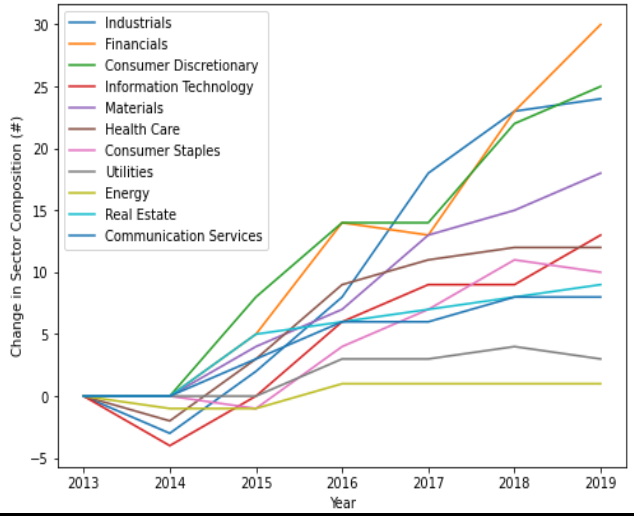
Figure 4 – ESG & ENV Score Delta for Aggregate Sample



Moreover, a sector composition for the dataset can be found at Figure 5. While the current S&P Global ESG methodology is in its infancy, the agency's ESG and climate-related data have been used previously in the literature, which affirms its credibility (Cheema-Fox, et al., 2021; Ehlers, et al., 2021; Bender, et al., 2020; Baldassarri Höger von Högersthal et al., 2020; Dawkins et al., 2010).

Figure 5: Sector Composition for Aggregate Sample

Sector Group	Observations	Percent
Industrials	1073	16.37%
Financials	974	14.86%
Consumer Discretionary	965	14.72%
Information Technology	635	9.69%
Materials	624	9.52%
Health Care	577	8.80%
Consumer Staples	556	8.48%
Utilities	377	5.75%
Energy	289	4.41%
Real Estate	259	3.95%
Communication Services	227	3.46%
Total	**6556**	



There are a variety of ESG rating agencies that have been used in the literature, including but not limited to, Thomson Reuters's Asset4, London Stock Exchange Group's Refinitiv, Moody's Vigeo-Eiris, and Morningstar's Sustainalytics. Each agency has their own methodology to determine the weighting of each factor; nevertheless, they focus on similar quantitative and qualitative assessments of activities. This paper asserts that the underlying decision to invest in ESG-related activities, especially during the current green and net-zero transition, can be influenced largely by the accessibility of financing in excess of basic operational needs. If corporations invest in and finance ESG activities to improve their ESG score, then at an aggregate-level, a country's financing should reflect material contributions to overall ESG performance irrespective of unique methodologies.

3.1.3 Sovereign Capital Flows measured by Central Banks

For the independent variables, prices of F3 and F5 (see Figure 6), we extracted annual data from each country's available Financial Accounts (Flow of Funds, Sequence of Accounts, or Balance of Payments), both programmatically (Python) and manually, depending on the source.

We calculated Price Delta, BaseYr 2015 as such:

$$Stock_n = Stock_{n-1} + Flow_n + Revaluation_n + Other\ Changes\ in\ Volume_n$$

$$Growth\ Rate_n = \frac{Revaluation_n}{Stock_{n-1}}$$

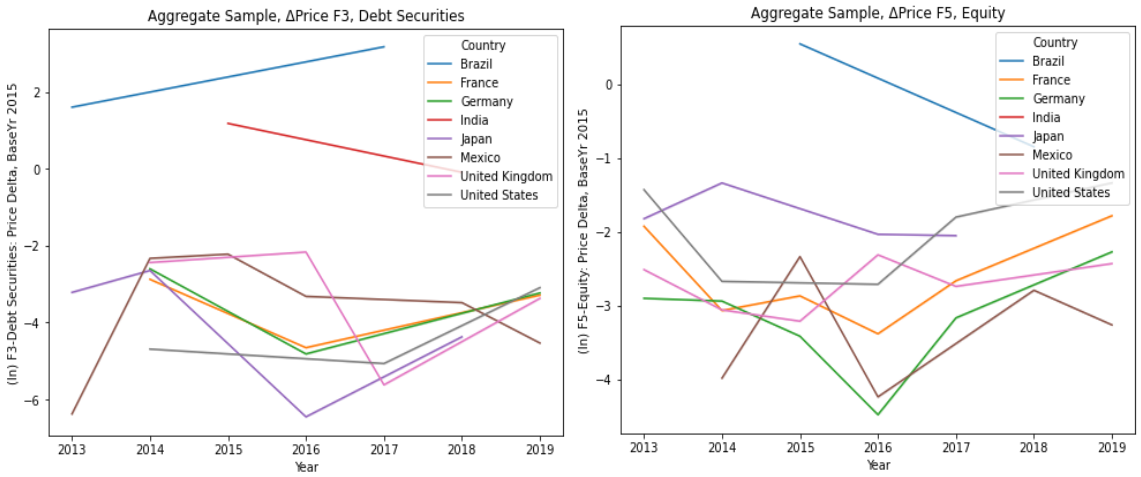
$$Price_n = Price_{n-1} * (1 + Growth\ Rate_n)$$

$$Price_{n\ -\ Base2015} = \frac{Price_n}{Price_{2015}}$$

$$YoY\ Delta_n = \frac{x_n}{x_{n-1}} - 1$$

For example, the stock of F3, Debt Securities for 2014 is equal to the stock (*S*) of F3 in 2013 plus the Flow (*F*), Revaluation (*V*), and Other Changes in Volume (*OCV*) in 2014. The Growth Rate (*G*) in 2014 is calculated by dividing the *V* of the current year by the previous year's *S*. With a starting *G* as zero and Price (*P*) as one, the *P* of the financial instrument is equal to the previous year's *P* times one plus *G*. The *P*, base year 2015 is equal to the current year's *P* divided by the *P* in 2015. The calculation of *P*, BaseYr 2015 may differ between countries due to the recording method and data availability. In the cases of Brazil, India, and Mexico, there was no *V* account. The *F* of the financial instrument was used in place of *V* and if *F* was not available, then *F* was calculated as the delta of the current year's *S* and the previous year's *S*. There are concerns with using the *F* account because the delta between *S* in Year$_n$ and Year$_{n-1}$ does not segment out *OCV*.

Figure 6: Change in Prices for Financial Instruments by Country



3.1.4 Macroeconomic Indicators sourced from the World Bank, OECD, IMF, IFS

Similar to Capelle-Blancard, et al., 2019; Zhou, et al., 2020; Diaye, et al., 2021, we used the following macroeconomic indicators: GDP Growth, Inflation Rate, Primary Balance-to-GDP, Current Account-to-GDP, Reserves-to-Imports, and Trade Openness (see Figure 7). Capelle-Blancard, et al. used these factors as control variables with regards to sovereign risk and bond spreads. We used the same variables as Capelle-Blancard, et al., but as independent variables, because they all are considered to contribute to sovereign risk, value, and economic stability. Their study focused on country risk, which influences the rate and magnitude of capital flows; thus, it seems appropriate to segment out fiscal conditions, liquidity conditions, and economic activity and focus on the specific price changes in financial instruments that influence sustainability performance. In these research papers (Capelle-Blancard, et al., 2019; Zhou, et al., 2020; Diaye, et al., 2021), all authors used ESG performance as an explanatory variable for sovereign risk or macroeconomic conditions whereas this research uses ESG as a response variable.

3.2 Methodology

3.2.1 Model Specifications

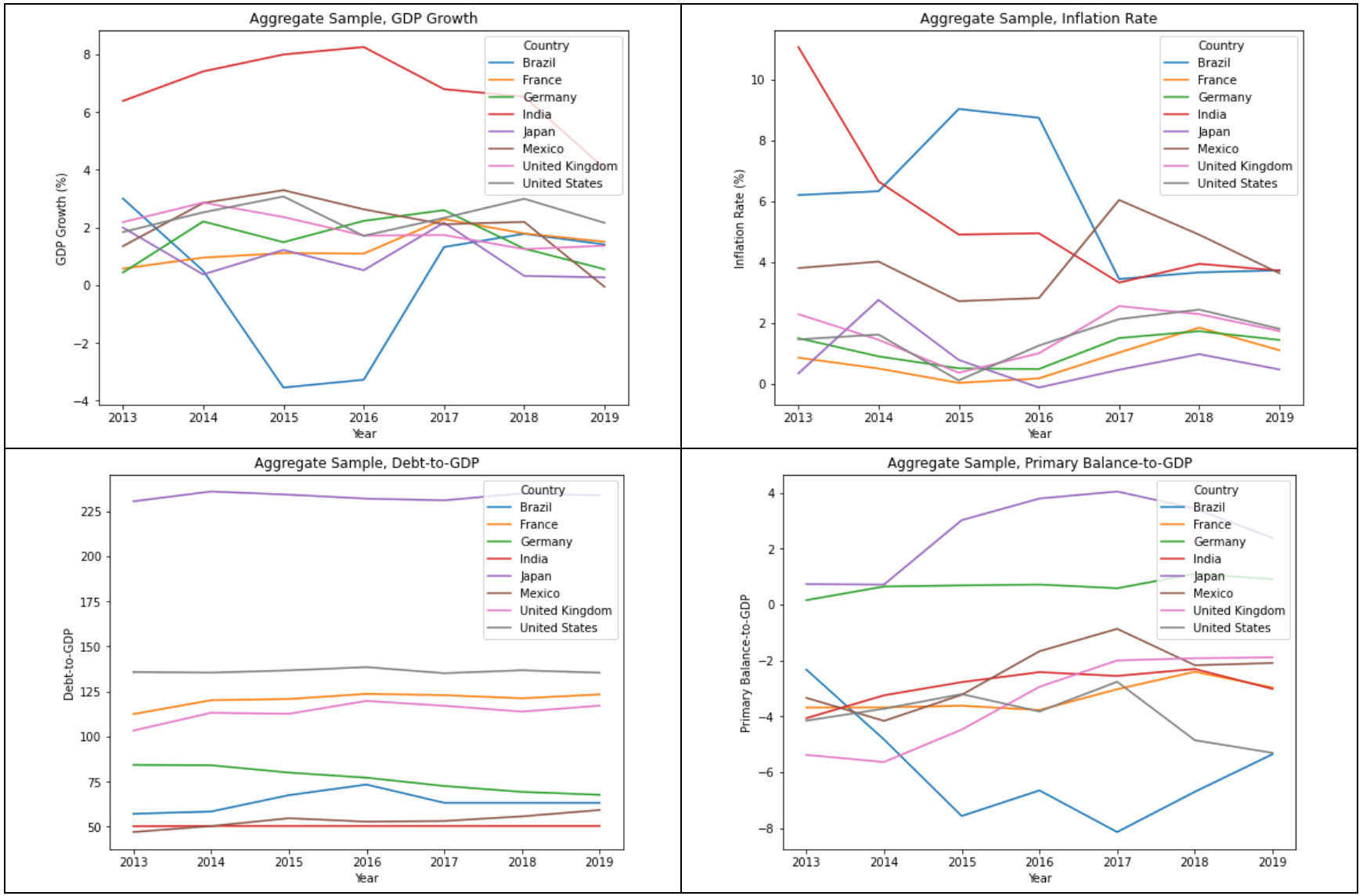
Based on the previous literature, we model the relationship between ESG performance and sovereign capital flows using a country fixed effects panel data regression and an individual country ordinary least squares (OLS) regression. The equation is as follows:

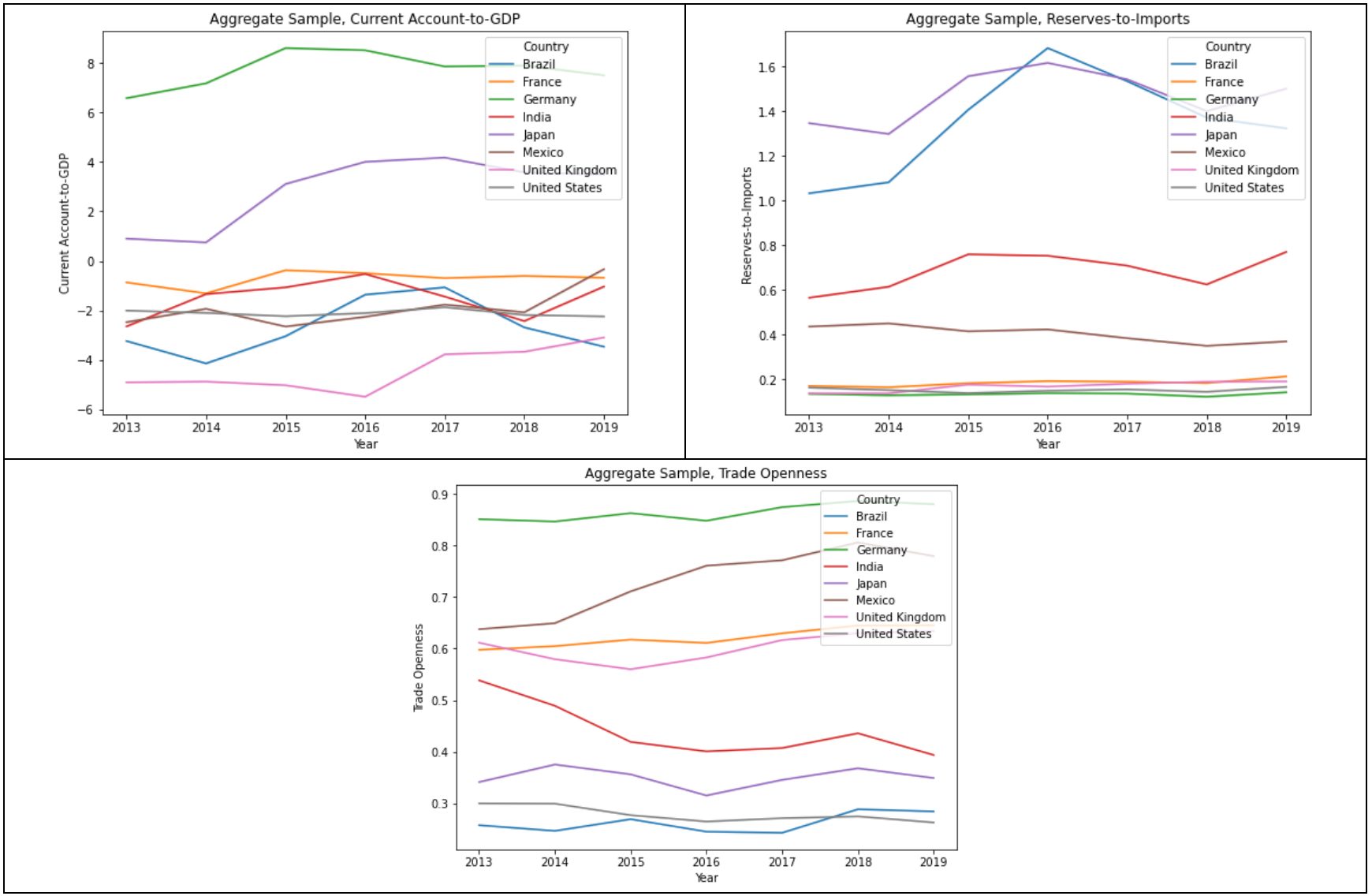
$$\Delta Y_{itc} = \beta_0 + \beta_1 \Delta F3Price_{itc} + \beta_2 \Delta F5Price_{itc} + \beta_3 \left(\frac{\Delta GDP}{GDP}\right)_{itc} + \beta_4 \left(\frac{\Delta P}{P}\right)_{itc} + \beta_5 \left(\frac{Debt}{GDP}\right)_{itc} + \beta_6 \left(\frac{\text{PB}}{GDP}\right)_{itc} + \beta_7 \left(\frac{\text{CA}}{GDP}\right)_{itc} + \beta_8 \left(\frac{Reserves}{Imports}\right)_{itc} + \beta_9 \left(\frac{(X+M)}{GDP}\right)_{itc}$$

where i = country, t = period or year, and c = individual company. The equation models change in ESG performance, year-over-year (YoY), which is regressed using the macroeconomic indicators and prices of sovereign capital flows. ΔY is the difference between a company's ESG or Environmental score between each year. $\Delta F3Price$ and $\Delta F5Price$ are calculated as the percent change in price over time. GDP Growth ($\frac{\Delta GDP}{GDP}$) is the annual percentage of constant price GDP changes and represents growth of the state of the economy. Inflation Rate ($\frac{\Delta P}{P}$) is the Consumer Price index (CPI), the annual percentage of average consumer price changes. Debt-to-GDP ($\frac{Debt}{GDP}$) ratio represents the fiscal condition of an economy that accumulates all liabilities with a required payment(s) of interest and/or principal to the debtor in the future. Primary Balance-to-GDP ($\frac{PB}{GDP}$) ratio is an indicator of the fiscal condition as well that is calculated using the primary net lending/borrowing plus net interest payable/paid portions of the national accounts. Current Account-to-GDP ($\frac{CA}{GDP}$) ratio is a liquidity ratio based on all transactions other than those in financial and capital items. Reserves-to-Imports ($\frac{Reserves}{Imports}$) ratio is the holdings of monetary gold special drawing rights and holdings of foreign exchange under the monetary authorities divided by total imports. Trade Openness ($\frac{(X+M)}{GDP}$) ratio is the sum of exports and imports of goods and services as a portion of GDP.

We expand the analysis to focus on the E factor of ESG. The environmental factor is considered to have the most financially and sustainability material influence on a company; thus, capital flows may be more easily identified to this measure of sustainability. The motivation is linked to fiscal policy commitments, H3 and H4, and capital flows, H5, that note a sustainability-targeted allocation of capital. Understanding the relevant economic and policy mechanisms are necessary to financing the green transition and climate change mitigation. Due to the delayed and annualized nature of ESG scores and macroeconomic factors, the analysis is a historical representation of the relationship.

Figure 7: Macroeconomic Indicators by Country




Aggregate Sample, Current Account-to-GDP
Current Account-to-GDP
Year
Country
Brazil
France
Germany
India
Japan
Mexico
United Kingdom
United States
Aggregate Sample, Reserves-to-Imports
Reserves-to-Imports
Year
Aggregate Sample, Trade Openness
Trade Openness
Year

4. Results

First, I calculated the criteria for a fixed effects panel data regression: Homoskedasticity Residuals Plot, White-Test, Breusch-Pagan Test, Durbin-Watson Test, Durbin-Wu-Hausman Test. The Durbin-Watson resulted in a value of 1.53 and the p-values for the remaining criteria were $p < 0.01$.

After verifying the heteroskedasticity and viability of the model, the results suggest that there is statistically significant evidence[***] for a negative relationship between changes in ESG Score and GDP Growth, Debt-to-GDP, Current Account-to-GDP, Trade Openness, and F3-Debt Securities: Price Delta, BaseYr 2015. There is a statistically significant positive relationship between changes in ESG score and Primary Balance-to-GDP[*], Reserves-to-Imports[***], and F5-Equity: Price Delta, BaseYr 2015[***]. Inflation Rate had a low positive effect and was not statistically significant at a $p < 0.1$. Using ENV scores only generated comparable results. There is a statistically significant negative relationship between changes in ENV Score and GDP Growth[***], Trade Openness[***], Inflation Rate[*], Current Account-to-GDP[*], and F3-Debt Securities: Price Delta, BaseYr 2015[***]. Primary Balance-to-GDP had an insignificant negative relationship. Debt-to-GDP and F5-Equity: Price Delta, BaseYr 2015 had an insignificant positive relationship.

H1 is disproven for ESG with the negative, significant coefficient from GDP Growth and positive, insignificant coefficient from Inflation. It remains disproven for ENV based on GDP Growth, but the hypothesis is supported by a negative, significant coefficient from Inflation.

H2 rejects the null hypothesis and is accepted for ESG and ENV performance and monetary policy responsiveness, both large, positive, and significant coefficients.

H3 is disproven as the relationship with ESG is negative for Debt-to-GDP, but positive for Primary Balance-to-GDP. With regards to fiscal condition, there is a net effect. This hypothesis fails to reject the null hypothesis for ENV.

H4 is disproven for ESG and ENV performance and economic activity. The coefficients reject the null hypothesis, are significant, and negative.

H5 is disproven as the relationship with ESG and ENV is negative and significant for F3, Debt Securities. However, this hypothesis is supported by ESG and F5, Equity, but fails to reject the null hypothesis for ENV.

[***] $p < 0.01$
[**] $p < 0.05$
[*] $p < 0.1$

Table 6: ESG Performance: Effect of Macroeconomic Indicators & Sovereign Capital Flows

	ESG Performance (Y_{itc})	
	ESG	**ENV**
Constant	22.690***	3.894
	(5.123)	(6.762)
ΔGDP/GDP	-0.634***	-0.780***
	(0.106)	(0.142)
ΔP/P	0.003	-0.247*
	(0.095)	(0.126)
Debt/GDP	-0.166***	0.023
	(0.036)	(0.047)
PB/GDP	0.178*	-0.091
	(0.105)	(0.139)
CA/GDP	-1.155***	-0.514*
	(0.203)	(0.27)
Reserves/Imports	16.194***	9.482***
	(2.039)	(2.702)
(X + M)/GDP	-22.145***	-25.007***
	(4.478)	(5.918)
ΔF3Price	-0.113***	-0.104***
	(0.022)	(0.029)
ΔF5Price	0.659***	0.282
	(0.202)	(0.265)
Time Effects	Yes	Yes
Observations	6556	6437
R-squared	0.034	0.021

Notes: Standard errors are reported in parentheses under the coefficient value: * significant at 10%, ** significant at 5%, *** significant at 1%.

ESG Performance

There is a divergent relationship between the aggregated sample, individual countries, and economic status. For example, with GDP Growth: Brazil, Germany, Mexico, and the US possess a negative coefficient whereas France, India, Japan, and the UK have a positive coefficient. Brazil's economic growth has the largest, significant negative impact on ESG performance followed by the US. India and France lean toward the other side of the spectrum with only India being significant, but both nations experiencing a lower impact from GDP Growth comparatively to Brazil and the US.

The results show that these macroeconomic indicators favor the sustainability growth of developed nations more so than emerging markets within this sample. Debt-to-GDP and Primary Balance-to-GDP affect ESG performance more positively for emerging markets whereas developed markets lean more negatively. GDP Growth, Inflation Rate, Current Account-to-GDP, Trade Openness, and ΔF5Price affect ESG performance more positively for developed markets whereas emerging markets lean more negatively. Reserves-to-Imports and ΔF3Price are more positive for the ESG performance of both developed and emerging nations.

In Central and South America (Brazil and Mexico), these emerging markets' fiscal condition have a more positive influence on company ESG performance. India, however, experienced the opposite effect. Primary Balance-to-GDP had a similar effect on Debt-to-GDP for emerging markets. The fiscal conditions of France and UK had a positive impact from Debt-to-GDP; Germany, Japan, and US experienced the opposite. Europe (France, UK, and Germany) and Japan had a negative relationship with Primary Balance-to-GDP differing from the opposite coefficient of the US. These results highlight an underlying difference in fiscal policy and one's ability to efficiently use debt for economic and ESG growth.

Described by the IMF, "persistent current account deficits or surpluses indicate a macroeconomic instability that is not conducive to sustained economic growth" (IMF). The type of financing, macroeconomic conditions, and market sentiments contribute to the risk of international financial outflows, which would decrease the means to fund sustainability initiatives. Additionally, a nation's ability (reserve adequacy) to pay for imports, priced in foreign currency, is related to the probability of credit restructuring to ease current and future payments. Both indicators target the efficient use of capital and financing capabilities given the expected result of GDP Growth or purchasing goods from abroad to facilitate productivity and economic growth.

Brazil, India, US, and Germany present a negative relationship between Current Account-to-GDP and ESG performance. The results from Mexico, France, Japan, and UK indicate a positive relationship from this macroeconomic indicator. Reserves-to-Imports presented a mostly positive relationship for all countries except for the UK. Thus, having responsive monetary policy can support currency and credit stability which results in a more positive impact on ESG performance.

For Trade Openness (i.e., an economy's international trade exposure), the indicator is negative for all emerging nations. The factor is positive for Germany, the UK, and the US except for France and Japan. Emerging nations are not benefiting from economic openness, which indicates that traditional forms of economic growth and globalization have not been enhancing sustainability or ESG. Benefiting from international trade allows developed nations to support the sustainability improvements of their domestic economies.

Lastly, ΔF3Price and ΔF5Price are capital profitability indicators of capital flows[11], specifically for the two largest financial instruments by size within the sample of countries as noted previously. The risk factors of Brazil, France, the UK, and the US show a positive relationship for both F3 and F5 price with ESG performance. Germany and Mexico present a positive for F3 price and negative relationship with F5 price. Japan shows a negative relationship with F3 price but a positive relationship with F5 price. India indicates a negative relationship for both financial instruments. Bonds and bills are potentially more beneficial for ESG development across most countries whereas equity and investment fund shares may only benefit developed countries or those with larger financial markets.

[11] "The risk factors of a financial instrument are the market parameters (interest rates, foreign currency exchange rates, commodity and stock prices), which, through their fluctuation, produce a change in the price of the financial instrument" (Deutsch, 2004).

Table 7: ESG Performance, Country Comparison

	ESG Performance (Y_{ict})							
	Brazil	**France**	**Germany**	**India**	**Japan**	**Mexico**	**UK**	**US**
Constant	-0.215***	-59.015***	53.757*	6.194***	-0.191***	-4.680	-1.944	4.820***
	(0.054)	(21.466)	(28.673)	(1.639)	(0.042)	(8.702)	(2.003)	(1.368)
ΔGDP/GDP	-6.455***	1.1625	-0.231	1.579***	0.566**	-0.232	0.142	-1.865***
	(0.832)	(1.557)	(0.66)	(0.495)	(0.272)	(1.275)	(1.406)	(0.447)
ΔP/P	-3.914***	4.373	-6.296**	0.828	2.425***	-0.064	-1.026**	0.778**
	(0.676)	(3.409)	(2.603)	(0.647)	(0.343)	(0.763)	(0.412)	(0.321)
Debt/GDP	0.697***	0.325**	-0.552**	-2.051***	-0.287***	2.095***	0.029	-0.320***
	(0.139)	(0.146)	(0.274)	(0.468)	(0.017)	(0.54)	(0.036)	(0.051)
PB/GDP	5.637***	-10.096**	-13.445**	-16.043***	-5.357***	5.071***	-0.893	3.805***
	(0.858)	(4.473)	(5.819)	(2.783)	(0.574)	(1.273)	(0.599)	(0.366)
CA/GDP	-4.041***	3.799	-2.013	-5.570**	2.153***	0.612	1.550***	-23.648***
	(0.749)	(2.488)	(1.321)	(2.716)	(0.647)	(2.399)	(0.521)	(2.708)
Reserves/Imports	0.047	20.750***	21.256*	28.189***	50.191***	50.107***	-3.196***	2.857***
	(0.052)	(6.663)	(10.953)	(7.173)	(2.934)	(7.44)	(1.033)	(0.629)
(X + M)/GDP	-0.015***	-35.261***	19.201***	-84.892***	-5.447***	-153.869***	1.022	15.865**
	(0.002)	(13.303)	(7.127)	(22.437)	(0.306)	(33.581)	(1.091)	(8.102)
ΔF3Price	0.854***	35.130***	38.582**	-0.046	-6.265***	34.828***	10.438**	19.710***
	(0.104)	(11.864)	(17.028)	(0.034)	(0.432)	(8.996)	(5.168)	(1.582)
ΔF5Price	0.744*	14.929**	-5.818	-120.851***	4.768***	-30.783***	47.094***	20.180***
	(0.394)	(6.133)	(23.952)	(32.051)	(1.424)	(5.52)	(6.094)	(1.181)
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	310	269	208	675	1354	167	573	3000
% of Full Sample	5%	4%	3%	10%	21%	3%	9%	46%
R-squared	0.241	0.192	0.14	0.258	0.233	0.312	0.184	0.219

Notes: Standard errors are reported in parentheses under the coefficient value: * significant at 10%, ** significant at 5%, *** significant at 1%.

ENV Performance

ESG and ENV performance share characteristics between developed and emerging markets. For emerging markets, Debt-to-GDP, Primary Balance-to-GDP, Current Account-to-GDP, Reserves-to-Imports, Trade Openness, ΔF3Price, and ΔF5Price are impacted similarly. GDP Growth and Inflation Rate, however, lean more positively due to Mexico. For developed markets, GDP Growth, Current Account-to-GDP, and Trade Openness lean more negatively to explain ESG performance. A shift from positive to negative occurred in Japan*** and UK for GDP Growth whereas Germany faced the opposite effect. Japan*** switched from positive to negative for Current Account-to-GDP. UK and US switched from positive to negative for Trade Openness.

For GDP Growth, Brazil***, Japan***, and US*** have a significant negative impact on ENV performance. The UK has an insignificant negative for the same relationship. France, Germany, India, and Mexico have an insignificant positive relationship between GDP Growth and ENV score. The relationship between Inflation Rate and ENV performance is significant and negative for Brazil*** and Germany*. For the UK, it is insignificant and negative. France, India, Mexico, and US share an insignificant, positive relationship between Inflation Rate and ENV Performance.

The fiscal condition and ENV performance of Brazil, Mexico, and India remained consistent with ESG. A significant, positive relationship resulted for Debt-to-GDP for Brazil*** and Mexico**; an insignificant and negative effect occurred for India. Primary Balance-to-GDP trended in the same direction with Brazil*** and Mexico** being significant and positive whereas India** is significant and negative. For the developed markets, Debt-to-GDP is significant and positive for France** and UK***; it is significant and negative for Germany*, Japan***, and US***. Primary Balance-to-GDP is negative for France*, Germany, Japan***, and UK* whereas it is positive for the US***.

The Current Account-to-GDP has a significant and negative relationship for Brazil*** and US*** where Germany, India, and Japan presented an insignificant, negative relationship. The UK resulted in a positive effect for this factor at a significance of 5%. France and Mexico are positive, but insignificant for Current Account-to-GDP. Reserves-to-Imports is negative for the UK*** and positive for Brazil*, France***, Germany*, India, Japan***, Mexico***, and US.

For Trade Openness, there is a negative impact on ENV for Brazil***, France**, India, Japan***, Mexico***, UK, and US. Germany's ENV performance is positively affected by Trade Openness at a significance of 5%. Contradicting the general ESG Scores may point specifically to the environmental harm of excessive global trade e.g., aviation, sea, and land logistics and transportation have substantial resource requirements that generate GHG, especially with fuel/energy, water, and metals.

ΔF3Price and ΔF5Price trend in the same direction for ESG and ENV. Brazil and Mexico's ENV performances are positively influenced by ΔF3Price at a significance level of 1% and 5%, respectively. Contrary to the other emerging markets, India has an insignificant negative relationship for these factors. France***, Germany*, UK***, and US*** indicates a positive relationship between debt security prices and ENV performance. Japan***, like India, presents a negative relationship. For ΔF5Price, Brazil, France*, Japan, UK***, and US*** possess a positive relationship between equity and investment fund shares prices and ENV performance. However, Germany, India, and Mexico*** face the opposite effect. Debt securities have a more positive effect on ESG and ENV performance for most countries, except for India and Japan which may point to a regional effect within Asia-Pacific. Likewise, for F5, the larger market indices' sustainability performance benefits from positive change in equity prices.

Table 8: ENV Performance, Country Comparison

	ENV Performance (Y_{ict})							
	Brazil	**France**	**Germany**	**India**	**Japan**	**Mexico**	**UK**	**US**
Constant	-0.252***	-68.332**	69.936*	3.129	-0.194***	-3.083	-6.466**	-0.607
	(0.071)	(26.282)	(39.983)	(2.396)	(0.059)	(11.416)	(2.774)	(2.002)
ΔGDP/GDP	-5.976***	1.314	0.399	0.376	-1.706***	1.669	-2.244	-2.103***
	(1.112)	(1.907)	(0.92)	(0.735)	(0.379)	(1.689)	(1.947)	(0.653)
ΔP/P	-3.944***	4.35	-6.311*	0.306	0.913*	0.343	-0.886	0.569
	(0.916)	(4.174)	(3.629)	(0.945)	(0.48)	(0.998)	(0.57)	(0.469)
Debt/GDP	0.753***	0.448**	-0.696*	-0.944	-0.186***	1.725**	0.133***	-0.26***
	(0.187)	(0.179)	(0.382)	(0.686)	(0.024)	(0.709)	(0.05)	(0.074)
PB/GDP	5.166***	-9.873*	-13.056	-9.161**	-2.427***	4.102**	-1.457*	3.289***
	(1.144)	(5.476)	(8.115)	(4.068)	(0.817)	(1.676)	(0.829)	(0.534)
CA/GDP	-2.595***	4.515	-2.804	-0.874	-0.1	2.535	1.837**	-27.126***
	(0.98)	(3.046)	(1.842)	(3.978)	(0.918)	(3.17)	(0.721)	(3.958)
Reserves/Imports	0.129*	23.484***	27.113*	14.465	36.446***	42.579***	-5.283***	0.039
	(0.068)	(8.157)	(15.274)	(10.49)	(4.101)	(9.731)	(1.431)	(0.92)
(X + M)/GDP	-0.015***	-40.964**	21.103**	-42.904	-3.901***	-127.707***	-1.501	-14.76
	(0.003)	(16.288)	(9.939)	(32.813)	(0.427)	(43.978)	(1.511)	(11.869)
ΔF3Price	0.667***	40.341***	46.039*	-0.026	-4.677***	28.814**	21.72***	23.686***
	(0.137)	(14.525)	(23.745)	(0.05)	(0.607)	(11.785)	(7.158)	(2.328)
ΔF5Price	0.754	13.375*	-30.779	-61.037	1.747	-26.425***	35.788***	14.739***
	(0.516)	(7.509)	(33.4)	(46.873)	(1.999)	(7.229)	(8.441)	(1.753)
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	304	269	208	654	1329	160	573	2940
% of Full Sample	5%	4%	3%	10%	21%	2%	9%	46%
R-squared	0.124	0.135	0.035	0.104	0.082	0.16	0.089	0.093

Notes: Standard errors are reported in parentheses under the coefficient value: * significant at 10%, ** significant at 5%, *** significant at 1%.

Robustness

I conduct a robustness test for the dependent variable using difference variations of ESG/ENV Scores for the aggregate sample. Table 9 compares the variations of ESG Score. First, I calculated the regressions using the raw sustainability scores. ESG Score has stationary characteristics, i.e., the score is reevaluated annual and without drastic variation over time, whereas the independent variables possess stronger non-stationary trends. Two indicators diverge when using the ESG Score variation: GDP Growth and ΔF5Price. For GDP Growth, the coefficient for ESG Score is positive and slightly greater in magnitude/absolute value compared to ESG Score Δ. Change in ESG Score is more statistically significant at 1%. For ΔF5Price, the coefficient for ESG Score is insignificant and negative whereas ESG Score Δ is significant at 1% and positive. Hence, the change in ESG Score as an indicator of annual sustainability performance is more significant and appears to be more moderated by macroeconomic indicators resulting in a lower overall impact. I included the percent change in ESG score as well. The differences are minimal, but the significant indicators follow the same direction as ESG Score and ESG Score Δ, except for Inflation Rate, and Primary Balance-to-GDP. The most robust indicators across the variations of ESG Score are: Current Account-to-GDP, Reserves-to-Imports, Trade Openness, and ΔF3Price. In addition, we included Table 10, which presents the averages and ranks for each country. Table 11 contains the descriptive statistics for the dataset. Table 12 is a correlation matrix for the independent variables whose output further supports the heterogeneity of these variables.

Table 9: ESG Performance, Robustness Checks

	ESG Performance (Y_{ict})					
	ESG Score Δ	**ESG Score**	**ESG Score %Δ**	**ENV Score Δ**	**ENV Score**	**ENV Score %Δ**
Constant	22.690***	48.713***	0.8822***	3.8941	42.141**	1.577**
	(5.123)	(15.544)	(0.2227)	(6.762)	(19.381)	(0.6184)
ΔGDP/GDP	-0.634***	0.707**	-0.0347***	-0.7801***	-0.338	-0.0782***
	(0.106)	(0.322)	(0.0046)	(0.142)	(0.408)	(0.013)
ΔP/P	0.003	0.545*	-0.0071*	-0.2466*	0.182	-0.0391***
	(0.095)	(0.289)	(0.0041)	(0.126)	(0.361)	(0.0115)
Debt/GDP	-0.166***	-0.087	-0.0057***	0.0228	0.123	-0.0066
	(0.036)	(0.108)	(0.0015)	(0.047)	(0.134)	(0.0043)
PB/GDP	0.178*	1.061***	-0.0021	-0.0908	-0.549	-0.0082
	(0.105)	(0.317)	(0.0045)	(0.139)	(0.398)	(0.0127)
CA/GDP	-1.155***	-2.862***	-0.0095	-0.5135*	0.786	-0.0092
	(0.203)	(0.617)	(0.0088)	(0.27)	(0.775)	(0.0247)
Reserves/Imports	16.194***	24.604***	0.3297***	9.4816***	6.255	0.3276
	(2.039)	(6.187)	(0.0886)	(2.702)	(7.746)	(0.2472)
(X + M)/GDP	-22.145***	-25.906*	-0.5335***	-25.007***	-51.698***	-1.378**
	(4.478)	(13.587)	(0.1947)	(5.918)	(16.964)	(0.5413)
ΔF3Price	-0.113***	-0.122*	-0.0034***	-0.1041***	-0.041	-0.0062**
	(0.022)	(0.066)	(0.0009)	(0.029)	(0.082)	(0.0026)
ΔF5Price	0.659***	-0.170	0.0284***	0.2817	0.748	0.0235
	(0.202)	(0.612)	(0.0088)	(0.265)	(0.760)	(0.0242)
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6556	6556	6556	6437	6437	6437
R-squared	0.034	0.006	0.023	0.021	0.004	0.014

Notes: Standard errors are reported in parentheses under the coefficient value: * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 10: ESG & ENV Avg Score, Avg Score Change, and Rank

	ESG				ENV			
	Observations	Average Score	Average Score Change	Rank	Observations	Average Score	Average Score Change	Rank
France	269	65.55	-1.02	1	269	71.30	0.44	1
Germany	208	62.38	-1.50	2	208	66.47	0.42	2
UK	573	58.07	-0.98	3	573	61.48	0.55	3
Japan	1354	44.94	-0.43	4	1329	50.82	1.13	4
Brazil	310	44.30	-1.03	5	304	43.14	0.93	5
US	3000	38.60	-0.70	6	2940	35.26	0.98	7
Mexico	167	37.47	0.72	7	160	36.79	2.63	6
India	675	32.34	-0.30	8	654	27.33	1.32	8
Mean	820	47.96	-0.66		805	49.08	1.05	
St. Dev.	962	12.44	0.67		943	16.05	0.72	
Aggregate	6556	43.07	-0.65		6437	42.93	1.01	

Table 11: Descriptive Statistics

Variables	N	Mean	St. Dev	Min	25%	50%	75%	Max
GDP Growth	6556	2.30	1.82	-3.55	1.41	2.16	2.86	8.26
Inflation Rate	6556	2.01	1.89	-0.12	0.79	1.62	2.44	11.06
Debt-to-GDP	6556	137.42	57.33	47.11	113.85	135.43	138.50	235.84
Primary Balance-to-GDP	6556	-2.32	2.92	-8.14	-4.15	-3.20	-1.89	4.05
Current Account-to-GDP	6556	-0.85	2.81	-5.48	-2.23	-2.01	-0.49	8.60
Reserves-to-Imports	6556	0.54	0.56	0.12	0.15	0.17	1.03	1.68
Trade Openness	6556	0.38	0.15	0.24	0.27	0.30	0.41	0.89
F3-Debt Securities: Price Delta, BaseYr 2015	6556	-0.45	4.33	-33.75	-0.03	-0.01	0.01	24.06
F5-Equity: Price Delta, BaseYr 2015	6556	-0.02	0.51	-5.34	-0.10	0.07	0.16	1.72
ESG Score Delta, YoY	6556	-0.65	6.71	-54.00	-3.00	0.00	2.00	45.00
ESG Score	6556	43.07	21.84	0.00	26.00	36.00	63.00	93.00
ENV Score Delta, YoY	6437	1.01	8.74	-60.00	-3.00	0.00	4.00	63.00
ENV Score	6437	42.93	27.65	0.00	17.00	40.00	68.00	100.00

Table 12: Correlation Matrix of Independent Variables: ESG Performance

		1	2	3	4	5	6	7	8	9
1	GDP Growth	1								
2	Inflation Rate	0.36	1							
3	Debt-to-GDP	-0.52	-0.61	1						
4	Primary Balance-to-GDP	-0.23	-0.36	0.68	1					
5	Current Account-to-GDP	-0.26	-0.30	0.50	0.82	1				
6	Reserves-to-Imports	-0.25	0.05	0.52	0.69	0.58	1			
7	Trade Openness	0.02	0.10	-0.33	0.18	0.22	-0.12	1		
8	F3-Debt Securities: Price Delta, BaseYr 2015	-0.33	-0.30	0.16	-0.01	0.03	0.02	-0.10	1	
9	F5-Equity: Price Delta, BaseYr 2015	-0.05	-0.35	0.23	0.09	0.00	-0.22	0.02	-0.04	1

5. Discussion and Implications

Based on the aggregated firm-level ESG performance of eight developed and emerging nations from 2013 to 2019, we provide evidence for the ways in which economic and financial mechanisms are influencing corporate sustainability performance. Our findings contribute to the literature by investigating macroeconomic and financial factors' influence on firm-level ESG, and not vice versa. This research is, to the best of our knowledge, the first to use multiple quantitative macroeconomic indicators to explain ESG performance at the firm-level. This study draws inspiration and integrates components from Capelle-Blanchard et al. (2019), Diaye et al. (2021), Margaretic et al. (2018), and Zhou et al. (2020), who focused on using ESG scores as explanatory variables to represent signals of stability or catalysts for greater economic value. Cassely et al. (2020) is also a source of inspiration that explains CSP using macro, meso, and microeconomic factors. Our results provide an additional narrative to the literature by extending current theories between ESG and macroeconomic performance.

While the literature finds that ESG performance is beneficial for GDP, GDP per capita, returns, and yield spreads (Capelle-Blanchard et al., 2019; Diaye et al., 2021; Margaretic et al., 2018; Zhou et al., 2020), we find evidence that positive macroeconomic and financial performance is detrimental to ESG, historically. Zhou et al., (2020) used a similar composite firm-level ESG methodology against GDP per capita and grouped their sample by economic status; while that is possible in this study, it is apparent that individual countries have unique priorities and sovereign risk differences with varying impacts on firm-level ESG. Although this research has a similar approach to Cassely et al., (2020), by using sustainability performance as the dependent variable and macroeconomic characteristics as an independent variable, we chose to further investigate quantitative, macroeconomic indicators. Our results do not refute previous literature; however, this study does provide evidence that extends the ESG-to-GDP and other macroeconomic factors relationship in which the traditional approach to economic growth is significantly harming nations and their firms' sustainable growth (i.e., GDP and other macroeconomic factors-to-ESG).

This study progresses the acceptance and use of the Ecological Finance Theory (Lagoarde-Segot et al., 2021) framework by perceiving the financial sphere as an internality to the natural world. The financial system can play its role but has been critical about changing its stance on market neutrality and climate change. We contribute to previous literature and show that responsive monetary policy (Reserves-to-Imports) is significantly and largely beneficial for sustainability (Monasterolo, 2021; Ameli et al., 2021; Kedward et al., 2021). These findings should encourage more financial system actors, especially from the Central Bank and government level, to change their approach, address climate finance gaps, and ingrain climate risk mitigation into their strategy to reach forms of the Ecological Finance theory framework. Furthermore, inefficient fiscal policy (Debt-to-GDP) is seen to increase both sovereign and ESG risk; thus, decreasing ESG performance, whereas a government budget surplus (Primary Balance-to-GDP) boosts it. Persistent, traditional forms of economic activity (Current Account-to-GDP) and international trade (Trade Openness) weaken ESG performance. In terms of specific financial instruments as forms of financing, higher pricing of debt securities result in lower ESG, but higher pricing of equity improves sustainability performance. These results suggest national policies of price stability, spending plans, economic activity, and pricing controls (e.g., interest rate ceilings, subsidies, or asset purchase programs) for sustainable investments are necessary to facilitate long-term sustainability performance.

Our results put forth some practical implications. From the government and financial system perspective, it is already evident that their role is crucial to address climate change from a holistic and global approach. Transitioning monetary and fiscal policy to be climate resilient is necessary and influences corporate-level sustainability performance. The current supranational commitments and agreements have had little to marginal impact on the actual state of climate change (IPCC, 2021) and result in only short-term effects in the market (Seltzer et al., 2020). These commitments should translate

into material policies, regulations, financing, and sustainable performance that are aligned with one another. While ESG is an imperfect system, it is widely used and accepted by firms so it is through this channel that may better facilitate transition risk. This study is valuable for the policy developments in both developed and emerging nations because it showcases the mechanisms with which one can improve their ESG and sustainability performance.

For investors and financial institutions, aspects of sovereignty, whether financial or climate, may be more important when considering with regards to firm-level ESG performance. The use of specific financial instruments facilitates ESG growth and sustainable investments; however, the outcomes may not necessarily align with long-term ESG performance depending on the instrument and its perception in the market. Climate and market forces are changing and being more recognized by governments and the financial system. Macroeconomic indicators and ESG could inform flows of investment and mitigate against large policy shocks and other transition risks. For all stakeholders, proactivity and reframing sustainable, economic growth are key. Recognizing the inconsistencies between traditional economic and sustainable, climate-relevant growth is necessary to facilitate long-term economic development and a more shock-resilient economy.

6. Conclusion

In summary, these underlying factors highlight policy responsiveness, capital use effectiveness, and capital flows as contributors to a nation's corporate-level ESG performance and highlights sustainability commitments across developed and emerging markets. Successful climate and ESG investments require more than simply the movement of capital and traditional economic indicators. Capital should be framed and designed to generate tangible, sustainable outcomes and protect against climate change shocks. There are still open questions on how we should appropriate and effectively financing climate change mitigation and long-term sustainability. Nevertheless, these findings have potential to support policy development and investment decisions from multilateral organizations to investment funds to individual investors.

While there were attempts to ensure consistency and quality, measuring and integrating sustainability factors into finance is challenging and thus, creates limitations for this research. Especially for ESG, challenges e.g., data availability, data quality, standardization, policy requirements, collection methodology, and "greenwashing," are limitations. Due to the varying methodologies and lack of ESG regulations, rating agencies can also produce widely differing scores for the same companies (Berg, 2020). The discrete and stationary nature of ESG scoring (i.e., 0 – 100) requires a transformation to the change in ESG score year-over-year (YoY) matching the non-stationary nature of macroeconomic factors e.g., GDP, Inflation, Financial Instrument Stock, and Price. ESG is a representation of multiple individual factors across E, S, and G so the tangible impact of ESG remains difficult to measure. Moreover, the financial materiality of ESG have been questioned and may not be viable in a traditional valuation (Cornell et al., 2020). Moreover, in terms of classification and taxonomy within the S&P Global Capital IQ database, this data provide uses their own classification, S&P Global & MSCI Industry Classification, 1999. This draws concern to potential subjectivity in the data at the sector and firm-level ESG analysis.

For future research, it would be worthwhile to extend this analysis to more countries, both developed and emerging, as well as extend the period since S&P Global's earliest ESG data begins in 2013. Including more countries would allow for a more robust grouping by region, economic status (Zhou et al., 2020), and even, national business/economic system (Cassely et al., 2020). Moreover, a sector-based investigation may provide insights by focusing on the top growing sectors (Financial, Consumer Discretionary, Industrials, Materials, and Information Technology), financialization, digitization, and climate-at-risk sectors. Based on these results, there are more country-specific differences that are influencing firm-level ESG performance. Exploring each country's priorities and policy approaches would provide interesting insights. Lastly, to expand on the robustness, using multiple ESG rating agencies would be worthwhile as well due to the large score and methodology discrepancies.

As a continuation of this research, we will include disaggregated Social (S) and Governance (G) scores. GHG emissions per company (tCO2e) and Company Intensity Adjusted Profit (tCO2e/$M value added) will also be included as proxies for Environmental (E). To follow previous literature, GDP per capita will also be included in place of GDP growth.

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