

**ERASMUS UNIVERSITY ROTTERDAM  
ERASMUS SCHOOL OF ECONOMICS  
Bachelor Thesis Economics & Business**

# **Sovereign ESG and Economic Performance**

**A study on the relationship between sovereign ESG and economic performance using 35 OECD countries.**

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**Finish date:** 19-07-2023

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## **ABSTRACT**

In this thesis I explore the relationship between sovereign ESG and performance. An abundance of academic literature suggests that ESG has become an important extra-financial metric to consider at the firm level, however little research has been done on the importance of sovereign ESG. To study the relationship between sovereign ESG and performance a sample of 35 OECD countries is used with data ranging from 2010-2020 collected from the World Bank's sovereign ESG framework. Due to the panel structure of the data a random-effects OLS regression model is used to explore the hypothesis that sovereign ESG has a positive relationship with country performance. The results of this model suggest that the overall government quality of a country is likely to have a positive relationship with country performance. Moreover, life expectancy which is part of the social pillar of ESG showed a positive relationship with performance and no evidence was found to support that environment metrics have a relationship with performance. Although sovereign ESG may have a positive relationship with country performance, proxied by economic growth, it is unclear whether the relationship is causal in nature. This leaves room for future research which can then influence governments' attitude towards sustainability, equality, and other sovereign ESG concerns.

## **Keywords:**

Sovereign ESG  
Economic Growth

**JEL codes:** O10, O11

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## **CHAPTER 1 Introduction**

With increasing awareness of climate deterioration, inequality concerns, and other environmental and social problems, investors are now more than ever prepared to consider ESG activities in their investment decisions. According to Gillan et al. (2021), “more than 3000 institutional investors and service providers have signed an agreement to incorporate ESG concerns into their investment analysis and decision-making processes.” Investment attraction is one of the main drivers of an economy’s development, and the lack of ESG research at the country-level has become conspicuous as the implications of sustainable development are not emphasized enough in political decisions. According to the World Bank’s Sovereign ESG Data Framework, sovereign ESG metrics are categorized by three main pillars: Environment, Social, and Governance. The environment pillar is primarily concerned with the internalization of environmental externalities (e.g. omissions), as well as with the management of the country’s natural resources and its resilience to the climate. The social pillar is concerned with the country’s ability to reduce poverty, manage equity issues, invest in human capital, and meet its population’s needs. Lastly, the governance pillar accounts for the capacity of a country’s political, financial, and legal systems to address environmental and social risks. Sovereign ESG scores can reflect a country’s commitment to improving the living conditions of its population, therefore making them an important area to explore.

There is an overwhelming amount of literature on the relationship between ESG and corporate financial performance(CFP). Fatemi et al. (2018) studied the relationship between ESG and CFP using public US firms but also included ESG disclosure as a mediator. They found a positive relation between the ESG ratings that were assigned to firms, and their value using Tobin’s Q as a proxy. They also found that ESG disclosure has a mitigating role in this relation. On the other hand, research by Halbritter & Dorfleitner (2015) investigated the relationship between ESG ratings and abnormal stock returns through investment portfolios which consisted of public US firms. There is so much scientific literature on corporate ESG that Friede et al. (2015) wrote an overview of over 2000 empirical studies that have analysed the relationship between ESG and corporate finance performance (CFP). These findings suggest that ESG may be a concept worth exploring at the country-level too as there may be a similar relationship. Assuming that the relationship between ESG and CFP is similar in nature to that of sovereign ESG and performance at the country-level, there is overwhelming evidence that sovereign ESG is an important concept to explore.

However, research on the overall impact of sovereign ESG as well as the remaining pillars is scarcely found. Data on this topic has only recently become available and so this study focuses on the relationship between sovereign ESG and country performance, with emphasis on the effect of each ESG pillar. Differences between countries in terms of overall ESG and environmental and social commitments may reveal insights explaining some of the variation between countries in terms of their development and

quality of living. Thus, the research question guiding this study is “How does sovereign ESG impact a country’s performance?”

This study answers this research question using a panel analysis. The sample used will consist of 35 countries belonging to the Organisation for Economic Co-operation and Development (OECD) for the period between 2010-2020. The dependent variable used to proxy country performance will be the Gross National Income (GNI) per capita. The GNI per capita is a useful indicator of a country’s development. On the other hand, the independent variables consist of variables indicating the impact of each of the ESG pillars which are derived from the World Bank’s Sovereign ESG framework.

My expectation for this study’s results is that countries whose activities result in a higher ESG rating as well as better performance in terms of the Environment, Social, and Governance pillars, are more likely to achieve greater economic development. This should be reflected through a higher GNI for countries with better scores in each of the ESG dimensions. Furthermore, some of the variation in development across-countries is expected to be explained by differences in geographic regions, and year-specific trends. I believe this study will result in valuable insights regarding sovereign ESG for political figures, investors, the general population, and other stakeholders of countries. The unexplained variation left by the analysis will provide the groundworks for future research in the sovereign ESG field.

## **CHAPTER 2 Theoretical Framework**

### **2.1 Environmental, Social, Governance (ESG) Factors**

It is important for the understanding of this study that ESG factors are clearly defined. Due to its recent emergence in academic research, the concept of sovereign ESG does not yet have a formal definition. The sovereign ESG framework is generally defined as how environmental, social, and governance factors are used to evaluate countries on how advanced they are with sustainability (Robeco, 2023). In academic literature, ESG has mostly been explained at the corporate level as the way in which corporations integrate environmental, social, and governance concerns into their business models (Gillan et al., 2021). The principal difference between sovereign and corporate ESG is that the sovereign ESG framework deals with the country level of aggregation. For the purpose of this study, sovereign ESG is defined as the way in which governments integrate environmental, social, and governance concerns in their objective of economic performance.

Despite this study primarily being concerned with sovereign ESG, understanding the course of past literature on corporate ESG can provide important insights. Furthermore, it is an argument that similarly to governments, firms also have a social contract, consisting of a set of rights and obligations (Donaldson, 1983). The motivation behind this argument lies in the fact that the behaviour of firms can determine several social factors such as equal opportunities, worker safety, environmental protection, etc (Wartick & Cochran, 1985). The authors argue that large corporations have become more than just economic institutions. The modern firm should be concerned with more than just economic performance.

One of the first mentions of what is known today as the ESG framework was made in the United Nation's report "Who Cares Wins". The report urged companies, investors, analysts and other stakeholders to start considering ESG implications in their decisions. One of the first studies to investigate ESG stressed its importance using the universal ownership theory (Kiernan, 2007). The author explains that large institutional investors are so large and broadly invested that they "collectively "own" the entire global economy. Therefore, it is important that these investors leverage their power to push their firms towards ESG improvements. Most of the research on corporate ESG is based on institutional and stakeholder theory (T.-T. Li et al., 2021). Thus, most of the research is concerned with the relationship between ESG and firm performance, and whether investors would benefit from considering ESG ratings in their investment decisions. ESG ratings are provided by several different institutions. The problem with this is that inconsistencies in the formulation of these ratings across ESG rating providers can lead to different portfolio outcomes (F. Li & Polychronopoulos, 2020). Consequently, investors do not have a concrete and reliable metric that would allow them to systematically engage in sustainable investing.



## **2.2 Economic Performance**

Economic development is a well-known concept which can be measured through a wide variety of indexes and performance indicators. It is essential to understand its definition as it will impact how it will be operationalised in this study. Although the two concepts may colloquially be used interchangeably, it is important to distinguish between economic growth and economic development. In their book, Greenwood et al. (2015) explain that while economic growth only considers the changes in the output of an economy, economic development is concerned with the output as well as standard of living in a country. This study is concerned with the definition of economic growth, as the outcome of the studied relationship will be proxied by an economic growth indicator, and not one of development.

## **2.3 ESG and Performance**

### **2.3.1 Corporate level**

There is a vast amount of academic literature examining ESG at the corporate level is typically studying the relationship between corporate ESG and financial performance. Currently the most exhaustive literature review regarding this relationship examined over 2000 studies and found that almost 90% of them found a non-negative relationship between ESG and corporate financial performance (Friede et al., 2015). A study by Aouadi & Marsat (2018) explored the relationship between ESG controversies and firm value. They collected over 3000 controversies, for over 4000 firms in 58 countries, and classified them into the appropriate ESG pillar. They found that while ESG controversies had no direct impact on the firms' market value, their overall corporate social performance (CSP) score did in fact impact their value. Furthermore, they found that this relationship only holds for large firms with high media attention. Gillan et al. (2010) found a positive relationship between ESG measures and operating performance using a sample of firms from 1992 to 2007. They used Tobin's q to measure the performance. Moreover, some studies have also explored this relationship by comparing the returns of portfolios consisting of firms rated high or low in terms of ESG ratings. Statman & Glushkov (2009) do this using the sample as Gillan et al. (2010) and in similar fashion find a positive relation between ESG ratings and performance. However, these results contradict the findings of Humphrey et al. (2012) who used a sample of firms located in the UK to construct their portfolios. In their case, there was no significant difference in performance between the firms with high and low ESG ratings. Therefore, they conclude that firms are able to implement corporate social responsibility (CSR) strategies without a significant financial cost or benefit. The overall conclusion from these studies is that ESG is likely to be linked with firm value/performance. Although, this depends on several factors such as ESG rating provider, and the sample.

### 2.3.2 Country level

The previous subsection aimed to show that based on an abundance of empirical studies, evidence suggests that ESG does have an impact on performance at the corporate level. For this reason, studying ESG at the country level can yield important insights for policy makers, the general population, and other country stakeholders. Unfortunately, there is not much academic literature on the relationship between sovereign ESG and performance in terms of economic growth, however, existing studies show that ESG can have a positive impact on countries' performance in other dimensions.

A study by Zhang et al. (2022) aims to “address how sovereign ESG impacts corporate investment decisions in the UK from a sustainable perspective.” The study uses data for 680 UK firms from 2000 to 2018 to explore how the different sovereign ESG dimensions individually affect investment decisions. The authors find that a stronger governance score (proxied by institutional quality) has a positive impact on corporate investment, and that migration and environmental policy uncertainty negatively impact business investment in the UK. The results of this study indicate that ESG can promote economic growth (performance) by attracting corporate investment.

Another way in which ESG can impact a country's performance is through its effect on sovereign borrowing costs (Crifo et al., 2017). Using a panel data set of 35 OECD countries from 2007 to 2012 the study explores the hypothesis that “higher ESG ratings are associated with lower borrowing costs”. The authors state that certain countries have a “structural tendency to default”, and that their ESG risk could help explain that as their ESG risk can reflect their management/availability of natural resources (Environmental pillar), as well as their ability to implement policies to generate sufficient revenue to service their debt (governance pillar), impacting their default risk. The relationship between sovereign ESG and borrowing costs has further been analysed by Ebner (2009) who showed that instability during crisis periods is linked with higher borrowing costs. Additionally, Eichler (2014) states that even a country's political system (G pillar) can impact its bond yield spreads. Moreover, Ciocchini et al. (2003) show that countries which are perceived as more corrupt (G pillar) also face higher borrowing costs. Finally, the study by Margaretic & Pouget, (2018) link the cost of sovereign debt with the environmental and social ESG factors. Their results indicate that better performance in those factors can also reduce sovereign debt cost. Given the literature on the relationship between sovereign ESG and performance, the expectations of this study are expressed in the following hypothesis.

Because of the growing importance sovereign ESG, Jiang et al. (2022) constructed a sovereign ESG index which ranks 171 countries using panel data from 1990-2020. The study's findings are important as the authors find evidence that high-income countries tend to emphasize sustainable development much more than low-income countries, which are focusing on overall economic development.

**Hypothesis:** Sovereign ESG has a positive relationship with a country's performance.

## CHAPTER 3 Data

### 3.1 Sample

In order to answer the hypothesis of this research paper, data on sovereign ESG has been collected from The World Bank's Sovereign ESG data framework which has been available since 2019. The framework consists of 131 ESG indicators collected through different sources over 61 years for 217 economies. The paper selects 35 OECD countries belonging to five different regions from the database, with data spanning over the 2010-2020 period, resulting in variations in terms of GNI per capita. The reason for choosing this period is that it is relatively recent, and it makes for the most complete dataset given the chosen countries.

### 3.2 Variables

#### 3.2.1 Dependent Variable

**Economic Performance.** Given its provided definition, I measured economic performance through GNI per capita (**GNIpc**) as it is one of the most common methods. Furthermore, GNI per capita accounts for the population of each of the countries, allowing for a fairer comparison between countries that vary widely in size. Due to the lack of prior literature on the topic there was not much guidance on other relevant proxies for economic performance.

#### 3.2.2 Independent Variables

##### **Governance:**

**Regulatory Quality (Estimate).** Similarly, Regulatory Quality belongs to the Governance pillar. It is an estimate created for the World Bank's Sovereign ESG data framework and it measures the perception of a government's ability to implement and enforce policies to permit and private sector development (Kraay et al., 2010). It is an aggregate score that can range between -2.5 and 2.5. I found this to be an appropriate variable of interest assuming that governments which actively try to promote private sector development are more likely to attract investment, and thus improve economic performance. This assumption is supported by Zhang et al. (2022) who found a positive relationship between institutional quality and corporate investment.

**Control of Corruption (Estimate).** Similarly to the regulatory quality estimate, this variable is also a score that is normalized to range between -2.5 and 2.5. I chose this variable as I believe it is also an important factor to consider when assessing the quality of a government. Control of corruption refers to the extent to which government agents exercise their public power to pursue their own interests (Kraay et al., 2010).

**Individuals on Internet.** This variable simply measures the percentage of the total population of a country that uses the internet. A person qualified as an internet user if they accessed the internet in the past 3 months prior to the data collection. This variable also falls in the Governance Category as a measure of economic development. Currently, having access to the internet is crucial for economic development as it allows for more opportunities, and as was seen during the Covid-19 pandemic, it allowed for easier access to education. The statistic was provided to the World Bank by the International Telecommunication Union (ITU).

**Voice and Accountability (Estimate).** This measures the extent to which a country's citizens have freedom of expression, free media, as well as the capacity to select their own government (Kraay et al., 2010). Similarly to the other estimates which are provided by the Worldwide Governance Indicators project, this variable is normalized to range between -2.5 and 2.5.

**Gender Equality.** Additionally, to understand the impact of gender equality on economic growth, two measures are used. Both the measures are classified as part of the Governance pillar of the sovereign ESG framework by the World Bank. The first measure is **Women in Parliaments**. This measure indicates the proportion of seats held by women in national parliaments and it is expressed as a percentage. This variable is measured by the Inter-Parliamentary Union (IPU). The second measure of gender equality included in the model is the ratio of **female to male labor force participation rate**. This is simply a ratio expressed as a percentage and it is calculated by dividing the female labor force participation rate by the male labor force participation rate. The statistic is provided by the International Labour Organization (ILO).

#### **Social:**

**Life Expectancy.** The Social pillar variable used in the model is life expectancy at birth, measured in years. The reason why this variable might be of interest is because the findings of Hansen & Lønstrup (2015) showed that countries which experienced higher growth in life expectancy later experienced lower growth rates of GDP per capita. Therefore, it is expected that this variable will have a negative relationship with economic growth in the model. The data was collected from the World Bank (2023).

#### **Environment:**

**PM2.5 Air Pollution Exposure.** PM2.5 air pollution is produced by combustion of fuel (gasoline or diesel), oil, and wood. This variable belongs to the Environmental pillar of the sovereign ESG framework and is included in the model due to the importance of clean energy and sustainability. The variable is a measure of the average level of exposure of a nation's population to these pollution particles which can cause severe health damage. It is measured in terms of micrograms per cubic meter in a mean annual manner. The data is collected from Brauer et al. (2017).

The reason behind most of the variables belonging to the governance pillar is that after analysing a correlation matrix and running several models with different variables only few of the environmental and social measures seemed to have a high enough correlation and improve the model’s explanatory power.

**3.2.3 Control Variables**

**Geographical region.** Account for different development levels between countries that belong in different regions.

**Year.** Account for year-specific trends in GNI per capita growth.

**3.3 Descriptive Statistics**

**Table 1: Summary Statistics**

	mean	sd	min	max
GNI per capita (\$)	38020.91	21198.49	8750	104370
Regulatory Quality	1.27	0.48	-0	2
Control of Corruption	1.20	0.82	-1	2
Individuals on Internet	80.73	12.88	31	100
Voice and Accountability	1.11	0.46	-1	2
Life Expectancy	80.27	2.77	70	85
PM2.5 Air Pollution Exposure	14.73	7.52	6	45
Women in Parliaments	28.34	9.96	8	48
Female to Male Labor Force Participation Rate	79.30	9.62	39	91
Europe	0.74	0.44	0	1
East Asia & Pacific	0.11	0.32	0	1
Latin America	0.06	0.23	0	1
North America	0.03	0.17	0	1
Middle East	0.06	0.23	0	1
Observations	385			

Table 1. descriptive statistics of all the sovereign ESG, and region variables included in this thesis’ sample.

Table 1 presents summary statistics for the variables and reveals some important insights regarding the sample. Firstly, the GNI per capita between the countries appears to vary widely, with the lowest recorded value being \$8750 and the highest being \$104370. The mean GNI per capita of the sample is \$38020.91. Due to this, it may be necessary to use natural logarithms (ln) to transform the data to normalise the residuals’ distribution. Moreover, Table 2 shows that the region with most countries in the sample is Europe (74%), and the region with the fewest countries in the sample is Latin America, making up for 3% of the sample. The average life expectancy amongst the countries is around 80 years old, which is significantly higher than the world average of around 73 years old. Moreover, the sample appears to have a better average regulatory quality, control of corruption, and voice and accountability

scores than the overall mean, which is zero. Lastly, an important figure for gender equality metrics is the mean Women in Parliaments percentage, which is just 28.34% amongst the sample of countries.

**Table 2: Correlation Matrix**

	GNI per capita (\$)	Regulatory Quality	Control of Corruption	Individuals on Internet	Voice and Accountability	Life Expectancy	PM2.5 Air Pollution Exposure	Women in Parliaments
GNI per capita (\$)	1.00							
Regulatory Quality	0.69	1.00						
Control of Corruption	0.79	0.90	1.00					
Individuals on Internet	0.65	0.69	0.71	1.00				
Voice and Accountability	0.72	0.84	0.87	0.65	1.00			
Life Expectancy	0.66	0.47	0.62	0.51	0.57	1.00		
PM2.5 Air Pollution Exposure	-0.54	-0.64	-0.67	-0.64	-0.82	-0.43	1.00	
Women in Parliaments	0.43	0.31	0.42	0.35	0.46	0.31	-0.49	1.00
Female to Male Labor Force Participation Rate	0.55	0.69	0.69	0.68	0.82	0.45	-0.84	0.47

Table 2. Correlation Matrix with the dependent variable and the variables of interest.

Table 2 presents the correlation matrix that includes the variables used in the model. The ESG variable with the highest correlation to GNI per capita is Control of corruption with a coefficient of 0.79. The lowest coefficient in magnitude is seen with the Women in Parliaments variable at 0.43. Only Pm2.5 air pollution appears to have a negative correlation with GNI per capita.

## CHAPTER 4 Method

The explanatory ESG variables that are used in model 1 were chosen based on their correlation coefficient with the outcome variable (GNI per capita). ESG variables whose correlation coefficient was higher than 0.5 were included in the model's first iteration. Following this, through a general-to-specific approach, certain statistically insignificant variables were removed from the model until there was at least one independent variable representing each of the sovereign ESG pillars. Given the panel structure of the data the most appropriate type of regression model was chosen through a Hausman test, comparing the efficiency and reliability of a fixed- and random-effects model. Equation 1 shows the model that was ran to compare the fixed- and random-effects models. The test results indicated that the random-effects model is more suitable to answer the paper's hypothesis. The normality of the data was analysed through the means of a Shapiro-wilk test which indicated that the GNI per capita is not normally distributed. The results of this test are presented in Table Figure A1 in the Appendix. Because of this, Huber-White standard errors (SE) were used to correct for the non-normality and achieve appropriate precision in the significance level of the variables. Moreover, variables were removed from the model if significant multicollinearity was detected through a multicollinearity test. The final model was chosen based on the adjusted R-squared value as it indicates the model with the highest explanatory power, after being adjusted for the number of predictors.

**Equation 1:** Random-effects OLS regression with no control variables

$$\begin{aligned} \ln(GNIpc)_{i,t} = & \beta_0 + \beta_1 \text{Regulatory quality}_{i,t} + \beta_2 \text{Control of corruption}_{i,t} \\ & + \beta_3 \text{Individuals on internet}_{i,t} + \beta_4 \text{Voice and accountability}_{i,t} \\ & + \beta_5 \text{Life expectancy}_{i,t} + \beta_6 \text{PM2.5 air pollution}_{i,t} \\ & + \beta_7 \text{Women in parliaments}_{i,t} + \beta_8 \text{female to male labor force}_{i,t} \\ & + \beta_9 \text{Control variables}_{i,t} + \varepsilon_{i,t} \end{aligned}$$

## CHAPTER 5 Results

**Table 3: Random-Effects Models**

	(1) Ln (GNI per capita)	(2) Ln (GNI per capita)	(3) Ln (GNI per capita)	(4) Ln (GNI per capita)
Regulatory Quality (G)	0.04 (0.07)	0.05 (0.07)	0.08 (0.07)	0.09 (0.07)
Control of Corruption (G)	0.17*** (0.05)	0.17*** (0.05)	0.11* (0.06)	0.11* (0.06)
Individuals on Internet (G)	0.00 (0.00)	0.00 (0.00)	0.01*** (0.00)	0.01*** (0.00)
Voice and Accountability (G)	0.35*** (0.09)	0.31*** (0.09)	0.30*** (0.09)	0.30*** (0.09)
Life Expectancy (S)	0.04** (0.02)	0.04** (0.02)	0.08*** (0.02)	0.08*** (0.02)
PM2.5 Air Pollution Exposure (E)	0.00 (0.01)	0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)
Women in Parliaments (G)	0.00* (0.00)	0.00* (0.00)	0.01*** (0.00)	0.01*** (0.00)
Female to Male Labor Force Participation Rate (G)	-0.00 (0.01)	-0.01 (0.01)	-0.00 (0.00)	-0.01 (0.01)
East Asia & Pacific		0.02 (0.13)		(.) -0.04 (0.12)
Latin America		-0.67*** (0.20)		-0.45* (0.25)
North America		0.12 (0.08)		0.04 (0.07)
Middle East		-0.05 (0.28)		0.13 (0.17)
2010			0.00 (.)	0.00 (.)
2011			-0.09*** (0.02)	-0.09*** (0.02)
2012			-0.10*** (0.03)	-0.10*** (0.03)
2013			-0.14*** (0.03)	-0.14*** (0.03)
2014			-0.13*** (0.04)	-0.13*** (0.04)
2015			-0.16***	-0.16***



			(0.03)	(0.03)
2016			-0.17***	-0.16***
			(0.04)	(0.04)
2017			-0.16***	-0.16***
			(0.04)	(0.04)
Constant	6.38***	6.73***	3.42**	3.74***
	(1.31)	(1.49)	(1.39)	(1.45)
Observations	279	279	279	279
$R^2$	0.82	0.82	0.85	0.87
Adjusted $R^2$	0.81	0.81	0.84	0.86

Table 3. Presents the random-effects model that was constructed to explore the hypothesis of this thesis. Each column shows the model with a different set of control variables. The values next to the variables' names indicate their coefficient, while the values in the parentheses indicate their respective standard error.

Note: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$

Table 3 presents four different models which share common variables of interest but differ in their control variables. The first model does not include any control variables, the second model includes the region control variable, and the third model includes the year control variable. Finally, in the fourth model all variables of interest and control variables are fitted. The  $R^2$  value reported for each model is the overall  $R^2$  of each model. To avoid multicollinearity the "Europe" dummy variable is omitted from the models, as well as the dummy variables for years 2018, 2019, and 2020. The letter next to the independent variables indicates whether it belongs to the Environment (E), Social (S), or Governance (G) pillar of sovereign ESG.

### 5.1 Hypothesis Test

The model presented in Table 3 was estimated using a random-effects OLS regression. The independent variable (Y) of the regression was transformed using natural logarithms. Because of this a unit change in the dependent variables (X) leads to a percentage change in Y equal to the coefficient of X multiplied by 100.

Table 3 presents the different versions of the model that is used to answer the paper's hypothesis. The base model without control variables has an  $R^2$  of 0.8178, meaning that around 82% of the variation in countries' GNI per capita growth can be explained by the sovereign ESG variables. Firstly, it is important to note that after adding just the region control variables the explanatory power of the model slightly drops from 0.8178 to 0.8170, as indicated by the  $R^2$  value. On the other hand, only adding the year control variables increased the  $R^2$  to 0.8485. The complete model with all the control variables yields an  $R^2$  value of 0.8665, the highest that was achieved. Note that this may be evidence of overfitting as the  $R^2$  value drops when only the region control variable is included but increases the most when it is included alongside the year control variable. This may be due to the fact that the  $R^2$  value naturally increases as more variables are added, even if the model's explanatory power does not improve.

Looking at the coefficients of the variables of interest, we observe that **Individuals on Internet**, **Voice and Accountability**, **Life Expectancy**, and **Women in Parliaments** are the variables in the model that

are statistically significant at the 1% confidence level. The values in Table 3 suggest that as the percentage of individuals using the internet increases by 1 unit, the country's GNI per capita increases by 1%. Moreover, as the voice and accountability score increase by 1 unit, the country's GNI per capita increases by 30%. Additionally, a one-year increase of the average life expectancy in a country shows an increase in GNI per capita by 8%. Lastly, a 1 unit increase in the proportion of women in parliaments has a positive change in GNI per capita of 1%.

The only variable that is significant at the 10% confidence level is **Control of Corruption**, with a coefficient of 0.11 suggesting that as the control of corruption score improves by 1 unit, the GNI per capita of a country will on average increase by 11%. In terms of the control variables, years after 2017 were omitted from the model. The estimated coefficients of all the years apart from the base year (2010) are significant and non-zero, which suggests that they successfully control for some of the time-variation and possible economic performance trends amongst the sample. All these values are negative, indicating that compared to 2010 the economic performance was on average worse. This can also be seen through the coefficients becoming increasingly larger in magnitude following 2010. In terms of the region control variables, only the Latin America variable is significant, and just at the 10% significance level. Nonetheless, the coefficient suggests that the countries within the sample which belong to Latin America, Chile and Mexico, experience on average a lower GNI per capita by 45%. In conclusion, Hypothesis 1 which stated that Sovereign ESG has a positive relationship with country performance, is not rejected based on the aforementioned results.

## 5.2 Discussion

In existing literature, researchers have rarely examined the relationship between sovereign ESG and country performance. As was mentioned in the theoretical framework chapter, the existing literature investigates whether sovereign ESG affects an intermediary factor of country performance, such as investment attraction and public debt costs, but did not explore the aggregated effect on the overall economy of those countries. These studies found positive relationships between sovereign ESG and their respective dependent variables, which in turn positively affect country performance. More specifically, if the Government variables in the model (Individuals on Internet, Voice and Accountability, Control of Corruption, Women in Parliaments) can be regarded as a representation of the institutional quality of a country, then the results of this study are in line with those of Zhang et al. (2022). Likewise, an interesting insight to reiterate from the results is the positive relationship between Control of Corruption and country performance because they are in line with the findings of Ciocchini et al. (2003). The authors find that countries which are perceived as more corrupt often face higher borrowing costs. The conclusion that can be drawn by the relationship between these results is that one way in which better control of corruption in a country can lead to higher economic growth is through the alleviation of borrowing costs. The social factor included in the model (Life expectancy) appeared to have a positive and significant relationship with country performance which is in line with the findings of Margaretic

& Pouget, (2018). Similarly, linking the results of these studies can motivate further research into the link between the environmental and social factors of sovereign ESG and sovereign debt cost such that we can understand whether there is a causal relationship and why the phenomenon occurs. On the other hand, no evidence was found in my model to support their findings that environmental factors are also linked with better country performance. In Conclusion, the results of my study are generally in line with prior literature as they indicate that the governance and social pillars of sovereign ESG are positively related to country performance. However, I found no evidence to support the conclusions of prior literature that the environmental factors of sovereign ESG are related to country performance.

### **5.3 Robustness Check**

In order to check the model's robustness a macroeconomic indicator was used as the dependent variable while keeping the rest of the model the same. This model can be found in Table B1 in the appendix of this thesis. The independent variable GNI per capita was replaced by GDP per capita, measured in current USD (\$). Similarly, to the original model, the **life expectancy**, **control of corruption**, and **individuals on internet** variables were statistically significant. However, none of the other variables of interest were significant. Moreover, control of corruption appeared to be significant at the 1% confidence level in the new model while in the original model it was only significant at the 10% confidence level. On the one hand these results reassure us of the positive relationship between those variables and country performance, but on the other hand it leaves us with uncertainty about the statistical significance of the remaining variables of interest. It is important to note that the explanatory power of the model with GDP per capita as its dependent variable did not decrease by much in comparison to the original model.

## **CHAPTER 6 Conclusion**

This study was inspired by the abundance of existing literature on ESG on performance in the corporate environment, but the lack of it in at the country level of aggregation. Seeing as sustainability and equality are two incredibly important aspects of our life, it felt natural to explore this area and act as a steppingstone for further exploration. This thesis therefore explored the following research question: “How does sovereign ESG impact a country’s performance?” The research question was investigated through a random-effects OLS regression that included sovereign ESG factors as independent variables, and GNI per capita as the dependent variable. The sample used included 35 OECD countries belonging to five different regions. The results of the model, which are shown in Table 3, support the hypothesis that sovereign ESG positively impacts country performance. The study concludes that there is no evidence in the sample for a relationship between the environmental pillar of sovereign ESG and country performance. However, there is a positive relationship between aspects of the social and governance pillars and country performance.

### **6.1 Research Implications**

Firstly, research within the sovereign ESG framework can highlight a country’s own challenges, weaknesses, and strengths in those development areas. Moreover, if there is a causal relationship, policy makers can use this information to boost economic growth as well as development, and as a result the overall welfare, by focusing on improving social and governance concerns such as less corruption, higher gender equality, and more freedom of expression when it comes to political affairs. Additionally, a better understanding of the impact of sovereign ESG on a country’s growth and development can consequently lead to better understanding of the risks of ESG concerns and so better risk management and more accurate asset pricing in bonds and other capital market instruments.

### **6.2 Limitations**

Although this study provides some valuable initial insights into the relationship between sovereign ESG and country performance, it is important to note this thesis’ limitations. Note that despite the use of Huber-White standard errors in all models there was still some heteroskedasticity detected in the error term. Although heteroskedasticity does not cause bias in the coefficient estimate of the models, it may make them less precise. As a result, it may be the case that the estimated coefficients have a lower p-value, making them appear more statistically significant. They may still however serve to indicate the direction of the relationship between the respective dependent and independent variables. Additionally, as can be seen when comparing the number of observations in the models with the overall observations in the sample, there are some missing values in the dataset that could have altered the results if they were present. This was a primary reason for using estimates such as regulatory quality, voice and accountability, and control of corruption. Since the estimates were constructed for all countries by the World Bank there would be no missing values for those variables. The elimination of missing values is

a difficult limitation to improve upon for future researchers until the sources used by the World Bank's Sovereign ESG framework are updated with them. Finally, unfortunately the statistical methods used in this thesis do not provide evidence on whether the relationship between sovereign ESG and country performance is causal. Thus, this is an additional aspect of the relationship that future research may focus on.

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**APPENDIX A Descriptive Statistics & Heteroskedasticity Test**

**Table A4: Correlation matrix with Control Variables**

	GNI per capita (\$)	Europe	East Asia & Pacific	Latin America	North America	Middle East
GNI per capita (\$)	1.00					
Europe	0.18	1.00				
East Asia & Pacific	0.06	-0.61	1.00			
Latin America	-0.31	-0.42	-0.09	1.00		
North America	0.07	-0.29	-0.06	-0.04	1.00	
Middle East	-0.16	-0.42	-0.09	-0.06	-0.04	1.00

Table A1. This table shows the correlation coefficients between the region control variables and the GNI per capita (\$).

**Figure A1: Heteroskedasticity Histogram**

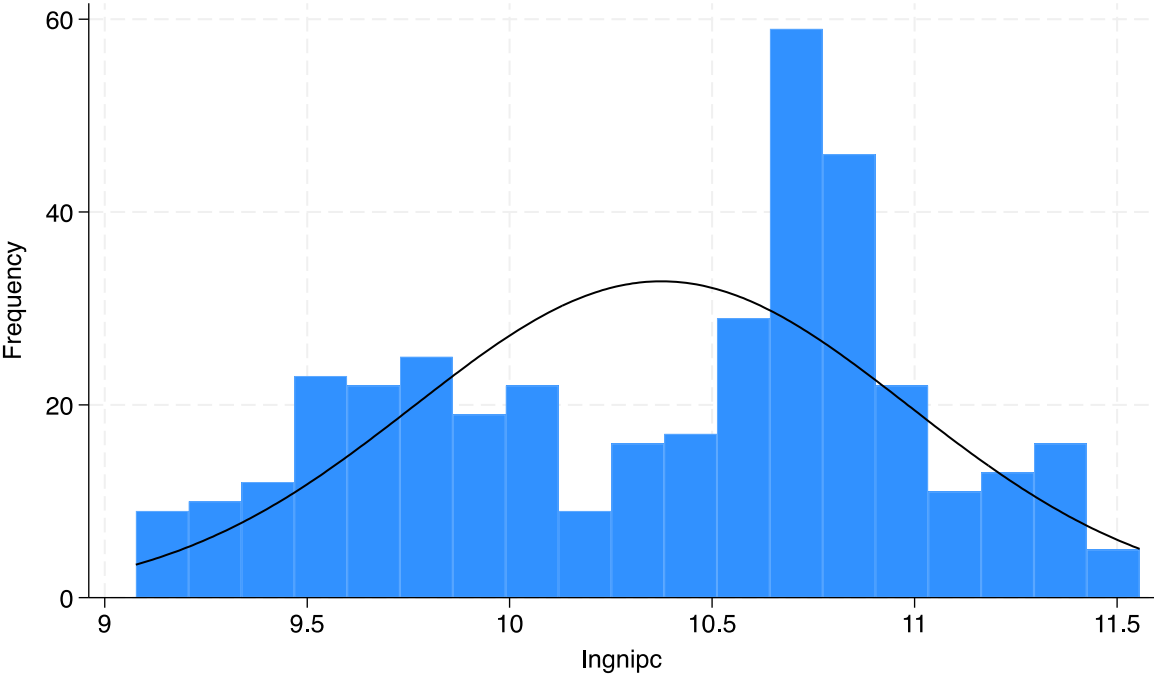


Figure A2. Histogram constructed after performing Shapiro-wilk test with the ln-transformation of the independent variable GNI per capita. The black line illustrates what a normal distribution would look like. The tests rejected the null hypothesis that the variable is normally distributed.

## APPENDIX B Robustness Check

**Table B5: Random-effects model for robustness check**

	(1)
	Ln (GDP per capita)
Regulatory Quality	0.03 (0.09)
Control of Corruption	0.21*** (0.05)
Individuals on Internet	0.01*** (0.00)
Voice and Accountability	0.16 (0.10)
Life Expectancy	0.07*** (0.02)
PM2.5 Air Pollution Exposure	-0.01 (0.01)
Women in Parliaments	0.00 (0.00)
Female to Male Labor Force Participation Rate	-0.01 (0.00)
East Asia & Pacific	-0.08 (0.13)
Latin America	-0.39 (0.26)
North America	-0.01 (0.08)
Middle East	0.10 (0.18)
2010	0.00 (.)
2011	-0.04 (0.03)
2012	-0.09*** (0.03)
2013	-0.09** (0.04)
2014	-0.12*** (0.04)
2015	-0.11** (0.04)
2016	-0.17*** (0.05)
2017	-0.14** (0.06)
Constant	4.66*** (1.41)
Observations	279
$R^2$	0.84
Adjusted $R^2$	0.83

Table B1. This regression was used as a form of robustness check of the original model. Only control of corruption, individuals on internet, and life expectancy remain statistically significant from the variables of interest. The adjusted-R<sup>2</sup> of the model shows that 83% of the variation in ln(GDP per capita) is explained by the independent variables.

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01