PERSPECTIVES

UNDERGRADUATE RESEARCH JOURNAL

WINTER EDITION FOCUS:

SUSTAINABILITY

VOLUME I

TABLE OF CONTENTS

LIST OF CONTRIBUTORS

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ACKNOWLEDGEMENTS

The entire editorial team would like to thank the Education Committee of KBS for their support in funding *Perspectives*, as this will ensure that the journal will have the resources needed to help support budding academics across King's Business School.

The team would also like to recognise the incredible support from the academic faculty. In particular, we would like to express our heartfelt gratitude to Vice Dean of Education Sally Everett for her commitment to supporting the journal, and for her steadfast belief in its stated purpose. We would like to thank Prof. Mary O'Mahony, as *Perspectives* is rooted in the economics department at KBS, for her contributions towards the original essay competition and for her support in turning the journal from an idea into a reality.

Finally, we would like to thank Dr. Canh Thien Dang for all his efforts as the first advocate for a KBS student journal. He provided tireless support in building up this first edition, and it is no exaggeration to say that without him, *Perspectives* would not exist.

PROFESSOR FOREWORDS

As Vice Dean Education, I am thrilled that King's Business School now has its own undergraduate research journal, edited and written by our students. To say that we are proud of their work, research and unswerving commitment to this project is an understatement - this is a truly wonderful achievement. Our students never fail to impress and inspire me, and this new journal is truly magnificent and worthy of celebration and acknowledgement.

This journal, *Perspectives*, celebrates the independent thought, critical research skills and academic excellence of our student population, and is a wonderful example of our students working in partnership with our academic staff to produce a journal that champions new ways of thinking, challenges dominant discourses in business, economics and finance, and gives our student community a channel for their ideas. It is a showcase of our students' talents and research expertise.

This inaugural edition of *Perspectives* offers a rich collection of papers that stretch across numerous disciplinary boundaries. Whether it be papers addressing the role of technology in fostering sustainability and inclusion, to exploring finance and environmental, social and governance factors in corporate decision-making and political economy, to how education for sustainability promotion in schools can help a transition to a more sustainable future – each and every contribution demonstrates a commitment to responsible leadership, education with purpose and celebrates life-changing business research and practice.

I would like to offer my heartfelt thanks to all the writers, editors and academics involved in this wonderful collection. You should be very proud of this tremendous accomplishment. I particularly extend my appreciation to Dr. Canh Dang for initiating the essay competition, kickstarting this journal and for supporting the student writers and editors. I also extend my thanks to the co-editors in chief, Aleksandra Jaremko and Chakri (Jack) Swartz, both of whom I had the pleasure to teach during their time at KBS. My congratulations to the whole team – what you have produced is the start of an exciting journal for us all, and for generations of KBS students to come! Thank you. This is a proud moment for us all.

Professor Sally Everett
Vice Dean Education, King's Business School

I am delighted to introduce King's Business School's own undergraduate research journal that allows students to engage in debate on the major issues facing economies and societies. I cannot think of a better topic for the first issue than sustainability. There has been considerable progress in the past few decades on environmental sustainability in terms of an increasing share of renewables in electricity generation and transport, and changes in attitudes of firms and the public such as on conserving energy and recycling. But there is still much to be done, and this requires buy-in from a range of stakeholders. Fostering discussions among the younger generations is an important element of this progression, which journals like *Perspectives* facilitate.

I would like to congratulate the editors, writers and academics involved for producing an interesting volume and for the work involved in launching this exciting initiative.

Professor Mary O'Mahony
Head of the Economics Department, King's Business School

Welcome to the inaugural edition of the King's Business School's *Perspectives*: Undergraduate Research Journal! As a proud academic advisor to the editorial team of this new journal, I am thrilled to present and have participated in the creation of this new platform that showcases the remarkable research endeavours undertaken by our undergraduate students at King's College London. The new journal is expected to expand the set of activities that KBS is providing to enrich our student experience. Within these pages, you will find a diverse array of academic essays from our undergraduates, ranging from insightful quantitative analyses of contemporary business trends to innovative, qualitative discussions on complex societal challenges. This journal is a testament to the intellectual curiosity and dedication of our undergraduate students, and it reflects the spirit of academic excellence that thrives within the King's Business School community. We hope that this publication serves as both an inspiration and a source of knowledge for years to come, as we continue to foster a culture of inquiry and innovation in pursuit of a brighter future. Thank you for joining us on this exciting journey of exploration and discovery.

Dr. Canh Thien Dang
Lecturer in Economics, King's Business School

EDITORS' FOREWORD

Welcome to *Perspectives*, King's Business School's first undergraduate research journal. Our goal in starting this academic endeavour is to create an environment in which students can engage further with their business studies, offering a destination to demonstrate their research prowess. *Perspectives* will give students the opportunity to publish with an independent journal that still has deep ties with the academic faculty, allowing them the freedom to pursue topics of interest while being supported by the wider KCL network.

Perspectives will be published twice a year, with a winter edition cultivating the best submissions from an essay competition and a spring edition publishing own-research coursework from students. Not only will this allow students to pursue research into topics of interest, but will also create a space to celebrate the best work that happens regularly in Kings' classrooms. *Perspectives* can act as a place to build up independent research skills alongside like-minded peers, fostering a community of undergraduates who will encourage each other to further develop their own business passions.

The team is planning to launch events and workshops throughout the year to promote cutting-edge research and give advice to students, aiding the difficult transition towards writing academic publications. The journal will fill a void currently felt within the King's landscape, as many societies offer vocational events and advice, however, there are few community-oriented resources for the academic aspects. We aim to create a collaborative and inclusive space for those seeking to engage with their degree to a higher level, complete with supportive

events and an opportunity to show off their best work. *Perspectives* will be run by students and for students, allowing an internal discussion across a variety of subjects while also projecting outwards the best undergraduate research here at KBS. We are extremely excited to welcome you on this journey with us.

Chakri (Jack) Swartz & Aleksandra Jaremko
Perspectives Co-Editors in Chief

TECHNOLOGY SECTION INTRODUCTION

Welcome to the Technology Section of *Perspectives*, an arena dedicated to discussing the intricate relationships between technologies, firms, economies, and society at large. Specifically, we delve into how technology can address sustainability challenges and promote inclusive economic growth – key issues that are shaping our present and future.

Emerging technologies – particularly big data and artificial intelligence – are not merely exciting scientific pursuits; they are now at the heart of sustainability and economic growth research and serve as indispensable tools for addressing global challenges. It is self-evident that economic policies and business models that are set for future success will adeptly integrate sustainability and technological innovation.

To effectively navigate the intricate nuances of the evolving technological landscape and its implications on sustainability and economic progression, we will focus on several pertinent questions. These include the impact of renewable energy technologies on demographic patterns, the potential for blockchain technologies to establish transparent and traceable supply chains that meet Environmental, Social, and Governance (ESG) criteria, and the effectiveness of AI-powered algorithms in refining ESG investment strategies. We aim to engage students with these cutting-edge technological inquiries and curate a diverse

collection of research articles that offer incisive perspectives.

In the forthcoming articles of this section, we will endeavour to explore the profound implications of technological advancements for businesses, society, and the global economy. We will reflect on the dynamic equilibrium between the theoretical constructs and practical applications, encompassing quantitative data, ethical considerations, and economic interpretations that underpin the domain of technology.

Zidong Zhang
Perspectives Technology Section Editor

Studying the Effects of Population Decline on the Development of Renewable Energy in Europe

Arthur Garnier

Introduction

The European continent has one of the highest living standards in the world according to the Human Development Index (HDI, 2023). However, the war in Ukraine, the COVID-19 pandemic and wider social and political factors have led to the continent facing two existential crises, namely climate change and population decline. The issues of climate change and the energy transition are currently being combated by almost every government; however, population decline has not received much attention despite its potentially catastrophic effects (Van Dalen et al., 2011). This essay will look at the interaction between the development of renewable energy and the population growth of a country, particularly focusing on high-income countries in Europe. The question posed, therefore, is: does population stagnation or decline lead to a larger share of renewable energy in the electricity mix of a high-income European country? Data from Poudel (2022) on world energy consumption from 2000-2020 will be used to answer this question, as well as population data from the World Bank to test the null hypothesis that population stagnation or decline has no impact on the share of renewable energy in the electricity mix of a country (World Bank, n.d.).

Literature Review

This question is worth investigating due to the multitude of different effects population decline or stagnation has on a country. Hummel et al. (2007) state that the negative effects of population decline in European countries are linked to impacts on welfare and pension plan financing, and provides some arguments in favour of stable population decline, specifically focusing on central and

eastern European countries. These arguments are especially focused on sustainability and environmental factors, including the decrease in nominal primary energy consumption for a country. There is a fundamental dichotomy in the arguments for and against population decline in relation to the development of renewable energy: on one end, the decline of economic growth and labour supply would increase costs and reduce development. On the other end, it would reduce energy demand therefore projects would be focused on developing clean energy instead of rushing to meet demand by any means necessary.

Similar studies have been run by Akira (2015) when looking at the effect of population decline on energy consumption in Japan. His findings suggest that economic and energy consumption structures affect electricity demand more than population. Another paper by Vho et al. (2021) looks at the effects of population growth, renewable energy, and economic growth in Southeast Asian nations and finds that "moderating population growth and extending renewable energy usage are vital to achieving sustainable economic growth" (p.1). No paper currently exists that specifically looks at the interaction between population growth and its potential effects on the development of renewable energy.

Methods

The interaction between these two effects is tested using a complete panel data set that is split into three subgroups: stable population, stagnant population, and declining population. A stable population has a long-run average growth rate of more than 0.5%, a stagnant population has a growth rate between 0.0-0.5% and a declining population has a growth rate below 0% (see Appendix A for a list of countries and population trends). The sub-groups and variables are defined below:

Variable	*Obs.*	*Mean*	*St. Dev.*	*Min.*	*Max.*
Stable Population					
Renewable Energy (%)	180	31.37	32.38	0.00	99.81
Log Population	180	15.23	1.56	12.87	18.02
GDP per Capita ('000)	180	52.46	27.92	10.32	12.40
Electricity Generation (TWh)	180	95.25	110.93	0.41	395.47
Fossil Fuel Energy (%)	180	57.01	41.06	0.19	100.00
Stagnating Population					
Renewable Energy (%)	180	29.15	19.76	1.26	81.47
Log Population	180	16.33	1.22	14.50	18.24
GDP per Capita ('000)	180	35.30	13.78	5.42	64.27
Electricity Generation (TWh)	180	195.09	224.39	13.62	647.90
Fossil Fuel Energy (%)	180	38.13	18.08	6.28	84.53
Declining Population					
Renewable Energy (%)	240	25.53	21.73	0.21	80.14
Log Population	240	15.82	1.06	14.09	17.92
GDP per Capita ('000)	240	14.45	84.48	14.84	40.88
Electricity Generation (TWh)	240	64.02	79.99	2.75	312.50
Fossil Fuel Energy (%)	240	61.94	21.46	15.25	99.79

Table 2.1: Summary Statistics

When trying to plot the effect of population growth on renewable energy through time, the relationship is unclear, as graphs with the percentage of renewables in a country's electricity mix and population across time do not show a clear relationship. As such, a regression analysis is necessary.

The fixed effects regression used is specified below:

$$renewablesp_{it} = \beta_1 * popgrowth_{it} + \beta_2 * lngdp\_capita_{it} + \beta_2 * elec\_gen_{it} + \beta_3 * fossilp_{it} + \alpha_i + \mu_{it}$$

$$popgrowth_{it} = logpop_{it} - logpop_{(i-1)t}$$

with renewablesp, the dependent variable, equal to the percentage of country i's electricity grid that is made up of renewable energy at time t. The independent variable, popgrowth, is the natural log of the population of country i at time t lagged by one year to ensure that effects on electricity demand or consumption have time to filter into the economy and energy grid. The variable lngdp_capita controls for the overall level of wealth in a country i at time t. The variable elec_gen controls for the total amount of electricity being generated in country i at time t. Finally, fossilp is a control for the percentage of the electricity mix coming from fossil fuels.

The model specified seeks to find the unbiased effect of population growth on renewable energy development. The GDP per capita, electricity generation and fossil fuel variables control for the wealth level of a country across time which could influence its ability to commit capital to more expensive renewable energy projects. Given electricity generation controls for factors such as weather, industrial mix and electrification that affect overall production regardless of population growth. Finally, fossil fuel mix looks at a country's existing electricity grid to control for the extent of its reliance on fossil fuels. Higher fossil fuel reliance signals that a country has an advantage from their use, either having its own reserves or being in proximity to a country with a plentiful gas supply (I.E. Russia, Norway). It may also signal that the country is not prioritising the development of renewable energy due to political or social factors.

Results of Regression Analysis and Discussion

The regression results for the three sub-groups are as shown in Figure 3.2 below:

Renewable Electricity (%)

	Country Fixed Effects			
VARIABLES	Declining	Stable	Stagnating	Total
Population Growth	-3.45** (1.56)	-0.62* (0.36)	0.00 (0.78)	-1.74** (0.80)
Log GDP per Capita	10.91*** (1.42)	1.59*** (0.53)	2.37** (1.01)	7.74*** (0.87)
Electricity Generation	-0.82*** (0.12)	0.01 (0.01)	-0.10*** (0.02)	0.12*** (0.03)
Fossil Fuel %	-0.47*** (0.06)	-0.99*** (0.02)	-1.00*** (0.03)	0.68*** (0.03)
Observations	240	180	180	600
Number of countries	12	9	9	30
Adjusted R-squared	0.343	0.965	0.894	0.533

Standard errors in parentheses
*** p<0.01, **p<0.05, *p<0.1

Figure 3.2: Regression on Time Series Data on the Percentage of Renewable Energy in the Electricity of a Country 2001-2020.

The focus of the study is on the independent variable for population growth, with the rest of the coefficients acting as controls. The results show that for countries with a declining population, when the population goes up by 1%, the percentage of renewable energy in the electricity mix of a country goes down by 0.87%, given the average percentage of renewable energy in the electricity grid of 25.53%. For countries with a stagnating population, when the population goes up by 1%, the percentage of renewable energy in the electricity mix of a country goes up by 0.11%, given the average percentage of renewable energy in the electricity grid of

29.16%. For countries with a stable population, when the population goes up by 1%, the percentage of renewable energy in the electricity mix of a country goes up by 0.37%, given the average percentage of renewable energy in the electricity grid of 31.37%. All these coefficients are significant at the 1% level, and overall, the model is significant.

The results above suggest that in a country with a long-term trend of population decline, a further 1% decline in population would see the percentage of renewable energy in the electricity mix go up by 0.87%. This implies that in countries with stagnating or stable populations, a decline in population would mean the renewable electricity mix goes down.

With these results, the null hypothesis that population stagnation or decline has no impact on the share of renewable energy in the electricity mix of a country can be rejected. Population growth has a significant impact on the share of renewable energy in the electricity mix of a country. This relationship remains significant at the 1% level in countries with declining, stagnating, and growing populations.

The significance of these results is most important for countries with a declining population. The coefficient is -86.567, meaning when the population goes up by 1% the percentage of renewable energy in the electricity mix of a country goes down by 0.87%. When the population goes down in countries with a declining population, the electricity mix seems to shift more aggressively towards renewables. Therefore, it can be concluded that the effect of diminishing energy demand from a declining population allows for more targeted investment in energy. This is even more significant given the GDP per capita is lowest in countries with a declining population, therefore despite less capital, the electricity mix still changes in a significant way.

Ultimately the lack of demand for energy is a stronger driving force in the energy mix than the ensuing lack of labour supply and economic growth.

These findings therefore suggest that as Europe and other countries face population decline, the resulting lack of energy demand can ultimately help the

energy transition. Furthermore, while countries with declining populations build out more renewables, percentage-wise, as their population goes down, countries with stable growing populations would respond negatively to population decline, perhaps reflecting the diverging economies of both countries. These findings reflect what was found by Akira (2015) in his study of Japan, a country which is experiencing the longest population decline in history. There seems to be endogeneity in the model that explains how population decline can cause an accelerated buildout of renewable energy. Ensuring this relationship expresses a causal link and not a simple correlation is key to the study.

Conclusion and Limitations

This study does have limitations in its scale and scope. Results with different regression methodologies and with more control variables could lead to different results. More advanced regression techniques such as Vector Autoregression could be used in this study given their widespread use in the energy economics literature. Including controls such as education level, R&D spending, capital investment and manufacturing level would have provided additional insight, however, would have greatly expanded the scope of research and finding variables across all observations would have been more difficult.

Ultimately, despite these limitations, thinking further about how population decline is extremely important, especially as most developed countries are or will experience this, including the USA, China, and most Western European nations (Rosenheck, 2017). Understanding how these effects interact can inform unforeseen impacts that demographics will play on the transition to Net Zero Carbon for developed nations.

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Appendix: List of Countries and Population Trend

Bosnia and Herzegovina	Decl
Bulgaria	Decl
Croatia	Decl
Czechia	Decl
Estonia	Decl
Greece	Decl
Hungary	Decl
Italy	Decl
Latvia	Decl
Lithuania	Decl
Poland	Decl
Portugal	Decl
Cyprus	Stab
Ireland	Stab
Luxembourg	Stab
Malta	Stab
Netherlands	Stab
Norway	Stab
Sweden	Stab
Switzerland	Stab
United Kingdom	Stab
Austria	Stag
Belgium	Stag
Denmark	Stag
Finland	Stag
France	Stag
Germany	Stag
Slovakia	Stag
Slovenia	Stag
Spain	Stag

Studying the R&D Expenditure and Stock Performance of a High-ESG Scoring Company in the Decade of Transition

Zidong Zhang

Introduction

The negative environmental consequences of fossil fuel extraction and combustion have compelled many oil companies to enhance their Environmental, Social, and Governance (ESG) efforts to appeal to environmentally-conscious investors. Consequently, these firms have channelled resources into their research and development departments, aiming to bolster operational efficiency via technological innovations and potentially transition to renewable energy sources. By examining the energy sector and studying a proxy company's financial reports and stock performance over the last decade, this article offers an in-depth analysis of a high-ESG-scoring energy company, evaluating the correlation between its R&D investments and stock performance.

Literature Review

As one of the most popular initiatives in the recent investing world, ESG has drawn the attention of the world's investors. Breaking down the ESG score, it is composed of environmental, social, and governance metrics. These scores provide an in-depth view of a company's commitment to sustainability and ethical practices. Environmental metrics analyse a company's impact on nature, examining its carbon emissions, waste management, and resource conservation. The social aspect explores the company's relations with its stakeholders and the broader community, evaluating factors like worker rights, equal opportunities, and community development. Governance, on the other hand, scrutinizes the internal dynamics of the company, focusing on issues like corporate governance

structures, transparency in operations, and the rights of shareholders. For many modern investors, the ESG score isn't just about identifying ethically run companies; it signifies investments that are sustainable and future-ready (Drei et al., 2019).

With increasing awareness about global challenges and a growing dedication to building a sustainable and inclusive economy, ESG scores play a vital role in directing capital towards more responsible and resilient businesses (Bose, 2022). Several empirical studies have tried to discover the correlation between ESG scores and stock performance, albeit with mixed results. While some researchers contend that companies with higher ESG scores yield better returns, others claim that there is no substantial evidence suggesting a correlation between the two (La Torre et al., 2020). Another body of work argues that the correlation between ESG and stock performance may be sector-dependent (Sahut & Pasquini-Descomps, 2015).

Another area that has received attention is the energy sector's research and development (R&D) investments to advance greener technologies. Research by Pinheiro et al., (2023) shows that higher R&D investments tend to show a better ESG performance in the energy sector, particularly in environmental metrics. Rao et al. (2013) caution that the impact of R&D expenditures on financial performance can vary and may take a period of 1-2 years to manifest. This essay will adopt the sector-dependent argument advanced by Sahut and Pasquini-Descomps (2015), focusing on the role of a high ESG-scoring company's research and development (R&D) expenditures in influencing its stock performance. Using a time-series distributed lag model, the subsequent sections will analyse the R&D expenditures and stock performance of EOG Resources, a company with a high ESG score. The findings may offer insights potentially applicable to the broader energy sector, suggesting a correlation between R&D investment, ESG scores, and stock performance.

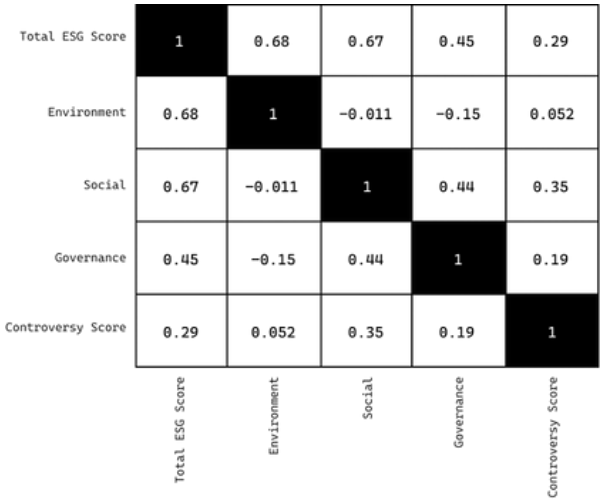
Methodology

Upon conducting a correlation analysis, the subsequent heatmap was derived

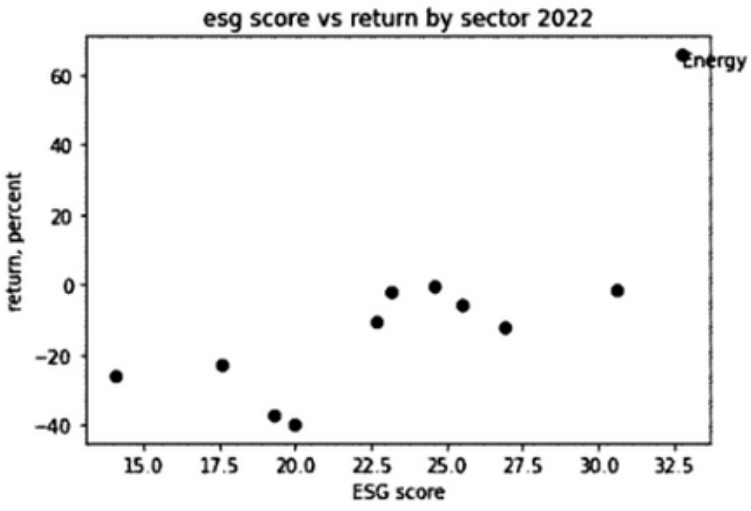
from the ESG dataset of S&P 500 firms. This visualization indicates that a company's environmental and social scores are most strongly correlated with its comprehensive ESG score, evidenced by coefficients of 0.68 and 0.67, respectively. In contrast, the governance metric exhibits a comparatively subdued correlation of 0.45. Furthermore, an in-depth sectoral examination reveals a pronounced positive correlation between each sector's market performance and its respective ESG score.

S&P500 by Sector	Average ESG Score	Performance 2022
Communication Services	19.944444	-39.89%
Consumer Discretionary	19.310345	-37.03%
Consumer Staples	24.566667	-0.62%
Energy	32.761905	+65.72%
Financials	22.666667	-10.53%
HealthCare	23.175439	-1.95%
Industrials	25.523810	-5.48%
Information Technology	17.590909	-22.7%
Materials	26.913043	-12.27%
Real Estate	14.034483	-26.13%
Utilities	30.592593	-1.57%

Table 1.1: Summary Statistics



Graph 1.2: Heatmap



Graph 1.3: Scatter Plots

The scatter plot presents a discernible linear association between the ESG scores and the sectoral stock returns for 2022, characterized by the regression equation y = 3.9568x - 100.88 and a determination coefficient R^2=0.6033. This elucidates a favourable correlation between a sector's mean ESG score and its stock performance for the said year. Notably, the energy sector, boasting an average ESG score of 32.76, outperformed the market significantly with an average return of +65.72%.

To further explore the underlying factors for the energy sector's commendable ESG score and substantial stock return performance, a proxy company is scrutinized. EOG Resources, Inc., selected as the proxy company, boasts a prominent ESG score of 39 and a return of 55% within the energy sector in 2022. By delving into its disclosed R&D expenditures from 2009 to 2022 in tandem with its average yearly stock price over this period, this section attempts to answer the question of whether a change in R&D expenditure affects a company's stock performance. Recognizing that R&D expenditures may exert their influence either instantaneously or over an extended duration, the DL(r) model is employed to analyse the dynamic effect of R&D expenditure on stock return performance. Given potential inaccuracies arising from Heteroskedasticity and Autocorrelation (HAC) robust standard errors in smaller samples, this study resorts to heteroskedasticity robust standard errors. Given the relatively constricted sample size, it's postulated—based on prevailing insights—that the impact of most environmental technological innovations begins to manifest in a 1 to 2-year timeframe (Rao et al., 2013). Consequently, the DL(1) model is formulated as follows:

$$Stock\ Return_t(1) = \beta_0 + \beta_1 R\&D_t + \beta_2 R\&D_{t-1} + \mu_t$$

A subsequent hypothesis test is further run to evaluate the significance of the cumulative multipliers:

$$H_0: \beta_1 + \beta_2 = 0$$
$$H_a: \beta_1 + \beta_2 \neq 0$$

If we reject the null (p-value ‹ significance level), then the cumulative effect of R&D on Stock return is significant. Furthermore, a Granger causality F-test can be performed to make statements about the predictability or "Granger Causality" of $R\&D_{t-1}$ to $Stock\ Return_t$. More specifically:

$$H_0: \beta_2 = 0$$
$$H_a: \beta_2 \neq 0$$

Results

Table 2.1 provides the regression results. The impact multiplier $\beta_1(0.713)$ captures the contemporaneous effect of R&D expenditure on stock returns, indicating that a unitary percent change in R&D expenditure will have an instant effect on the stock return in the same period, causing it to increase by 0.713%. The coefficient $\beta_2(0.448)$ represents the one-period lagged dynamic multiplier, suggesting that a one percent variation in R&D expenditure from the previous year will translate to a 0.448% increment in the subsequent period's stock performance.

Source	SS	df	MS	Number of obs	=	12
				F(2, 9)	=	1.43
Model	2411.23543	2	1205.61772	Prob > F	=	0.2899
Residual	7611.72788	9	845.747542	R-squared	=	0.2406
				Adj R-squared	=	0.0718
Total	10022.9633	11	911.178483	Root MSE	=	29.082

dy	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
dx						
--.	.7130982	.4748847	1.50	0.167	-.3611657	1.787362
L1.	.4484818	.4634976	0.97	0.359	-.6000226	1.496986
_cons	8.794908	8.43558	1.04	0.324	-10.2877	27.87752

Table 2.1: Regression Results

F(1, 9) =	**2.70**	F(1, 9) =	**0.94**
Prob > F =	**0.1348**	Prob > F =	**0.3585**

Table 2.2: Hypothesis Test & Granger Causality F-Test Results

With an F-statistic of 2.70 and a p-value of 0.1348, the hypothesis test results suggest a potential rejection of the null hypothesis at an 85% confidence level. This implies an 85% confidence in the significance of the cumulative effect of R&D expenditure on stock returns. However, at a confidence level of 90% or higher, the evidence is not compelling enough to reject the null hypothesis. Consequently, one would accept the null hypothesis, implying that the cumulative effect of R&D expenditure on stock returns is statistically insignificant. The result of the Granger causality F-test suggests acceptance of the null hypothesis. Failing to reject the null hypothesis at any confidence level above 70% leads to the conclusion that R&D expenditure does not Granger-cause stock return. In essence, R&D expenditure holds no predictive content for stock return performance.

Conclusion and Discussion

In conclusion, the immediate and short-term lagged positive effects of EOG Resources' R&D expenditures on stock returns were discernible. This is unsurprising, given that most technological advancements in energy sector companies focus on greener energy propositions, aiming to bolster their ESG scores, particularly the environmental metrics (Mancini & Paz, 2018). However, the cumulative significance of these expenditures, especially at higher confidence levels, remains inconclusive and R&D expenditure holds no predictive content for stock return performance. The implications of these findings may extend to analogous firms in the energy sector, given the likelihood of shared financial architectures and ESG objectives. This suggests a potential positive correlation between elevated R&D investments and stock returns within these organizations. Nevertheless, the results should be interpreted with caution due to inherent model limitations. First, the data's stationarity requires further

validation through the ADF test. Second, the assumptions underpinning the time-series distributed lag (DL) model, particularly those related to weak exogeneity, may not hold true as the omission of variables correlated with X is very likely and its absence can significantly compromise the model's validity. To achieve a broader perspective, future studies may consider extending the time span, analysing average data across the energy sector, adding on macroeconomic variables and employing a more meticulous selection of lags.

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Appendix

```
#the mean of esg scores (all companies)
mean_all = np.mean(esg['Total ESG Score'])
esg_by_sector = esg.groupby('Sector')[['Total ESG Score']].mean()
print("The average of esg socre of all companies is", mean_all)
print(esg_by_sector)

ytd2022_returnbysectors = {'Communication Services': [-39.89],'Consumer Descretionary': [-37.03]
                ,'Consumer Staples': [-0.62], 'Energy': [65.72]
                ,'Financials': [-10.53], 'Health Care': [-1.95]
                ,'Industrials': [-5.48], 'Information Technology': [-22.7]
                ,'Materials': [-12.27], 'Real Estate': [-26.13],'Utilities':[-1.57]
                }

ytd2022_returnbysectors = pd.DataFrame(ytd2022_returnbysectors)
ytd2022 = pd.DataFrame.transpose(ytd2022_returnbysectors)

plt.scatter(esg_by_sector,ytd2022)
plt.title("esg score vs return by sector 2022")
plt.xlabel("ESG score")
plt.ylabel("return, percent")
plt.text(x=32.761905, y=62.5, s='Energy')

# Correlation heatmap
plt.figure(figsize=(8, 5))
sns.heatmap(esg.iloc[:,5:10].corr(), annot, True,vmin=-1,vmax=1, center=0, cmap='vlag');
```

ECONOMICS SECTION INTRODUCTION

"An economist must be a mathematician, historian, statesman, philosopher- in some degree. He must contemplate the particular in terms of the general and touch abstract and concrete in the same flight of thought. He must study the present in the light of the past to understand the future."

- John Maynard Keynes

While a philosophical abstract, this quote establishes a strong precedent for a benchmark of economic reasoning to aspire to and highlights the breadth of the field. The pursuit of that very rigour of economic analysis lies at the heart of this section of the journal. Over the years the economic discipline has morphed and evolved, bleeding into the fields of psychology, finance, management, environment, etc., underscoring the scope of economic thinking. The last two years have placed us at the epicentre of a hotbed of economic activity with consecutive central bank rate hikes, trade wars and global sanctions, wage-price spirals, emerging geopolitical alliances looking to establish a new world order, banking crises, credit crunches and a resurgent space race. Creating a global environment that is not only conducive to economic analysis, but in dire need of it.

In lieu of the following, this segment of the journal seeks to :

- Question, challenge and further the horizons of economic thinking, seeking new applications and possibilities.
- Sharpen and pursue a rigour of economic analysis and thought, exploring quantitative and qualitative methods.
- Foster a genuine spirit of academic curiosity and collaboration.

Our first article for this year reflects these aims and seeks to apply economic methods to analyze the management of marine reserves in the Ross Sea Marine Protection Area in Antarctica. The Ross Sea is a crucial marine ecosystem from a biodiversity lens and its fisheries constitute an important economic reserve. Renewable resources however are fraught by incomplete property rights and necessitate government intervention. The author artfully establishes the challenges with governing international resources, outlines systemic failures to internalize market externalities, presents a critique of the current command and control framework and offers alternative ways forward.

Lastly, dear reader, thank you for flipping to this section of our journal. Herein lies our genuine attempt to contribute meaningfully to the vast economic literature. We hope you enjoy our perspectives.

Sharanya Seth
Perspectives Economics Section Editor

Management of Critical Marine Reserves in the International Waters of Antarctica: Issues with Current Policy and Evaluation from an Environmental Economics Perspective.

Aleksandra Jaremko

Introduction

The Ross Sea Marine Protection Area (MPA) is a marine reserve in the Southern Ocean surrounding Antarctica that was established as a result of an agreement between the EU and 24 countries following many years of negotiations (Smyth & Hille, 2016). The deal, effective on December 1st 2017, which was signed at the annual meeting of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), ensures no commercial fishing is allowed on the area of 1.5 million square kilometres (Slezak, 2016) which constitutes single largest marine sanctuary in the world (Dalton, 2018). The main objective is to protect areas "central to the life cycle of Antarctic toothfish, the region's most important commercial species" (Ashford et al., 2022, p. 1). The ban will expire in 2052.

The political debate around the Ross Sea MPA has involved many stakeholders, including governments, scientific organisations, environmental groups, and industry representatives. There have been numerous rounds of negotiations and proposals with economic interest playing a key aspect in shaping the policy. This essay draws upon environmental economics theory to critically evaluate the difficulties associated with the creation of a marine reserve in international waters and propose policy improvement.

Importance of the Ross Sea fisheries

From the biodiversity perspective, the Ross Sea is important not only for the preservation of unique and important species, but also for the functioning of the wider marine ecosystem (International Union for Conservation of Nature, 2022). It is home to squid, invertebrates, many seabirds, seals, whales and more than 95 species of fish (NZMFAT, 2016). Antarctic toothfish, which is the primary target of fishing activity in the Ross Sea (NIWA, 2021), is an important link in the Southern Ocean's food web (Blight et al. 2010).

The Ross Sea, in particular its Antarctic toothfish fisheries, is also significant from an economic perspective. According to the landings data provided by the CCAMLR – which has the sole responsibility for the management of this species in the Southern Ocean – for the 2011/2012 fishing season, the global market value for this fish could be as high as $175 million (Kennedy, 2013). This figure, however, does not include illegal, unreported, and unregulated fishing which may even double the total annual catch of the species (Lack, 2001). Additionally, a typical ship can catch as much as 40 tonnes of toothfish in a single haul, amounting to 300 tonnes on a single voyage (Ainley et al., 2012).

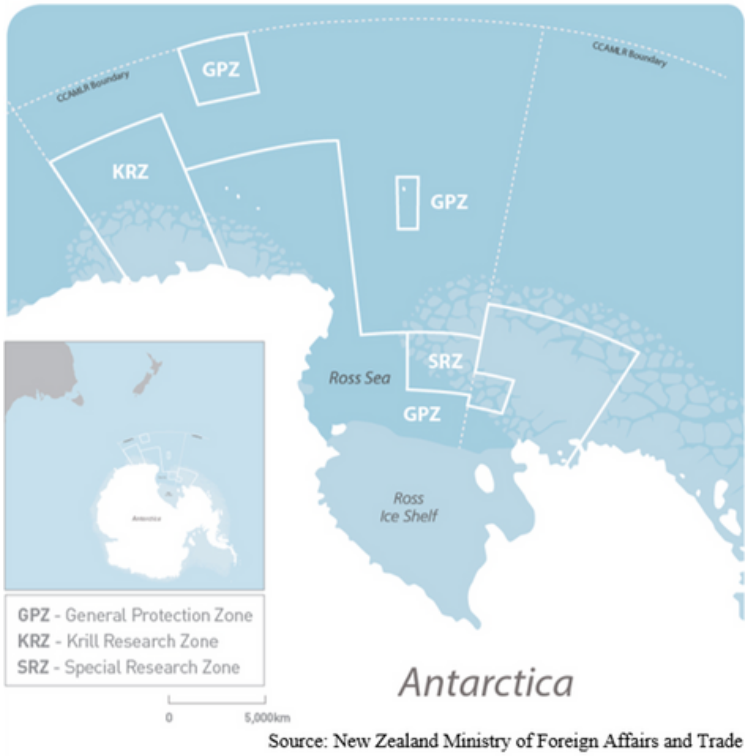

Figure 1.1: Map of the Marine Protected Area in the Ross Sea

Tragedy of the Commons

The need for government intervention in the Ross Sea stems from the problematic nature of renewable resources, in particular from the fact that they are rivalrous and characterised by incomplete property rights (Stavins, 2010; Scott, 1955). It is not clearly defined who has property over the resources nor what terms. In other words, the Ross Sea fisheries are non-excludable common pool resources governed by open access which means that prior to the introduction of the MPA, anyone could have harvested as much as they wanted. Additionally, fishermen have to compete for the resources as landings, once caught, are no longer accessible to other fishermen.

	Excludable	**Non-Excludable**
Rivalrous	Pure Private Goods	Renewable Natural Resources *Open access common pool resources such as ocean fisheries*
Non-Rivalrous	Club Goods	Pure Public Goods

Table 2.1: Taxonomy of problems in environmental economics

These features will drive every individual firm, and consequently, the market, to not internalise the negative externality of overfishing (Kuralbayeva, 2023). In a perfectly competitive market, a single producer will produce at the level which maximises their profit, i.e., when the private marginal benefit is equal to the private marginal cost (point A in Figure 3.1 below). However, the marginal private benefit does not account for the external costs imposed on society (Hardin, 1968; Gordon, 1954). As a result, the private agent neglects the costs that an additional unit of production will have on the consumption of other agents, including future generations. This leads to a negative externality, causing the market to fail in delivering social allocative efficiency (point B in Figure 3.1).

The red area, ABC, represents the deadweight loss that results from this failure. It signifies the economic inefficiency and the foregone economic value that emerges when the allocation of resources deviates from the socially optimal level, which is represented by point B on the graph. In the context of overfishing, the welfare loss arises due to the overallocation of resources to fishing activities which leads to the depletion of fish stocks and damage to the ecosystem, making society worse off as a whole. In other words, by surpassing the socially optimal level, overfishing exacts higher costs upon society, exacerbating the loss of overall welfare.

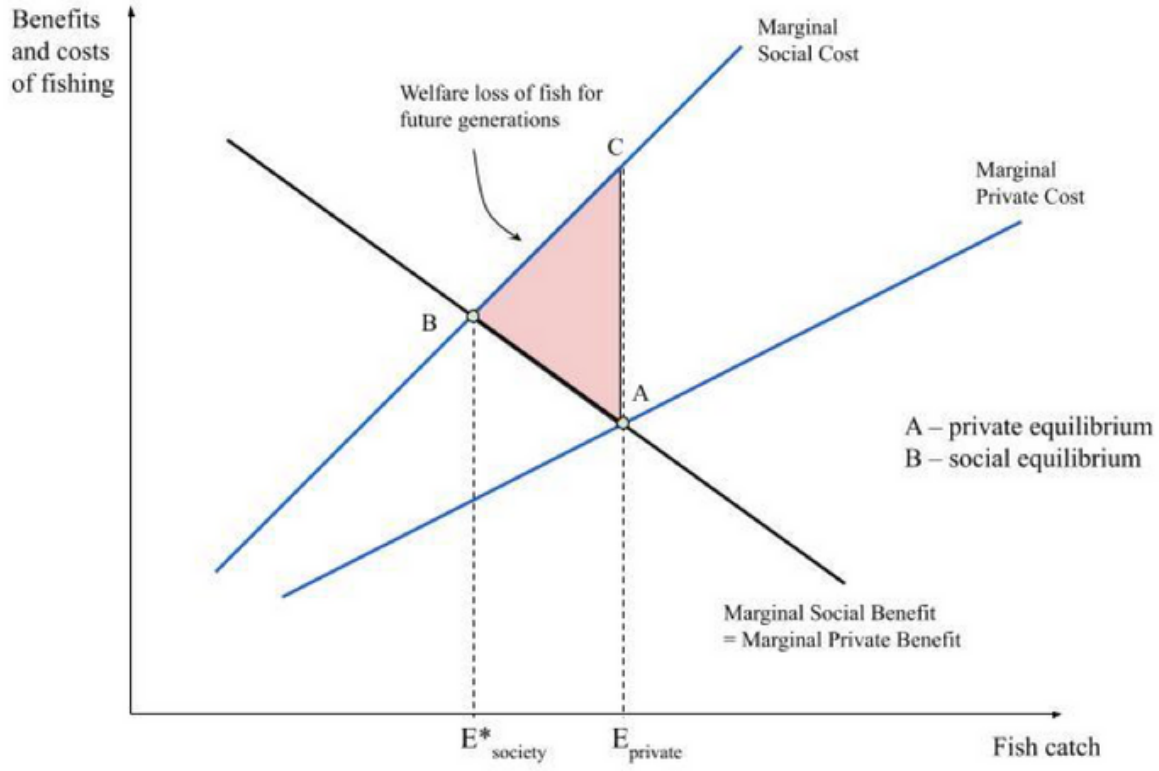

Figure 3.1: Marginal Analysis and Deadweight Loss

Challenges Facing Marine Reserves

Social choice mechanism and ethical implications

High economic benefit from toothfish fishing naturally leads to strong opposition to conservation proposals from countries that harvest large amounts. In the 2016/2017 season, the countries that sent the highest number of vessels were: South Korea (6 vessels) and New Zealand, Ukraine, and Russia (3 vessels

each). Three of those countries – South Korea, Russia, and Ukraine alongside China strongly lobbied against the MPA proposal (Mathiesen, 2014).

The social choice mechanism that governs the decision-making of CCAMLR is also problematic (Brooks et al., 2019). All members are required to agree on a decision unanimously which can lead to prolonged process or even impasse when countries veto proposals to pursue own political and economic goals (Mathiesen, 2014; Nyman 2018). In the case of Ross Sea, the initial proposal of 2.28 million squared kilometres was eventually reduced down to 1.55 million to obtain approval (Davis, 2013).

Ethical considerations also arise from the question of who is responsible for making those decisions. The countries that sit on the CCAMLR are those that harvest in the Antarctic water fisheries. In 2016, when the Ross Sea was established, this included delegates from only 24 countries and the European Union. Some of the biggest importers and exporters of toothfish such as Singapore, Canada, and Ecuador (Grilly et al., 2015) were not involved.

Incomplete property rights and practical problems

The way CCAMLR steps in and bans fishing in the Ross Sea is an extreme case of command and control. Responding with command and control to market externalities that result from incomplete property rights, such as with fisheries, is ineffective in controlling the stock and preventing overfishing (Kompas and Gooday, 2007; Steelman, and Wallace, 2001; Quarta, 2020). Establishing a reserve in international waters is more difficult because of the lack of authority of CCAMLR over other parts of the Southern Ocean where Antarctic toothfish, an ontogenetic species that migrate to different locations throughout stages of life (Lack, 2001), such as the Iselin Bank, Pacific-Antarctic Ridge, and the Amundsen Sea where fishing is not monitored (Ashford et al., 2022).

Another factor that reduces the effectiveness of command and control as a policy to protect fish stock is the issue of illegal unreported and unregulated fishing that often occurs when the economic reward is higher than the perceived cost, and that historically has been a problem in the Ross Sea MPA (The Guardian,

2015; Brooks et al., 2019).

Additionally, after the expiration date, in 35 years similar discussions will have to take place again, leaving the problem of market inefficiency unsolved – if despite the challenges described above the ban works in restoring the population of Antarctic toothfish, eventually overexploitation will occur again, and policymakers will face the same dilemma.

Why command and control?

The final issue to consider is, if command and control is not the best approach then why was it preferred over, for instance, a Pigouvian tax? Firstly, identifying an appropriate tax rate per unit of production is a huge challenge in practice (Stavins, 2010). This can be particularly difficult given the variability in catch rates and lack of knowledge of the size of stock (Lack, 2001, Grilly et al., 2015). The second challenge is that legislating a tax on a good harvested in international waters that is then traded globally could require passing legislature on a level outside of CCAMLR's jurisdiction. Negotiating the terms of such a taxation policy would be much more challenging than it was in the case of a sanctuary. Banning fishing activity was therefore a more feasible option.

Alternative Policy

Establishing an MPA is not sufficient in addressing the market failure generated by fishing activity since the underlying issue of undefined property rights remains unaddressed. The solution would be to "close" this incompleteness with a property-based market instrument (Beare and Newby, 2005). Typically, this is achieved through individual tradable quotas (ITQs) (Steelman and Wallace, 2001). Under ITQs, a specific proportion of the total allowable catch (set at the sustainable level) is assigned to individual agents, who then exchange permits with one another. This approach is cost-effective and ensures that firms are not subject to additional taxation (Stavins, 2010). Furthermore, introducing ITQs could play a positive role in reducing illegal and unreported fishing, as it is in the interest of agents to monitor the competition's catch (Stavins, 2010).

Conclusion

The non-excludable and rivalrous nature of marine resources in the Southern Ocean means that the fisheries in this region are highly vulnerable to overfishing and market failure. This can have devastating effects on the delicate ecosystem, including the depletion of fish stocks, disruption of food chains, and damage to biodiversity. Intervention is necessary to prevent the depletion of stocks and to ensure the sustainability of resources for future generations. One approach to tackling this issue is through command-and-control policies, such as the creation of marine reserves. This essay reviewed the challenges of a command-and-control policy which does not necessarily solve the underlying problem of incomplete property rights. Therefore, while command-and-control policies can be effective, in this case they are not sufficient on their own and more complex solutions are needed to eliminate the market failure. A more sustainable strategy would be to, in conjunction with command and control, implement measures, such as ITQs that introduce property rights to the market (Steelman and Wallace, 2001). This will require a collaborative effort between policymakers, fishermen, and other stakeholders to find solutions that are effective, equitable, and sustainable for the long term.

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FINANCE & BUSINESS SECTION INTRODUCTION

Welcome to the Business and Finance section of *Perspectives* – the section updating you on all things corporate and growing your financial acumen! This curated section of articles explores the dynamic landscape of business and finance in a manner that is succinct not only for those already familiar with emerging trends, but also strives to uncover the most compelling issues for those who are looking to become more polished in their understanding of such literature. This section, whilst emulating an engaging and informative approach, will still maintain its strong foundations in scholarly pursuits. Ensuring that all the complexities and technical jargon that are characteristic of the business and finance terrain are bypassed, this section seeks to ensure the readership attains a comprehensive and critical understanding of the issues most relevant to them.

Recognising the university's robust internship culture enhances the journal's goal of reaching a broader audience. To help students improve their technical knowledge for interviews, regardless of their field of study, the journal needs to adopt a more accessible presentation style. By reinforcing essential concepts and highlighting industry updates, we not only solidify the journal's reputation as a dependable resource for enhancing financial literacy but also foster active engagement with our readers. This is a crucial step toward ensuring the journal's success.

We begin with a critical examination of the concept of 'fiduciary duty' and its profound implications for policy formation in the realm of ESG considerations. The author provides insights into how the fiduciary duty framework, which captures employees' requirements to act according to firm/shareholder values, shapes decision-making processes within the corporate world and how it intersects with the imperative to promote sustainability and social responsibility. Through strong engagement with this thought-provoking literature, we hope to encourage you to perceive business and finance as a research interest, alongside its staple interest as a rewarding career pathway.

In forthcoming articles, the journal plans to delve into a spectrum of issues within the realm of business and finance, ones that are also at the heart of research and industry development. Some topics include but are not limited to: the developing landscape of corporate governance, the growing prominence of sustainable and impact investments, and the particular integration of environmental, social and governance (ESG) issues in decision-making processes.

Raees Arif & Pramika Vaseekaran
Perspectives Finance & Business Section Editors

To ESG, or Not to ESG? There Really is No Question: Why directors' fiduciary duty is not a legitimate barrier to the incorporation of ESG initiatives in US firms' corporate governance structure.

Amelia Marshall-Davies

Introduction

The extent to which the consideration of ESG factors in corporate decision-making is harmonious with the fiduciary duty of US company directors has become a polarising and politicised point of discussion. Whilst lacking an absolute definition, fiduciary duty is understood to be the legal and ethical obligation of a firm's employees to act in the 'best interests' of the organisation, historically interpreted to mean the maximisation of shareholder returns. As such, the scope of fiduciaries' ability to address environmental, social and governance (ESG) factors has long been questioned, and faces particular scrutiny in the US, where shareholder primacy has dominated corporate governance structure for decades. However, US consumers' expectation of private businesses to tackle ESG issues has begun to develop, and the nation seemingly finds itself in the early stages of a cultural shift away from the shareholder-centric thinking of the past, and towards a redefined nature of the corporation within modern American society. This essay seeks to support the United Nations Environment Programme Finance Initiative (UNEP FI) assertion that "fiduciary duty is not a legitimate barrier to the incorporation of ESG initiatives in US firms' corporate governance structure" (UNEP FI, 2019). In a modern society, addressing ESG concerns is conducive to maximised long-term financial and reputational success, and is therefore vital to the successful practice of fiduciary duty.

Historical View of Fiduciary Duty

The concept of fiduciary duty is rooted in US common law, traceable back to the 1830 case of Harvard College v. Amory (Harvard College v. Armory, 1830). The fiduciary duty of directors was institutionalised within the US legal system without the guidance of formal written law, it instead evolved through more than a century of common law rulings to emphasise the concept's core principles of loyalty and prudence (Black, 2001). Fiduciary duty was codified in US federal law under the Employee Retirement Income Security Act of 1974 (ERISA) and defined fiduciaries' responsibility to "act solely in the interests of beneficiaries, using prudence to provide benefits and minimise losses" (Youngdahl, 2014).

Historically, directors' practical interpretation of this has been widely shareholder-centric, with an absolute focus on maximising shareholder value. This aligns closely with Americans' cultural conception of the nature of the corporation, epitomised by Milton Friedman's 1970 essay, "The Social Responsibility of Business Is to Increase Its Profits". Friedman's widely influential work posits that "profit maximisation is the corporations' sole societal duty', popularising the shareholder primacy approach to corporate governance adopted by US firms from the mid-20th century onwards (Lipton, 2022). Through this lens, fiduciary duty is still argued as a legitimate obstacle to addressing ESG issues as part of corporate governance. The ERISA and judicial precedence stress fiduciaries' duty to consider only the financial interests of the beneficiary; any action motivated by factors outside of this, including ethical concerns, is a violation of this duty and could see fiduciaries held personally liable for losses incurred (Schanzenbach, 2020).

The ERISA's constricted definition of 'fiduciary duty' fuels a narrative, argued by some, that corporate governance strategies should be unconcerned with ESG-related issues. This argument is founded on a lack of comprehension of ESG initiatives' practical application within corporate governance structure, and a gross underestimation of ESG's long-term financial materiality for firms. Sonal Mahida, U.S. Strategic Projects Senior Consultant at PRI, notes the common misconception that addressing ESG issues inherently negatively impacts

financial performance (Mahida, n.d.). Morality and righteousness aside, the implementation of ESG policy boasts numerous long-term financial benefits for businesses. Data shows consumer demand is real and mighty for companies addressing ESG issues consumers care about; products making ESG-related claims averaged 28 percent cumulative growth over the past five-year period (Feber, 2020). Furthermore, 2020 US consumer sentiment data from McKinsey shows more than 60 percent of Americans said they'd pay more for a product with sustainable packaging (Feber, 2020). The financial materiality of addressing ESG extends far beyond increased sales and improved profit margins; as ESG policy develops globally, it is the private businesses who are early adopters of ESG monitoring and reporting that will be most successful in futureproofing their operations (Meager, 2021). The pursuit of profit maximisation gives rise to short-termism, rendering directors "myopic to long-term benefits in favour of short-term gains" (Posner, 2017), and thus unable to recognise the necessity of ESG to achieve long-term financial success. Global intermediary the United Nations Environment Programme Finance Initiative (UNEP FI) asserts ESG issues are inarguably financially material to the scope of directors' duties, and thus the fiduciary duties of loyalty and prudence require the incorporation of ESG issues in order to be fulfilled (UNEP FI, 2019).

The United States Shifts towards ESG

As recognition of the necessity, both financial and ecological, to incorporate ESG issues within the corporate governance structure, the US public's conception of the nature of the corporation has begun to shift, signifying a step away from the nation's long-held attachment to a shareholder primacy interpretation of fiduciary duty. In 2019, the Business Roundtable, whose ranks include the CEOs of most of the major U.S. companies, publicly rejected the shareholder-centric principles of corporate governance it had advocated for since 1997, instead choosing to recognise the necessity of all stakeholders, and committing "to deliver value to all of them, for the future success of our companies, our communities and our country" (Business Roundtable, 2019). The backlash to this cultural shift demanding increased action from companies to address ESG issues has become part of a broad conservative agenda. Republican lawmakers

publicly seek to frame ESG policy as an attempt from the left to violate firms' fiduciary duty to act in the best financial interest of shareholders (Rives, 2023). In a speech at the 2022 National Conservatism Conference, West Virginia Treasurer Riley Moore described ESG-based investment policy as "a combination of regulatory, anti-competitive cultural and social manoeuvres aimed at making the free market unfree" (Moore, 2022), serving a stark reminder of the depth of Americans' conviction in the duty of private business to maximise profits. Moore's statement is indicative of a lack of accountability for private business' role in addressing ESG issues in America, in particular issues surrounding sustainability and climate action.

Conclusion

In summary, this essay seeks to support the notion that US directors' fiduciary duties, as outlined in ERISA and judicial precedence, are not only harmonious with the incorporation of ESG factors in decision-making, but require it. Analysis of the financial materiality of ESG factors to US firms reveals it to be within the scope of the core principles of loyalty and prudence, and opponents of this view fall subject to misconceptions and short-termism. Whilst the US begins to redefine the nature of the corporation within modern society, federal policy, which is currently lacking, may be beneficial to alleviate public misconception of the scope of ESG and fiduciary duty.

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MANAGEMENT SECTION INTRODUCTION

"Management is doing things right; leadership is doing the right things"

- Peter Drucker

This quote eloquently captures the significance of proper management in achieving organisational goals. From the largest corporations across the globe to group assignments in a classroom – wherever there is a goal to be achieved collaboratively, somewhere within you are likely to find derivations of management practices. Management is the process of working with and through others in order to effectively achieve goals.

Increased digitalisation and changing regulations of the global landscape are viewed as an obstacle by some, while others see an opportunity. Regardless of one's stance on the effects of emerging technologies on our world, one thing is for certain: change comes along with it. What used to be pen-and-paper checklists have now translated into digital management tools. Colleagues and team members used to only be accessible in the office or over coffee, now they are always a Teams call or text message away. With all of these changes, how much of existing management practices have been made redundant? Which are the most efficient, and for which organisations? We are excited to see how the field of management shapeshifts around the ever-changing moulds that technology and

human behaviour create.

From ideas regarding how corporations and educational institutions can promote sustainability, to the ripple effects of remote work on an increasingly connected world, we hope the essays enclosed in this section inspire further thought into how effective, well-intentioned management practices are incorporated into daily life. This outlook is to create an appreciation of the subject of management and its everlasting impact on society.

Zain Lodhi & Jasmine Surif
Perspectives Management Section Editors

Treasure From Trash: Exploring Corporate Sustainability Engagement with Primary School Students

Chakri Swartz

Abstract

This paper examines the potential benefits of primary school Education for Sustainability (EfS) and the gap between the demand and supply of childhood EfS programmes. Interviews with industry professionals centred around childhood EfS identified three key themes: engagement, relatability, and parental engagement. Younger children prefer interactive curriculums, and the EfS programme should focus on tangible and familiar sustainability topics. In addition, engaging parents in the learning is crucial, as education can increase the behaviour change associated with parent-child discussions of sustainability. This paper proposes an art day where students create artworks from recycled trash to learn about sustainability in a way that satisfies the three key themes. The recommendation serves as a starting point for companies to engage primary school students with EfS and create lasting relationships with the students and their parents. The recommendation is then compared against the SHIFT framework to ensure prolonged sustainable behaviour.

Introduction

There is a growing consensus that education will play a key part in the transition towards a more sustainable future, with various initiatives launched in recent years to implement Education for Sustainability (EfS) in classrooms across the world (Cebrián et al., 2020). Within the UK specifically, a recent policy paper outlined the need for increased sustainability education across all schooling levels, intending to prepare the next generation for the implications of climate

change and instil skills to engage with the 440,000 new green jobs that will be created by 2030 (Department for Education, 2022). However, there has been a "traditional lack of attention to early years education" when it comes to EfS, leading to a "lack of resourcing" for primary school sustainability programs (Somerville & Williams, 2015: pg.103). As a result, while there has been a growing demand for primary school-level EfS, there is currently a lack of programs to support it (Ginsburg & Audley, 2020).

This is a gap that needs to be filled, with the UK government expressing a clear interest in collaborating with the private and charity sectors to help achieve their stated EfS goals (Department for Education, 2022). ESG-oriented organisations will benefit from primary school EfS through the creation of long-term climate-conscious consumers, as children introduced to EfS programs from an early age are more likely to develop environmentally responsible behaviours (Chawla & Derr, 2012). In addition, instilling climate-oriented values in children can have a direct impact on parents through a process known as "reverse socialisation", in which children transmit acquired beliefs to their families and prompt behaviour change (Hosany et al., 2022). This paper aims to offer companies a starting point for tapping into the short and long-term benefits of primary school EfS, facilitating the creation of lasting relationships between the company, the students, and their parents.

Methodology

The research for this paper consisted of three semi-structured interviews with industry professionals, done to gain "in-depth" opinions without compromising the natural flow of conversation (Carruthers, 1990: p.65). To mitigate triangulation issues that arise with using semi-structured interviews, academic and industry research was employed to reinforce the claims made by the interviewees. Each interview was conducted over the phone during the spring of 2022, and the participants have been given false names below to preserve previous promises of anonymity.

Name	Job Description	Relevance
Phoebe	Director of an early childhood school	Has extensive experience teaching primary school students and has implemented multiple EfS initiatives within her classrooms
Sam	Global Management Trainee at a leading global brewer	Currently training at a large organisation that prioritises sustainability within its operations. Interviewed to gain an idea of current commercial and environmental trends
Tatiana	Marketing Coordinator at BBC Studios	Employed within the Children's Branding section, and has extensive experience working with partners to create content for children that engages while also educating

Table 1.1: Interviewee Breakdown

Interview Discussions

Over the course of the interviews, three main themes emerged. The first was the topic of engagement, as Phoebe discussed the importance of using visual and interactive stimuli when looking to educate primary school students. She mentioned that younger children do not have the attention span to read through information as the main learning mechanism, instead heavily favouring materials that allow for the students to engage proactively and creatively. This point was also brought up by Tatiana, with her describing how children will be much more likely to engage with material that allows them to be playful and creative. This is backed up by the academic literature, as the use of imagination and creativity has been found to be some of the most effective ways of engaging children with sustainable education (Sundberg et al., 2019). Previous studies have singled out the experiential (Pruneau et al., 2003) and cooperative (Devine-Wright et al., 2004) aspects of EfS to be especially important, as these aspects "had significant

impacts on the attitudes and actions of children" regarding sustainability (Rousell & Cutter-Mackenzie-Knowles, 2020: pg.196).

The second theme was that of relatability, as Tatiana described that the program would need to be "quite consistent and make sense from a child's point of view". She described how it was "good to keep it positive and uplifting", and to focus on delivering the proposed message in a way that the children would understand. Phoebe also mentioned this point, putting particular emphasis on recycling initiatives, as these represented "a very tangible thing that kids can really see and engage with". When focusing specifically on "tangible stuff that they can see and touch", Phoebe noticed that kids were much more engaged with the learning material, especially when it came to environmental curriculums. EfS programs should then consider a "thorough understanding" of primary school students' "beliefs and attitudes" on sustainability, crafting the program around the elements already familiar to them to increase its impact (Brownlee et al., 2013: pg.13).

Finally, it was clear through the interviews that engaging the parents would also be crucial. Phoebe brought up the idea of reverse socialisation, in which ideas introduced to children are taken home to their families, with children then "informing and educating their parents" on sustainability topics brought up in class. Tatiana likewise explained the importance of parents when engaging children, saying that parental involvement and specifically catering to adults as well as students is important when designing educational content. Sam described how modern consumers are now pushing for increased "organisational, personal, and collective responsibility for the communities and the world we live in" and are more willing to give positive feedback in response to green agendas. This increased desire from consumers and parents then allows for an increased opportunity for sustainability conversations at home, with education playing a key role in facilitating those parent-child conversations (Liu et al., 2022). Leveraging educational interactions to start intra-household conversations surrounding sustainability has been found to increase the effect of those conversations by a magnitude of four to eight, leading to higher chances of attitude and behaviour change in both parent and child (ibid).

Recommendations

Based on the professional interviews and the corresponding academic research, it is clear that companies looking to engage with primary school EfS should ensure that their programs are engaging, relatable, and include both the children and parents. These programs should be collaborative and leverage creativity, all while teaching environmental lessons that students can take home with them. One such way this can be done is through an art day for students, where the children will be encouraged to playfully create artwork out of trash while learning about the importance of recycling and taking care of the planet. The school could then host an art show for the parents, displaying the artwork while also hosting educational discussions led by the students themselves.

This would be an extremely visual and interactive way for students to engage with EfS, while also creating the foundation for a lasting relationship between the company hosting the program, the students participating, and their parents. In addition, tackling issues of recycling and waste management are ideal places to start, as it is a topic that children can understand and engage with directly. At the end of the night, the parents would be able to purchase the artwork to take home, creating a pool of capital to use to further engage with the company's existing environmental programs or to be donated to relevant environmental charities.

To ensure the academic validity of this suggestion, the idea will be mapped out onto the SHIFT framework proposed by White et al. (2019). This framework offers a guide on creating prolonged behaviour change, specifically aimed at increasing sustainable actions, with the letters standing for Social Influence, Habit Formation, the Individual Self, Feelings and Cognition, and Tangibility. Essentially, the actions that are most likely to create continued sustainable engagement leverage peer-group factors, induce repeated actions, involve the participants' self-concept, prompt an affective or cognitive reaction, and help make sustainability less abstract (ibid). The art day recommendation conforms to this framework in the following ways:

SHIFT Section	Relevance
Social Influence	By having the art fair take place as a school-wide event, the organising company can create new social norms to promote sustainability (White et al., 2019). Having the entire school participate can create a sense of community (Bateman, 2002), which will aid in nudging individual behaviour towards sustainability through peer influences.
Habit Formation	The company will be able to use the funds raised from the art day to further engage the students with environmental activities, creating lasting habits and attitude formation within the students.
Individual Self	This section applies the theory of the Extended Self, which explains how consumers will integrate physical products into their sense of personality (Belk, 1998). The final product of the art fair is a physical object that took time and creativity to manifest, and it being brought home and put on display could aid in the integration of sustainability into the developing personality of the student.
Feelings and Cognition	This section of the framework, backed up by the interview with Tatiana, warns against letting the context of the programme become too negative, especially when working with children. By having the students engage with creative art processes, the mood should remain positive and light
Tangibility	This section also relates to the final art piece being a physical product that can hang in people's homes, and it can serve as a continuing reminder for acting sustainably. As previously mentioned, the focus on waste management and recycling is a practical way to engage primary school students, as the issues are tangible and already somewhat understood by the children.

Table 2.1: Recommendation According to the SHIFT Framework

Limitations

While the proposed recommendation does conform to existing academic theory and was based on professional interviews, it is only a starting point for companies looking to engage with primary school EfS. The company or organisation itself will likely require its own educational pathway beyond the art fair, however, this idea could serve as a useful tool when looking to initially engage students, parents, and educators. In addition, while the interviewees were relevant to the specific needs of this paper, the small sample size and relatively junior positions of those interviewed also limited the applications of the results. Further research will be needed to study the effectiveness of this specific recommendation, both as it pertains to students' attitude formations and continued sustainable behaviour.

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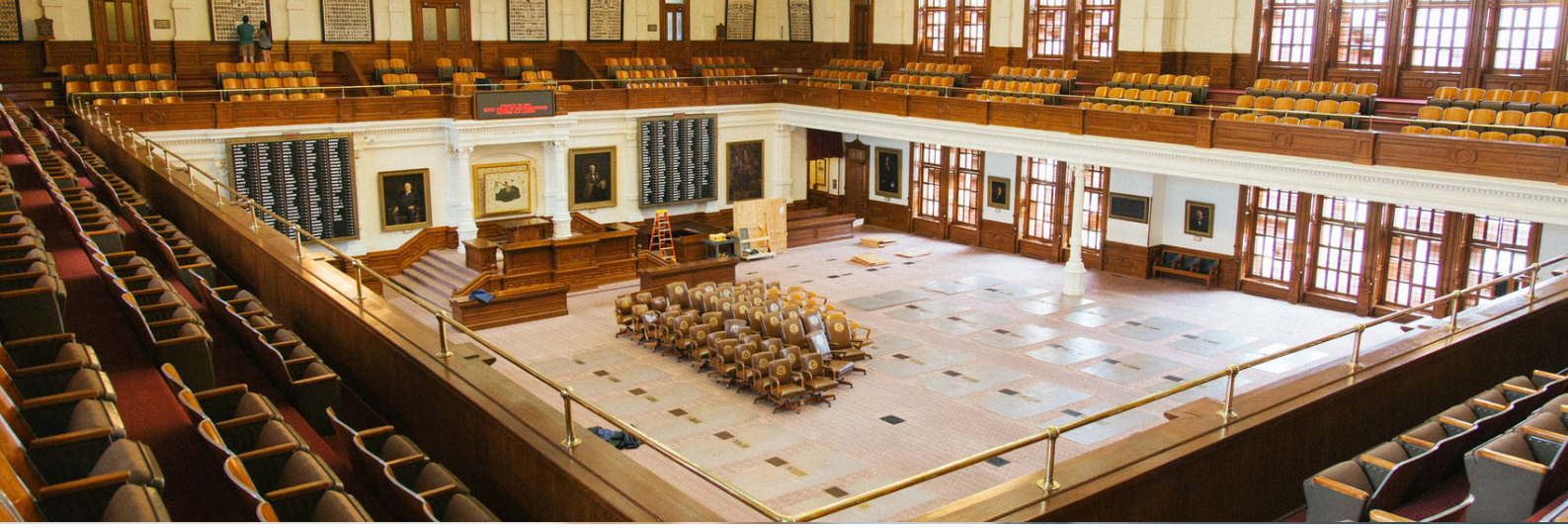

Political & Development Economics Section Introduction

Political economy, in the IMF's words, "is about how politics affects the economy and the economy affects politics." It is an interdisciplinary branch of the social sciences that studies the relationships that exist between individuals, the state, and public policy. Similarly, development economics is a specialized branch of economics with a distinct policy-oriented approach. It delves into the economic development and growth of nations, especially those in the developing world, honing in on strategies and policies to facilitate progress. Its central objective revolves around identifying and advocating for measures that can effectively combat poverty, ameliorate income inequality, and enhance living standards. We will aim to unite these two subjects with essays regarding governmental responses to recent trends, from ESG to artificial intelligence, and how rising economies can best utilise shifts in the business landscape.

In this edition of *Perspectives*, Guaraja Rawat and Caiyi Lin explore varied governmental responses towards sustainability and economic recovery in the wake of the COVID-19 pandemic. In her work, Guaraja highlights the divergence in responses between developed and emerging economies, identifying notable trends in the approaches of both. While Caiyi evaluates a similar question, she provides a more focused narrative centred around a comparative case study of

the United Kingdom and China. The authors' findings hold significant implications for the broader political economy and development discourse, given the need for collective action on sustainability goals. Their work provides an understanding of how the state of a country's economy may influence the prioritisation of its economic goals, thus identifying potential challenges and opportunities in aligning short-term recovery with global long-term sustainability objectives.

Luca Olin Dzikowski & Nicole Lim
Perspectives Political & Development Economics Section Editors

Assessing COVID's Influence on the Sustainability Commitments of Governments Around the World

Gauraja Rawat

Introduction

The coronavirus pandemic has been an unforeseen challenge for governments around the world with lasting impacts on economies and the global society. It has simultaneously highlighted the fragility of our social structures and demonstrated the strength of global collaboration towards external shocks. After experiencing the widespread impacts of the pandemic, governments' responses towards other major shocks such as climate change could also be affected. This essay seeks to analyze whether governments' sustainability measures improved or worsened following the pandemic. Sustainability can be defined through different lenses such as environmental, societal, or economic development. Therefore, this essay focuses only on changes in climate change mitigation policies around the world after 2020. This essay argues that in general during the pandemic, developed countries had a combined focus on economic recovery and environmental sustainability through green recovery packages, whereas developing countries were more vulnerable and prioritised economic recovery over sustainability.

Case Study Analysis

Developed Countries

It is apparent that developed countries focused on both the economic and environmental pillars of sustainability as they aimed to recover their economies while also meeting climate targets through increased green investments. During 2020, the European Union's real GDP fell by 6.1% more than during the 2008 financial crisis (Verwey & Monks, 2021). To counteract these impacts, the EU's long-term budget had the largest stimulus package ever created in Europe with

30% of the funds allocated towards climate change mitigation and adaptation policies (European Commission, 2023). Some key measures were created such as the 'Just Transition Fund', which seeks to invest €19.32 billion over 2021-2027 and aims to transition European countries towards their carbon-neutral goals in energy, environmental rehabilitation, and renewable energy job assistance (ibid.). Each country's individual measures were also green investment focused such as France which released a $122 billion package in September 2020 with one-third allocated towards green measures (Shipalana & Chigwenya, 2021). Additionally, the climate targets were also increased by the European Union as the European Commission's target increased to 55% by 2030 compared to their previous target of 40% (Climate Action, 2021).

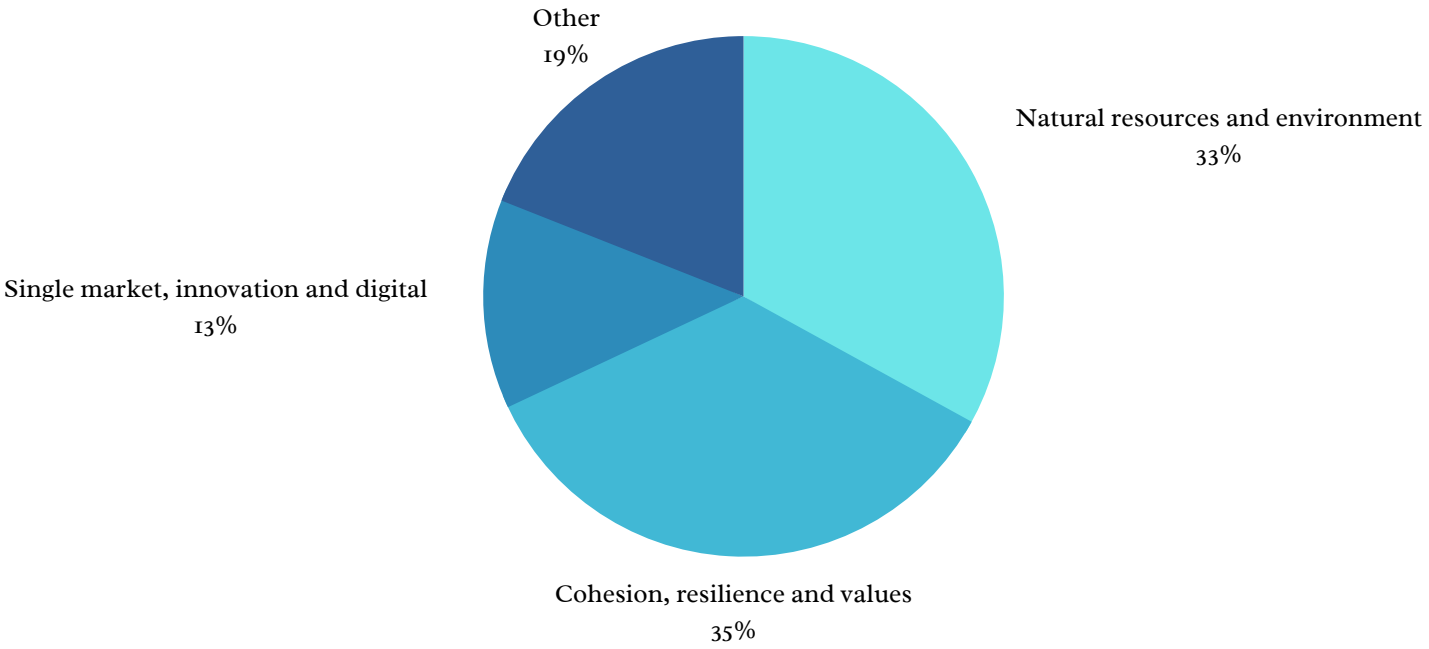

Figure 1.1: EU Budget Composition 2021-2027

The US had a similar combined focus on economics and the environment as it resorted to environmentally friendly measures to tackle inflation and recover struggling businesses. In 2021, the annual inflation rate in the US was 7% and continued increasing throughout 2022 due to supply and demand pressures from the pandemic and Ukraine War (US Inflation Calculator, 2021). To remedy this, the 2022 Inflation Reduction Act was released. This sported measures to support businesses, non-profits, and other organizations through incentivizing transition

to renewable energy. Investments in renewable energy were encouraged and production-based tax credits were provided to businesses as part of the Green Power Partners scheme (EPA, 2022).

Developing Countries

In contrast, developing countries were quite vulnerable and focused only on economic stabilization rather than sustainability. For instance, Ghana was impacted dramatically by the pandemic as its GDP growth rate in 2020 was only 0.4% compared to 6.5% in the previous year (Sasu, 2022). A case study in Ghana, which can be extrapolated to similar African economies, demonstrated that government interventions were short-term and focused on restoring livelihood and reducing the immediate impact of Covid-19 such as job losses, lower capital inflows, heightened debt levels, and declining commodity prices. Kenya also focused only on economic recovery as its $540 million COVID Relief package did not consider any green measures (Shipalana & Chigwenya, 2021). This was also the case in Latin America as Argentina and Colombia spent $1 billion on fossil fuel-related post-pandemic policies (Stott, 2022). Chile's economic package also consisted of fossil fuel subsidies rather than renewable energy (Stott, 2022).

Regression Analysis

Quantitative analysis also indicates fundamental differences in how the pandemic influenced the sustainability commitments of developed vs. developing economies.

A panel of the top 10 greenhouse gas emitters between 1990-2021 was analyzed (where the EU is a single entity). These top 10 emitters currently account for more than two-thirds of total emissions (Friedrich et al., 2023). In the regression analysis, the pandemic's influence is measured as an independent variable through the number of annual coronavirus cases. Sustainability commitments of governments are measured as a dependent variable through their greenhouse gas emission rates in $MtCO_2e$/year. GDP per capita and population are accounted as control variables.

$$Emission_{it} = \beta_0 + \beta_1 Covid_{it} + \beta_2 GDP_{it} + \beta_3 Pop_{it} + \alpha_i + \lambda_t + u_{it}$$

a_i = country fixed effects

λ_t = time fixed effects

u_{it} = error term

This panel data regression was performed for the whole sample and further divided into developed vs. developing countries for comparative analysis.

```
Fixed-effects (within) regression               Number of obs      =       318
Group variable: Country1                        Number of groups   =        10

R-sq:  Within  = 0.3420                         Obs per group: min =        30
       Between = 0.3608                                        avg =      31.8
       Overall = 0.3306                                        max =        32

                                                F(9,9)             =         .
corr(u_i, Xb)  = -0.8157                        Prob > F           =         .

                                    (Std. err. adjusted for 10 clusters in Country)
------------------------------------------------------------------------------
             |               Robust
    Emission | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
       Covid |  -.0000502    .000031    -1.62   0.140    -.0001203    .0000199
         GDP |  -.0053747   .0152541    -0.35   0.733     -.039882    .0291326
         Pop |   .0000109   9.01e-06     1.21   0.256    -9.46e-06    .0000313
------------------------------------------------------------------------------
```

Figure 2.1: Regression Results for Whole Sample

Fixed-effects (within) regression — Number of obs = 160
Group variable: **Country1** — Number of groups = 5

R-sq: Within = **0.3735** — Obs per group: min = 32
Between = **0.3689** — avg = 32.0
Overall = **0.2712** — max = 32

F(4,4) = .
corr(u_i, Xb) = **-0.6392** — Prob > F = .

(Std. err. adjusted for **5** clusters in **Country**)

Emission	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
Covid	-.0000184	3.98e-06	-4.61	0.010	-.0000294	-7.30e-06
GDP	.01149	.0075985	1.51	0.205	-.0096067	.0325868
Pop	-2.42e-06	4.78e-06	-0.51	0.640	-.0000157	.0000108

Figure 2.2: Regression Results for Developed Countries in the Sample

Fixed-effects (within) regression — Number of obs = 158
Group variable: **Country1** — Number of groups = 5

R-sq: Within = **0.5998** — Obs per group: min = 30
Between = **0.7167** — avg = 31.6
Overall = **0.6510** — max = 32

F(4,4) = .
corr(u_i, Xb) = **-0.8325** — Prob > F = .

(Std. err. adjusted for **5** clusters in **Country**)

Emission	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
Covid	-.000053	.0000341	-1.55	0.195	-.0001477	.0000417
GDP	.5181689	.2996936	1.73	0.159	-.3139138	1.350252
Pop	.0000106	6.44e-06	1.64	0.176	-7.31e-06	.0000285

Figure 2.3: Regression Results for Developing Countries in the Sample

The results show that the overall relationship between coronavirus cases and emissions is negative but insignificant at the 5% significance level. This is also the case for developing countries. The relationship is negative and significant for developed countries. This implies that for developed countries, as the number of coronavirus cases increased, emissions decreased. This could be explained through the case study analysis as developed countries tended to employ environment-focused pandemic policies.

Alternative Explanations

Apart from stimulus package composition, there are other explanations for why the sustainability commitments differed for developed and developing economies during the pandemic.

Firstly, developing economies' policy designs seem inadequate for sustainable development. The Emissions Gap Report demonstrated how key developing economies such as China and India have insufficient policy procedures to ensure their targets will be met. India was stated to have no separate carbon removal targets, no annual reporting and limited data on policy scope and coverage (Emissions Gap Report, 2022). China falls short in areas such as policy coverage of all gases, international shipping and aviation in its green policies. It also has restricted reporting procedures such as an absence of annual reporting compared to the EU and US which reduces transparency (Emissions Gap Report, 2022). Thus, insufficient policy design could hinder developing economies' ability to reduce emissions.

Another explanation is that many developing countries rely on international aid for sustainability measures and have limited inward investment towards green measures. As seen in Figure 3.1, Central Africa mainly relies on official development assistance for green finance. Latin America relies on long-term debt or FDI. Thus, as the global economy was impacted by the pandemic, developed countries reduced their aid outflows and developing countries were unable to fully fund different aspects of the economy including sustainability measures. For instance, even though foreign aid was provided to these countries during

Covid through organizations such as the African Development Bank which approved a $10 billion Covid Response Facility, the support was lower than pre-pandemic levels and thus was inadequate (Shipalana & Chigwenya, 2021). In contrast, developed countries maintained a much higher budget for themselves such as the EU which was able to spend $77 billion in climate finance alone as reported by the European Investment Bank in the same year (Shipalana & Chigwenya, 2021). Therefore, the $10 billion received by African countries went to priorities such as economic recovery rather than sustainability measures as they were credit-constrained.

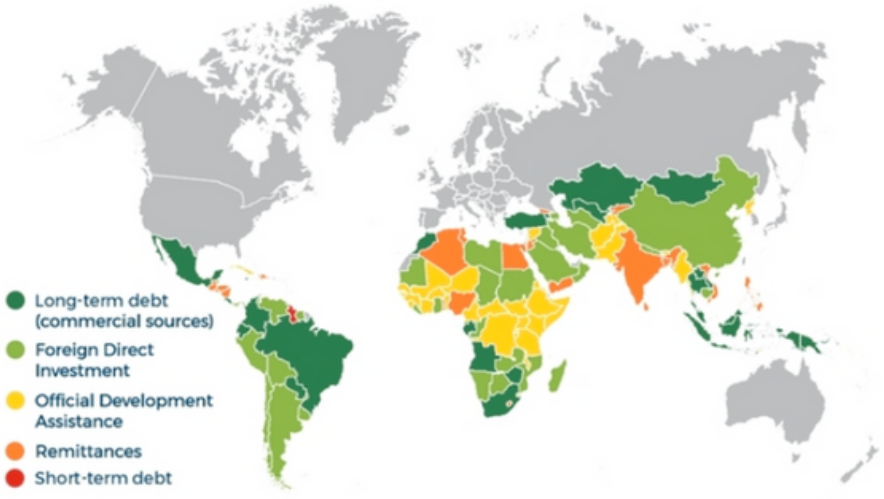

Figure 3.1: International Finance Flows (Shipalana & Chigwenya, 2021)

Further Research

The regression models in Figure 2 has a low R2 of 33% hence, other explanatory factors should be studied as well. The Ukraine War and the resulting energy insecurity is a crucial factor for sustainability analysis as it has shifted the emission trajectories of countries. In 2022, countries such as Germany restarted operations in their coal power stations to compensate for the reduced supply of Russian gas (Kinkartz, 2022). As seen in Figure 4.1, Germany's coal usage which was steadily declining until 2020 has increased and could continue on this path, worsening emissions. To validate the conclusions drawn in this essay, the combined effect of the Ukraine war's increasing emissions and COVID-19 decreasing emissions in developed countries, particularly Germany, could be further studied.

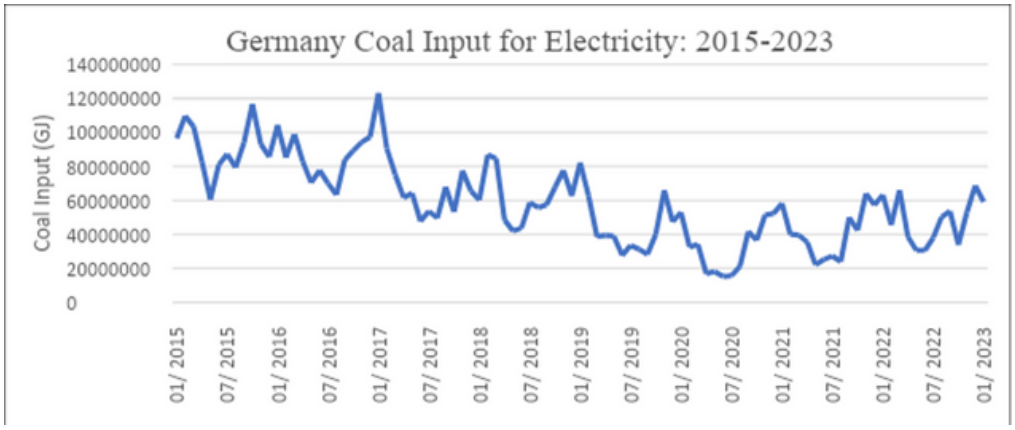

Figure 4.1: Coal Usage for Electricity Generation in Germany: 2015 - 2023

Conclusion

Through the case study and regression analysis, it is evident that developed and developing countries had different sustainability responses following the pandemic. Developed countries witnessed a decrease in emissions as the number of Covid cases increased. This might be because they were able to implement both economic and environmental measures for pandemic relief with green investment packages. In comparison, the pandemic did not instigate emissions reductions in developing countries. Some key reasons could be that developing countries prioritized economic recovery and did not implement sustainable investment measures in their stimulus packages. They were also impacted by inadequate policy designs and foreign aid reduction during the pandemic. Finally, it is important to highlight the limitations of this analysis as the last three years have witnessed many key events overlapping with COVID-19 such as the European energy crisis, recent financial market turmoil etc. Therefore, Covid is not the only key factor influencing policy decisions. More studies and analyses could be conducted to determine the direct causality between pandemic-led changes in government attitudes towards sustainability.

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Has the Covid Crisis Strengthened or Exacerbated Sustainability Commitments?

Caiyi Lin

Introduction

Sustainability refers to the rational use of limited resources to meet individuals' present needs without harming the interests of future generations (United Nations, 1987). If limited resources can be rationally allocated, it will lay a solid foundation for a better life in both the existing and future societies. Given the finite nature of our planet's resources and the ever-growing demands of a global population, the significance of sustainable development to every country becomes increasingly distinct. However, the recent COVID-19 pandemic has severely affected both the progress being made and the attitudes of countries towards sustainability-related development.

In the context of these observations, this essay will describe the UK and China's approach to sustainability before and after the Coronavirus outbreak. Then, based on their respective national strategies, it will discuss how the pandemic has impacted greater or reduced emphasis on the importance of sustainability. Finally, this essay will explore the potential reasoning behind the countries' choices regarding sustainability and provide relevant predictions.

The UK's Pre-COVID Commitment to Sustainable Development

Before the COVID-19 pandemic, the British government demonstrated a robust commitment to sustainable development, especially in climate change and renewable energy. Climate change has profound impacts on the natural environment, human health, and socioeconomic systems. It endangers biodiversity, raises agricultural costs, and necessitates socio-economic adaptations. Recognizing these challenges, the British government established a

primary sustainability strategy focused on mitigating and adapting to climate change. This commitment can be observed in several policy documents and initiatives, such as the UK's Climate Change Act of 2008 and the subsequent carbon budgets, which pursued substantial reductions in greenhouse gas emissions. In specific terms, the government aimed for a 50% carbon emission cut by 2025 from 1990 levels and set a net zero emissions goal for 2050 (Schreurs and Tiberghien, 2010). Moreover, to foster low-carbon technologies, the government dedicated £2.5 billion to energy innovation (Chan et al., 2017) and promoted alternative energy, such as mine thermal power, to reduce emissions.

Another sustainable development goal of the UK is to emphasize its use of renewable energy sources, especially offshore wind energy and biomass energy. In terms of offshore wind energy, with an installed capacity exceeding 10 GW, the UK is a global frontrunner in the offshore wind sector (Allan et al., 2020). Looking ahead, the government's ambitious goal is to amplify this capacity to 40 GW by 2030, which could fulfil nearly one-third of the country's electricity demand (Liebreich, 2013). Another promising area is biomass energy, contributing both to power and heating solutions. In specific terms, it can achieve 27% efficiency in power generation and provide over 80% of heat supply capabilities (Ward and Inderwildi, 2013). By expanding these renewable sectors, the government aims to reduce dependence on non-renewable resources, showcasing its commitment to a sustainable future.

The UK's Post-COVID Commitment to Sustainable Development

The COVID-19 pandemic actually reinforced the British government's commitment to sustainable development. Due to the vulnerabilities the pandemic exposed in terms of climate change, technology, and economic resilience, the government was further motivated to prompt more robust sustainable management plans.

Though 2022, the UK remained steadfast in its ambition to achieve net zero emissions by 2050. To achieve this goal, the government is leveraging artificial intelligence to curb carbon emissions, allocating a potential budget of up to

£1.5 billion for this initiative (Department for Business, Energy & Industrial Strategy and George Freeman MP, 2022). As highlighted by Goralski and Tan (2020), AI has substantially influenced social development and the global economy. Proper and effective use of AI in sustainability can accelerate progress towards these sustainable development goals, enhancing energy efficiency and promoting the shift to low-carbon fuels. This tech-forward approach not only elevates the UK's industrial competitiveness but also propels the nation closer to its emission targets.

Moreover, the British government introduced low-interest financing for related projects to support sustainability within economic challenges. This move came at a time when global economies were reeling from significant downturns after the pandemic, with the UK's economy being no exception. According to the Office for National Statistics (2022), the UK's GDP fell by 19.4% between April to June 2020. In response to these economic challenges and recognizing the integral role of robust financial strategies in sustainability, the government issued sustainable financial instruments such as green bonds and sustainability-linked loans (Caldecott, 2022). These measures underscore the UK's firm commitment to sustainable development and showcase its strategic approach to realising sustainability objectives.

China's Pre-COVID Commitment to Sustainable Development

Before the Coronavirus pandemic, the Chinese government formulated unique sustainable development strategies based on China's national conditions. China's waste classification project serves as convincing evidence of proactive sustainability. Urban centres in China generate nearly 180 million tons of waste, despite a mere 800,000 acres allocated for containment (Yang et al., 2017). Beyond the distinct space constraints, this situation raises significant environmental and public health concerns (Abas and Wee, 2014). Recognizing the urgency of this issue, the government implemented several decisive policies. In specific terms, the Regulation on the Management of Household Waste was introduced in 2018, which mandated residents to segregate household waste, with fines imposed for non-compliance (You, 2018). Moreover, the commitment to

tackle this issue was further demonstrated in 2019 through educational campaigns in schools and communities (Guo et al., 2017). Under such policy pressure and the widespread dissemination of relevant garbage knowledge, the statistics from the National Bureau of Statistics of China (2020) reported that China's garbage recycling rate in 2020 was more than double that of 2015.

Another well-known sustainability program in China is the South-to-North Water Transfer Project. This project was designed due to the vastness of China's terrain and its uneven resource distribution, where the south boasts abundant water near its coastal cities and the north faces scarcity inland. To bridge this gap, the project ingeniously diverts water from the Yangtze River in the lush south to the arid northern terrains. Zhang (2009) recognized the transformative impact of this project, pointing out that it has irrigated over 10 million hectares of agricultural land and has provided a vital source of water to more than 100 million residents. Such visionary projects not only demonstrate China's pragmatic approach to resource management but also highlight the government's firm commitment to driving sustainable development forward.

China's Post-COVID Commitment to Sustainable Development

In the wake of the unexpected pandemic, the Chinese government adjusted its priorities. While long-term sustainability remains important, the government placed a greater emphasis on immediate concerns such as technology and the economy. The "14th Five-Year Plan" is a representative example. While it incorporates commendable projects such as the carbon peak and neutrality targets, its main focus is heavily on technological innovation and high-quality development.

Regarding sustainability, the "14th Five-Year Plan" has distinctly laid out the timeline and road map for achieving carbon peak and neutrality targets for the first time. For example, by promoting technologies focused on wind and solar energy for power generation, the plan sets a goal to reach or exceed an electricity generation capacity of 1.2 billion kilowatts from non-fossil fuels by 2030 (Shi and Shi, 2021). However, a more substantial portion of the "14th Five-Year Plan"

emphasises technology innovation and high-quality development. The Chinese government is making significant investments in digital infrastructure, firmly believing in its potential to transform agriculture, industrialisation, and urbanisation. Moreover, the promotion of internet technology has a dual purpose: propelling internal development and enhancing China's position on the global digital stage (Creemers et al., 2022).

Driving these shifts is the Chinese Communist Party's long-standing strategy of using economic growth as a tool to secure public approval. As Barry Naughton argued, sustained economic growth not only uplifts living standards but reinforces political power. Consequently, in the post-pandemic environment, while sustainability remains on the agenda, it has been temporarily overshadowed by the imperative of economic resurgence.

Conclusion

In conclusion, the Coronavirus pandemic has affected the sustainability agendas of the UK and China differently. While the UK deepened its commitment, China's focus on sustainability diminished in the post-pandemic period. This difference can be attributed to their respective pandemic timelines. The UK ended its restrictions by the end of 2021, whereas China did so in January 2023. China's peak pandemic response followed that of the UK, requiring a more urgent allocation of resources and attention. This explains why China places a higher emphasis on swift recovery and economic stability over sustainability efforts currently. Given the significant resources consumed by the pandemic, there is a pressing need for the Chinese government to prioritize immediate concerns, such as the economy, before returning to longer-term sustainability objectives.

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