

THE ESG INDEX AND THE STOCK RETURN DURING THE PANDEMIC

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ABSTRACT

The COVID-19 pandemic had a profound impact on global economic sectors, notably on stock markets. This study delves into the intricate relationship between Environmental, Social, and Governance (ESG) factors and stock market performance during this period. Investors are increasingly applying these non-financial factors as part of their analysis process to identify material risks and growth opportunities. Using a meticulous analysis of the companies listed on the S&P 500 index, we examine the influence of ESG factors on stock market returns, particularly focusing on the year 2020. The observed correlation between stock market returns and S&P 500-related ESG performance illuminates a fundamental shift in market dynamics. The statistical significance of the environmental pillar in the S&P500 during the pandemic signifies a paradigm shift in market priorities. It emphasizes the integral role of environmental sustainability in shaping investor decisions, corporate strategies, regulatory frameworks, and the overall trajectory of the financial markets. This shift has the potential to drive positive change towards a more sustainable and resilient global economy.

KEYWORDS: *environmental factors, ESG factors, pandemic, quantile regression, S&P500.*

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1. INTRODUCTION

As a spread, ESG factors are reported for companies, but also for certain sectors of activity. The S&P 500 ESG Index is an alignment of environmental, social and governance values with investment objectives, with the aim of calculating the overall ESG sensitivity of a company in relation to other companies classified in the same industry.

The pandemic period affected the entire economic sector, but left its mark mainly on the stock market. Both European and international stock exchanges have been severely affected by the measures taken to prevent the spread of the Sars-Cov-2 virus, and these changes will be analyzed during the paper. The aim is to track the influence of ESG factors on the stock market, analyzing the S&P500 index. The background of this paper aims to discover the influence of the ESG factors during the pandemic over the S&P500 index.

The article is divided into four parts, the introduction where I establish the aim of the paper and the structure, the main body has two parts, a general description of the ESG factors and the S&P500 and ESG scores during pandemic, and the last part is the conclusion.

The COVID-19 pandemic marked a transformative period in global economic landscapes, significantly impacting various sectors, particularly the stock market. This study delves into the intricate relationship between Environmental, Social, and Governance (ESG) factors and stock market performance during this pivotal time.

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The unprecedented challenges posed by the pandemic amplified the need for sustainable and socially responsible business practices. During this crisis, companies with robust ESG frameworks showcased resilience, drawing attention to the intersection of ESG factors and market dynamics.

Understanding this connection became crucial for investors, businesses, and policymakers navigating an uncertain financial landscape. This research seeks to bridge the gap in understanding the specific influence of ESG factors on stock market returns, particularly focusing on the year 2020, a period marked by extraordinary volatility and economic uncertainty.

Several factors motivated the choice of the pandemic period for this research. First, the unique economic context, the pandemic induced unparalleled economic challenges, leading to significant market fluctuations. Studying this period allows us to explore how ESG factors mitigated risks and influenced investor confidence amid these uncertainties.

Second, by examining both European and international companies within the S&P 500, the study provides a holistic perspective on the global impact of ESG factors. This global outlook is crucial in understanding cross-border investment trends and sustainable market practices.

Third, the investor shifts, the pandemic accelerated investor interest in ethical investments and sustainable businesses. Analyzing ESG factors during this period sheds light on how investor preferences influenced market behavior, emphasizing the growing importance of ESG considerations in investment decisions.

And last but not least, the policy implications, the pandemic triggered discussions around reshaping economic policies to prioritize sustainability. Exploring the relationship between ESG factors and market performance in this context informs policymakers about the efficacy of sustainability-focused regulations.

By focusing on 2020, this study aims to capture the immediacy and intensity of the pandemic's impact, offering insights into how ESG factors played a crucial role in shaping market responses during this transformative period. Through a meticulous analysis of ESG factors and their correlation with stock market returns, this research contributes to a deeper understanding of sustainable market practices, aligning financial interests with societal well-being.

2. ESG FACTORS PANDEMIC ANALYSIS

2.1 The ESG factors

The paper is supported by a body of knowledge within the field of Economic Sciences. It comprises a variety of scientific articles that analyze both ESG factors and stock market returns for the period from 2008 to 2021.

The literature surrounding Environmental, Social, and Governance (ESG) factors and their influence on stock market behavior is extensive and diverse (Díaz et al., 2021; Ferriani & Natoli, 2021; Hübel & Scholz, 2020; Karamti & Belhassine, 2021; Takahashi & Yamada, 2021). In recent years, researchers have delved into various aspects of ESG factors, examining their impact on corporate behavior, market performance, and investor decision-making. Drawing from a comprehensive array of academic studies, this literature review aims to provide a nuanced understanding of ESG factors and their relevance, particularly in the context of the SARS-COV-2 pandemic.

Environmental, Social, and Governance (ESG) factors have become integral metrics for evaluating a company's ethical, social, and environmental impact. ESG considerations encompass diverse aspects, ranging from carbon emissions and resource management to labor practices and board diversity. In recent decades, these factors have evolved from ethical concerns to essential components of investment decision-making, reflecting a paradigm shift in assessing corporate sustainability (Heinkel et al., 2001).

ESG factors encompass a broad spectrum of considerations that evaluate a company's ethical, social, and environmental practices. These factors have gained significant traction in the investment

community, reflecting a growing recognition of the importance of sustainable and responsible business conduct. Researchers have highlighted the multifaceted nature of ESG, emphasizing the integration of environmental responsibility, social justice, and robust governance structures within corporate frameworks (Heinkel et al., 2001).

Studies indicate that firms adopting robust ESG practices often exhibit altered corporate behavior. Companies engaging in environmentally responsible practices not only mitigate ecological harm but also respond to the growing demand for sustainable products and services. Socially responsible initiatives, including fair labor practices and community engagement, enhance a firm's reputation and stakeholder trust. Additionally, governance structures emphasizing transparency and ethical leadership contribute to long-term organizational stability (Mishra & Modi, 2013; Lueg et al., 2019). Researchers have explored the impact of ESG factors on corporate behavior, investigating how companies respond to environmental and social responsibilities. Studies indicate that firms actively engaged in green practices exhibit altered behavior, potentially driven by reputational concerns and stakeholder pressure (Heinkel et al., 2001). Moreover, corporate social responsibility initiatives have been linked to financial leverage and idiosyncratic risk, indicating complex interconnections between ESG considerations and firms' risk profiles (Mishra & Modi, 2013; Diemont et al., 2016).

Understanding the relationship between ESG factors and stock market dynamics is crucial for investors and policymakers. Several studies have explored the impact of ESG performance on stock returns and market resiliency, particularly during times of financial crises. Research by Albuquerque et al. (2019) established theoretical frameworks linking corporate social responsibility to firm risk, shedding light on the intricate balance between ethical practices and financial stability. Furthermore, the resiliency of environmental and social stocks during the SARS-COV-2 market crash highlighted the significance of ESG considerations in navigating volatile market conditions (Albuquerque et al., 2020).

The relationship between ESG factors and stock market performance is a nuanced topic regarding the pandemic period. Albuquerque et al. (2019) established a theoretical link between corporate social responsibility and firm risk, highlighting the importance of ESG considerations in financial markets. During times of crisis, such as the SARS-COV-2 pandemic, stocks of companies with strong ESG profiles demonstrated higher resiliency, reflecting the market's recognition of their sustainable practices (Albuquerque et al., 2020; Broadstock et al., 2021). Moreover, ESG-focused investing has gained traction, indicating a shift towards portfolios that align with ethical and sustainable principles (Chen & Mussalli, 2020).

Investor sentiment and decision-making processes have been significantly influenced by ESG factors. Chen and Yang (2020) explored investor reactions to corporate ESG information, revealing the presence of an ESG momentum effect in the Taiwanese market. This phenomenon indicates that investors may exaggerate the influence of ESG factors, leading to unique market dynamics driven by ethical considerations (Chen & Yang, 2020).

Investor behavior is significantly influenced by ESG factors. Studies show that investors increasingly consider a company's ESG performance as an indicator of long-term financial viability. The presence of an ESG momentum effect, observed in various markets, suggests that investors might exaggerate the influence of ESG factors, leading to unique market dynamics (Chen & Yang, 2020). The rising importance of ESG was further underscored during the SARS-COV-2 pandemic, where investors closely scrutinized companies' responses to social and environmental challenges, impacting stock valuations (Umar et al., 2022).

The literature paints a complex picture of ESG factors' role in financial markets. While ESG considerations have become pivotal in shaping corporate behavior, market performance, and investor decisions, their impact is multifaceted. During the SARS-COV-2 pandemic, the significance of ESG factors was magnified, emphasizing the need for in-depth analysis to understand their influence fully. This research delves into the specific dynamics of ESG factors during the pandemic, aiming to unravel

their intricate connections with stock market behavior. Through rigorous analysis and robust methodologies, this study aims to contribute nuanced insights to the evolving discourse on ESG factors and their implications for financial markets.

The literature review illustrates the multifaceted nature of ESG factors and their substantial impact on corporate behavior, stock market performance, and investor decision-making. As the SARS-COV-2 pandemic unfolded, ESG considerations gained prominence, shaping market responses and highlighting the integral role of sustainability in contemporary financial landscapes. Examining these interconnected themes provides a robust foundation for exploring the specific influence of ESG factors on the stock market during the pandemic, as detailed in the subsequent sections of this research.

2.2 S&P500 and ESG scores during pandemic

The research methodology in this study encompasses documentary, bibliographic, and theoretical research to investigate the existing body of knowledge. Additionally, specific practical activities at both European and international levels will be analyzed. Data will be sourced from the Thomson Reuters Eikon platform and organized in Excel for further analysis. Throughout the research process, a combination of qualitative and quantitative analysis methods will be employed to gather data, including observation and case study.

To assess ESG risks, information and data from various sources will be analyzed. This includes environmental, social, and governance indicators reported by issuers, as well as specific indicators and analyses available from external sources such as rating agencies or other specialized agencies. Relevant information can also be extracted from periodic reports, issuance documents, and other publicly available sources, such as news articles and regulatory authority sanctions.

Furthermore, in order to provide a more concrete perspective on ESG aspects, a dialogue with representatives of the analyzed companies is proposed. When analyzing environmental, social, and governance factors subject to shareholders' voting, individual assessments will be conducted. This assessment will consider factors such as compliance with legal requirements and environmental standards in the respective industry, comparison with approaches adopted by other companies in the same sector, appropriate justification of proposals, including environmental and societal implications, impact on shareholders' interests and long-term value, effects on the company's financial and operational performance, and considerations regarding corporate governance practices, such as board composition, remuneration policies, and the presence of independent audit, remuneration, and nomination committees.

From a quantitative/econometric perspective, economic-financial theories will be examined. To evaluate the study hypotheses, a complementary approach combining quantitative and qualitative methods is necessary. By employing case studies and content analysis, the obtained results can be further developed, disseminated, and made available for public consultation. Notably, financial asset returns possess certain statistical properties, including non-Gaussian distribution, increased probabilities of extreme events, distribution asymmetry, substantial standard deviation from the mean (including negative daily returns), and significant autocorrelation of volatility dispersion. Given these characteristics, it becomes crucial to analyze performance and risk using Value at Risk (VaR) models, considering linearity, normality, historical testing (backtesting), and stress testing under extreme conditions.

In summary, the research methodology encompasses documentary, bibliographic, and theoretical research, along with analysis of specific practical activities at the international level.

2.2.1 Database

The database consists of the S&P500 index and the ESG scores related to the companies, the analysis period being the pandemic year 2020. The source of the data is the international Thomson Reuters Eikon database. During the research, qualitative and quantitative research methods will be used to collect data such as observation and case study.

2.2.2 Quantile regression

This method is one of the best study methods because in order to assess ESG risks, information / data from various sources will be analyzed, such as environmental, social and governance indicators reported by issuers, specific indicators / analyzes available from external sources (rating agencies or other specialized).

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.208819	0.530194	-4.166060	0.0000
ESG_FY0	-0.035799	0.040581	-0.882161	0.3781
EPS_FY0	0.035767	0.010483	3.411803	0.0007
SPS_FY0	-0.008791	0.019336	-0.454648	0.6496
GBS_FY0	0.015688	0.016446	0.953903	0.3406

Pseudo R-squared	0.017794	Mean dependent var	-0.456103
Adjusted R-squared	0.009889	S.D. dependent var	9.565578
S.E. of regression	9.707555	Objective	409.3270
Quantile dependent var	-1.828358	Restr. objective	416.7426
Sparsity	6.820460	Quasi-LR statistic	24.16131
Prob(Quasi-LR stat)	0.000074		

Figure 1. Quantile Regression

Source: eViews output

From 0.1 quantile regression we can see that only the Social sector from ESG is statistically significant, with a probability under 5%, which means that in the first part of the analyzed period only the social pillar have had an impact on the S&P500 companies.

Equation: RC01 - Workfile: BAZA DE DATE ACTUALIZATA...

View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: __FY0
 Method: Quantile Regression (tau = 0.2)
 Date: 05/18/22 Time: 12:25
 Sample (adjusted): 1 502
 Included observations: 502 after adjustments
 Huber Sandwich Standard Errors & Covariance
 Sparsity method: Kernel (Epanechnikov) using residuals
 Bandwidth method: Hall-Sheather, bw=0.071938
 Estimation successfully identifies unique optimal solution

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.302925	0.260646	-4.998820	0.0000
ESG_FY0	-0.013060	0.032812	-0.398009	0.6908
EPS_FY0	0.015166	0.008665	1.750239	0.0807
GBS_FY0	0.006336	0.011753	0.539093	0.5901
SPS_FY0	-0.008464	0.014605	-0.579537	0.5625

Pseudo R-squared	0.008661	Mean dependent var	-0.456103
Adjusted R-squared	0.000682	S.D. dependent var	9.565578
S.E. of regression	9.640922	Objective	470.5198
Quantile dependent var	-1.431704	Restr. objective	474.6304
Sparsity	3.213387	Quasi-LR statistic	15.99005
Prob(Quasi-LR stat)	0.003033		

Figure 2. Quantile Regression
 Source: eViews output

Equation: RC03 - Workfile: BAZA DE DATE ACTUALIZATA...

View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: __FY0
 Method: Quantile Regression (tau = 0.3)
 Date: 05/18/22 Time: 12:45
 Sample (adjusted): 1 502
 Included observations: 502 after adjustments
 Huber Sandwich Standard Errors & Covariance
 Sparsity method: Kernel (Epanechnikov) using residuals
 Bandwidth method: Hall-Sheather, bw=0.096379
 Estimation successfully identifies unique optimal solution

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.259049	0.237950	-5.291243	0.0000
ESG_FY0	-0.006166	0.020552	-0.300037	0.7643
EPS_FY0	0.008406	0.005003	1.680064	0.0936
GBS_FY0	0.008063	0.007592	1.062081	0.2887
SPS_FY0	-0.007263	0.008961	-0.810425	0.4181

Pseudo R-squared	0.010076	Mean dependent var	-0.456103
Adjusted R-squared	0.002109	S.D. dependent var	9.565578
S.E. of regression	9.624643	Objective	511.2570
Quantile dependent var	-1.166247	Restr. objective	516.4608
Sparsity	2.203158	Quasi-LR statistic	22.49513
Prob(Quasi-LR stat)	0.000160		

Figure 3. Quantile Regression
 Source: eViews output

From the 0.2 and 0.3 quantile regression we can see that none of the ESG pillars have had a probability under 5%, which means that in the first part of the analyzed period none of the pillars have had an impact on the S&P500 companies. Only the 0.1 quantile regression confirms that the Social sector from ESG is statistically significant, with a probability under 5%, which means that in the first part of the analyzed period only the social pillar have had an impact on the S&P500 companies.

Equation: UNTITLED Workfile: BAZA DE DATE ACTUALI...

View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: __FY0
 Method: Quantile Regression (tau = 0.4)
 Date: 05/18/22 Time: 12:47
 Sample (adjusted): 1 502
 Included observations: 502 after adjustments
 Huber Sandwich Standard Errors & Covariance
 Sparsity method: Kernel (Epanechnikov) using residuals
 Bandwidth method: Hall-Sheather, bw=0.11494
 Estimation successfully identifies unique optimal solution

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.888837	0.288575	-3.080091	0.0022
ESG_FY0	-0.023365	0.020536	-1.137748	0.2558
EPS_FY0	0.013838	0.005332	2.595262	0.0097
SPS_FY0	-0.002526	0.008902	-0.283721	0.7767
GBS_FY0	0.012436	0.007304	1.702792	0.0892

Pseudo R-squared	0.009906	Mean dependent var	-0.456103
Adjusted R-squared	0.001937	S.D. dependent var	9.565578
S.E. of regression	9.610771	Objective	541.0888
Quantile dependent var	-0.958942	Restr. objective	546.5023
Sparsity	2.130653	Quasi-LR statistic	21.17346
Prob(Quasi-LR stat)	0.000293		

Figure 4. Quantile Regression

Source: eViews output

From 0.4 quantile regression we can see that only the environmental sector from ESG is statistically significant, with a probability under 5%, which means that in the mid part of the analyzed period only the environmental pillar have had an impact on the S&P500 companies.

Equation: UNTITLED Workfile: BAZA DE DATE ACTUALI...

View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: __FY0
 Method: Quantile Regression (Median)
 Date: 05/18/22 Time: 12:50
 Sample (adjusted): 1 502
 Included observations: 502 after adjustments
 Huber Sandwich Standard Errors & Covariance
 Sparsity method: Kernel (Epanechnikov) using residuals
 Bandwidth method: Hall-Sheather, bw=0.12225
 Estimation successfully identifies unique optimal solution

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.587518	0.315125	-1.864394	0.0629
ESG_FY0	-0.017489	0.021473	-0.814486	0.4158
EPS_FY0	0.014216	0.005666	2.508809	0.0124
GBS_FY0	0.007594	0.007562	1.004185	0.3158
SPS_FY0	-0.005611	0.009542	-0.588058	0.5568

Pseudo R-squared	0.008113	Mean dependent var	-0.456103
Adjusted R-squared	0.000130	S.D. dependent var	9.565578
S.E. of regression	9.598615	Objective	562.2570
Quantile dependent var	-0.774539	Restr. objective	566.8561
Sparsity	2.190567	Quasi-LR statistic	16.79598
Prob(Quasi-LR stat)	0.002118		

Figure 5. Quantile Regression

Source: eViews output

From 0.5 quantile regression we can see that only the environmental sector from ESG is statistically significant, with a probability under 5%, which means that in the mid part of the analyzed period only the environmental pillar have had an impact on the S&P500 companies.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.051431	0.344104	0.149465	0.8812
ESG_FY0	-0.025064	0.022658	-1.106188	0.2692
EPS_FY0	0.018303	0.006390	2.864300	0.0044
SPS_FY0	-0.006817	0.010419	-0.654336	0.5132
GBS_FY0	0.006550	0.008146	0.804107	0.4217

Pseudo R-squared	0.010064	Mean dependent var	-0.456103
Adjusted R-squared	0.002096	S.D. dependent var	9.565578
S.E. of regression	9.590140	Objective	572.4162
Quantile dependent var	-0.531323	Restr. objective	578.2353
Sparsity	2.556155	Quasi-LR statistic	18.97080
Prob(Quasi-LR stat)	0.000796		

Figure 6. Quantile Regression

Source: eViews output

From 0.6 quantile regression we can see that only the environmental sector from ESG is statistically significant, with a probability under 5%, which means that in the mid part of the analyzed period only the environmental pillar have had an impact on the S&P500 companies.

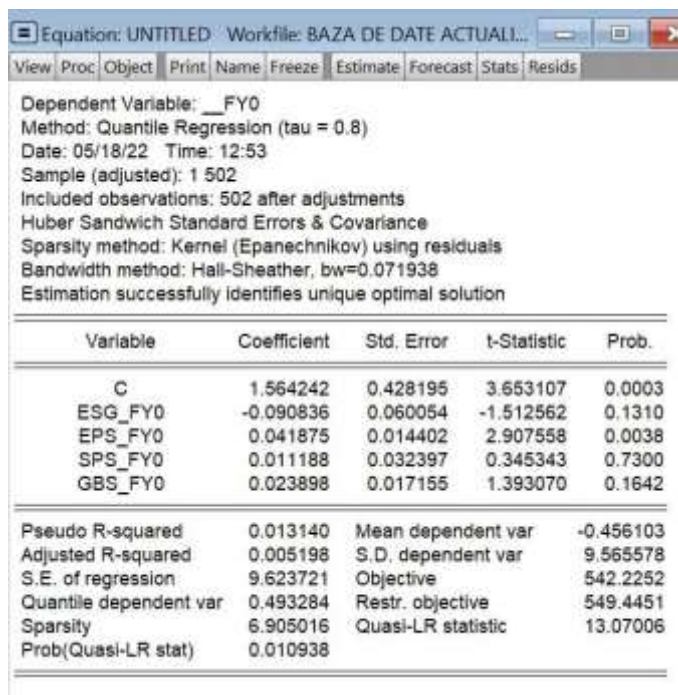
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.476324	0.445829	1.068402	0.2859
ESG_FY0	-0.041332	0.030311	-1.363590	0.1733
EPS_FY0	0.025704	0.008144	3.156049	0.0017
SPS_FY0	-0.001056	0.014616	-0.072222	0.9425
GBS_FY0	0.008567	0.010546	0.812385	0.4170

Pseudo R-squared	0.008640	Mean dependent var	-0.456103
Adjusted R-squared	0.000661	S.D. dependent var	9.565578
S.E. of regression	9.587183	Objective	570.2137
Quantile dependent var	-0.264930	Restr. objective	575.1834
Sparsity	3.710941	Quasi-LR statistic	12.75436
Prob(Quasi-LR stat)	0.012541		

Figure 7. Quantile Regression

Source: eViews output

From 0.7 quantile regression we can see that only the environmental sector from ESG is statistically significant, with a probability under 5%, which means that in the last part of the analyzed period only the environmental pillar have had an impact on the S&P500 companies.



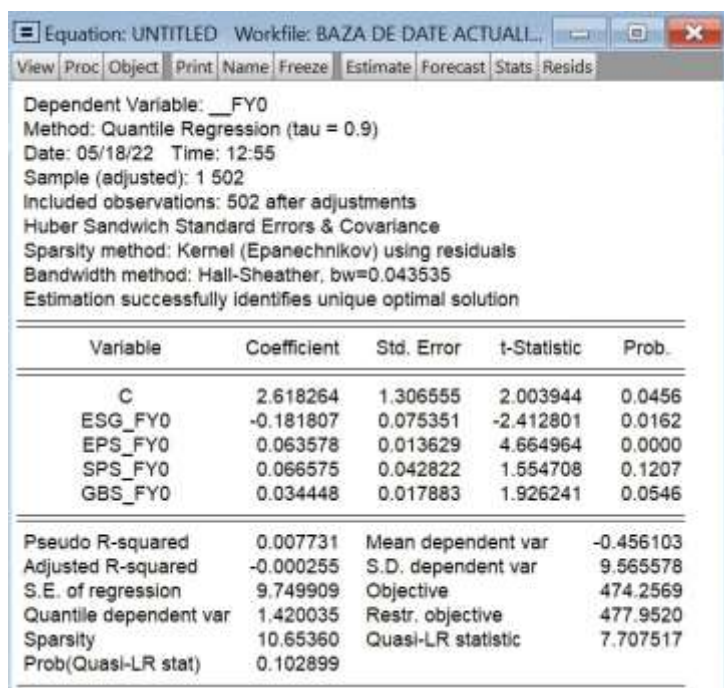
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.564242	0.428195	3.653107	0.0003
ESG_FY0	-0.090836	0.060054	-1.512562	0.1310
EPS_FY0	0.041875	0.014402	2.907558	0.0038
SPS_FY0	0.011188	0.032397	0.345343	0.7300
GBS_FY0	0.023898	0.017155	1.393070	0.1642

Pseudo R-squared	0.013140	Mean dependent var	-0.456103
Adjusted R-squared	0.005198	S.D. dependent var	9.565578
S.E. of regression	9.623721	Objective	542.2252
Quantile dependent var	0.493284	Restr. objective	549.4451
Sparsity	6.905016	Quasi-LR statistic	13.07006
Prob(Quasi-LR stat)	0.010938		

Figure 8. Quantile Regression

Source: eViews output

From 0.8 quantile regression we can see that only the environmental sector from ESG is statistically significant, with a probability under 5%, which means that in the last part of the analyzed period only the environmental pillar have had an impact on the S&P500 companies.



Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.618264	1.306555	2.003944	0.0456
ESG_FY0	-0.181807	0.075351	-2.412801	0.0162
EPS_FY0	0.063578	0.013629	4.664964	0.0000
SPS_FY0	0.066575	0.042822	1.554708	0.1207
GBS_FY0	0.034448	0.017883	1.926241	0.0546

Pseudo R-squared	0.007731	Mean dependent var	-0.456103
Adjusted R-squared	-0.000255	S.D. dependent var	9.565578
S.E. of regression	9.749909	Objective	474.2569
Quantile dependent var	1.420035	Restr. objective	477.9520
Sparsity	10.65360	Quasi-LR statistic	7.707517
Prob(Quasi-LR stat)	0.102899		

Figure 9. Quantile Regression

Source: eViews output

From 0.9 quantile regression we can see that the overall ESG score and the environmental sector from ESG is significant, with a probability under 5%, which means that in the last part of the analyzed period only the environmental pillar has had an impact on the S&P500 companies.

The analysis of the study revealed that ESG factors demonstrated statistical significance, especially of the environmental pillar in most of the quantiles. This indicates that stock market returns had a notable impact on the ESG returns associated with the S&P500 during the latter half of 2020. In the context of ESG ratings, it is important to note that terminology may vary across ESG rating agencies. These agencies typically classify general environmental factors into four major themes: Climate Change, Natural Resources, Pollution and Waste, and Environmental Opportunities.

Furthermore, the impact of the pandemic on ESG factors demands a nuanced exploration, drawing from existing academic works. A comparative analysis of these observations with established research findings would lend robustness to the study's conclusions, offering valuable insights into the complex relationship between global crises, ESG factors, and financial markets. Such in-depth contextualization is pivotal for comprehending the implications of the study's results in the broader academic landscape and practical applications within the financial realm.

The statistical significance observed in the environmental pillar within the context of the S&P500 during the pandemic carries profound implications for both the financial markets and the broader global landscape.

A statistically significant environmental pillar implies that investors closely monitored and valued environmental factors during the pandemic period. Companies with strong environmental practices were likely perceived as more resilient, fostering investor confidence. This heightened awareness suggests that the market recognizes the significance of sustainable business practices even in times of crisis.

The significance of the environmental pillar highlights a growing trend in sustainable investing. Investors are increasingly considering companies' environmental initiatives as indicators of long-term viability. This trend could lead to a shift in investment strategies, with more emphasis on environmentally responsible assets within the S&P500, reshaping the composition of investment portfolios.

Companies that effectively managed their environmental impact during the pandemic demonstrated adaptability and innovation. Such firms were likely better equipped to navigate challenges, indicating that environmental sustainability is not just a social responsibility but also a marker of corporate resilience. This recognition might encourage businesses to further integrate eco-friendly practices into their operations.

The statistical significance in the environmental pillar could influence regulatory policies. Governments and regulatory bodies might consider incentivizing or enforcing environmentally sustainable practices, recognizing their impact on market stability and investor confidence. This could lead to a shift in policies favoring green initiatives and sustainable technologies.

The pandemic's influence on the environmental pillar suggests that certain environmental issues gained prominence. This heightened awareness could persist beyond the pandemic, shaping long-term market dynamics. Companies and investors might continue prioritizing eco-friendly strategies, contributing to a more sustainable financial market ecosystem.

Internationally, the significance of the environmental pillar in the S&P500 during the pandemic could influence global ESG integration efforts. It may encourage standardization of ESG metrics and reporting, fostering a more transparent and comparable landscape for international investors and companies.

In summary, the statistical significance of the environmental pillar in the S&P500 during the pandemic signifies a paradigm shift in market priorities. It emphasizes the integral role of environmental sustainability in shaping investor decisions, corporate strategies, regulatory

frameworks, and the overall trajectory of the financial markets. This shift has the potential to drive positive change towards a more sustainable and resilient global economy.

3. CONCLUSIONS

Our study emphasizes the critical role of ESG factors in shaping stock market dynamics, especially during crises like the COVID-19 pandemic. The significant correlation identified highlights the importance of companies aligning with ESG principles. Moving forward, understanding and incorporating ESG considerations is vital for investors and businesses alike, ensuring resilience and sustainability in the face of unprecedented challenges.

We could see that ESG factors were statistically significant, especially the environmental pillar, in most of the quantiles, meaning that stock market returns had an influence on S&P500 related ESG returns in the second part of 2020.

Companies demonstrating a commitment to environmental sustainability during the pandemic likely appealed to conscious consumers. A significant environmental pillar suggests that consumer preferences aligned with eco-conscious brands, driving market demand for sustainable products and services. Businesses recognizing this trend might invest more in green innovation and marketing strategies.

Environmental sustainability often involves understanding and optimizing supply chains. Companies with a robust environmental pillar likely had resilient and adaptable supply chains, ensuring uninterrupted operations during the pandemic. This adaptability highlights the importance of sustainable practices in ensuring supply chain stability, influencing business continuity strategies across industries.

Firms focusing on the environmental pillar might have streamlined their resource usage, leading to cost efficiencies. During economic uncertainties, companies adept at resource management were likely more financially resilient. This cost-effective approach could become a model for businesses aiming to enhance their financial health while contributing to environmental conservation.

The pandemic emphasized the need for innovative solutions to global challenges. Companies with a significant environmental pillar likely invested in research and development for eco-friendly technologies. This focus on innovation could lead to breakthroughs in green energy, sustainable agriculture, and environmental conservation, shaping future market trends and investment opportunities.

Businesses acknowledging the significance of the environmental pillar may have actively sought insurance products covering environmental risks. This proactive risk mitigation approach could safeguard companies from financial losses associated with environmental incidents, aligning with investors' interests in companies with robust risk management strategies.

A significant environmental pillar underscores the importance of transparent corporate governance. Companies emphasizing environmental sustainability likely maintained high levels of transparency, addressing concerns related to greenwashing. This transparency enhances investor trust and underscores the pivotal role of ethical business practices in financial markets.

The acknowledgment of the environmental pillar's significance could foster international collaborations. Companies, governments, and organizations globally might collaborate on environmental initiatives, leading to partnerships that drive impactful changes. These collaborations can transcend borders, shaping a collective global effort towards a more sustainable future.

In conclusion, the statistical significance of the environmental pillar in the S&P500 during the pandemic reverberates across diverse facets of the economy. From investor behavior to corporate strategies, innovation, and global collaborations, the implications underscore the transformative potential of prioritizing environmental sustainability. This paradigm shift extends beyond financial

markets, catalyzing a broader societal movement towards a greener, more resilient, and ethically responsible global economy.

In synthesizing the findings, it is evident that the interplay between ESG factors and stock market performance, particularly in the context of the COVID-19 pandemic, is nuanced and impactful. The discovery of a statistically significant correlation in most of the quantiles for the environmental pillar signifies a noteworthy relationship: stock market returns indeed had a discernible influence on S&P 500-related ESG returns during the latter half of 2020. This observation prompts several important reflections and implications for investors, businesses, and policymakers.

The observed correlation suggests that investors and market participants increasingly prioritize companies that demonstrate robust ESG practices, especially when economic uncertainties are heightened. The pandemic, with its disruptive force, spotlighted the resilience of businesses grounded in strong ESG principles. Investors, recognizing the stability and sustainability of such companies, directed their investments, thereby influencing stock market returns. This alignment between financial performance and ESG considerations underscores a shifting paradigm in investment strategies, where non-financial factors play a pivotal role.

ESG factors, encompassing environmental sustainability, social responsibility, and governance integrity, are no longer peripheral considerations. They are integral components of investment decisions. The statistical significance observed in this study underscores the relevance of ESG factors, particularly during crisis periods. Companies adhering to ESG best practices not only weathered the storm better but also garnered investor confidence, translating into positive market responses. Such market dynamics accentuate the need for companies to integrate ESG considerations into their core strategies for long-term value creation and risk mitigation.

While the precise mechanisms behind this correlation warrant further exploration, it can be theorized that investors, seeking stable and ethical investments, gravitated towards companies with resilient ESG profiles during the uncertainty of the pandemic. The transparent governance structures, responsible environmental practices, and social accountability of these companies provided a sense of security to investors, leading to favorable stock market outcomes.

This study opens avenues for deeper research into the causal relationships between specific ESG factors and stock market behavior. Understanding which elements within ESG have the most significant impact can guide businesses in targeted improvements. Moreover, exploring the regional and sectoral nuances of these relationships can provide a comprehensive understanding of the global ESG landscape.

Policymakers can draw insights from this research to formulate regulations encouraging ESG adherence, fostering a market environment where sustainable and responsible practices are incentivized. For businesses, this study underscores the imperative of embracing ESG as a strategic imperative rather than a mere compliance requirement. Integrating ESG considerations into corporate DNA can enhance resilience, attract investments, and bolster reputation, thereby contributing to both financial success and societal well-being.

Although the exact terminology varies, ESG rating agencies classify general environmental factors according to four major themes: Climate Change, Natural Resources, Pollution and Waste, and Environmental Opportunities. Within each theme, several key issues are analyzed to arrive at key performance indicators, so the pandemic has left its mark mainly on this range of factors.

From the point of view of ESG factors and stock market returns during the pandemic period, after analyzing these periods we could observe that stock market returns had a significant influence on environmental factors (Climate change, natural resources, pollution and waste and opportunities for medium).

Although the exact terminology varies, ESG rating agencies generally classify environmental factors according to four major themes: Climate change, Natural resources, Pollution and waste, and

Environmental opportunities. Within each theme, several key issues are analyzed in order to arrive at key performance indicators, so that the pandemic has left its mark mainly on this range of factors. In conclusion, the observed correlation between stock market returns and S&P 500-related ESG performance illuminates a fundamental shift in market dynamics. Investors, now more than ever, recognize the intrinsic value of ethical, sustainable, and well-governed companies. As this paradigm deepens, businesses and investors must collaboratively pave the way for a future where financial prosperity is harmonized with environmental stewardship and social responsibility.

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