The Global Automotive Industry Stock Returns During the COVID-19 Pandemic

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Abstract

This study analyzes the relationship of firm-level ESG scores and stock returns from a worldwide database for the automotive industry. It measures the significance of the ESG and CFP relationship during the last decade, and includes a comparison of those firms with different levels of ESG scores, as well as between firms with ESG scores and to firms that lack such scores. A quasi-experimental difference-in-differences (DID) design and a panel data are estimated to examine the impact of ESG scores and ESG combined scores on firms' stock return before and during the COVID-19 pandemic period. The results suggest that sustainable actions during the pandemic lessened stock returns, as evidenced by the negative coefficients of the ESGC and ESG scores. The interaction terms with firm size, revealed that ESGC and ESG scores had a positive relationship with stock returns during the pandemic. Thus, larger firms' returns benefited from higher ESG scores during the COVID-19 crisis. The performance of the stratified sample firms' stock returns in the context of the COVID-19 sanitary emergency is an original contribution to the literature on the ESG-CFP relationship.
JEL Classification: C01, C58, G01, G11, G15, G30.
Keywords: ESG scores, Corporate Financial Performance, Automotive Industry, COVID-19 Pandemic.

Los rendimientos de las acciones de la industria automotriz mundial durante la pandemia de COVID-19

Resumen

Este estudio analiza la relación de los puntajes ESG a nivel de empresa y los rendimientos de las acciones de una base de datos mundial para la industria automotriz. Mide la importancia de la relación ESG y CFP durante la última década, e incluye una comparación de aquellas empresas con diferentes niveles de puntaje ESG, así como entre empresas con puntuaciones ESG y empresas que carecen de dichas puntuaciones. Se estiman un modelo cuasi-experimental de diferencia en diferencias (DID) y un panel de datos para examinar el impacto de las puntuaciones ESG y las puntuaciones combinadas ESG en el rendimiento de las acciones de las empresas antes y durante el período de pandemia de COVID-19. Los resultados sugieren que las acciones sostenibles durante la pandemia disminuyeron los rendimientos de las acciones, como lo indican los coeficientes negativos de las puntuaciones ESGC y ESG. Los términos de interacción con el tamaño de la empresa revelaron que los puntajes ESGC y ESG tuvieron una relación positiva con los rendimientos de las acciones durante la pandemia. Por lo tanto, los rendimientos de las empresas más grandes se beneficiaron de puntuaciones ESG más altas durante la crisis de COVID-19. La rentabilidad de las acciones de las empresas en la muestra estratificada, en el contexto de la emergencia sanitaria de la COVID-19, es una contribución original a la literatura sobre la relación ESG-CFP.
Clasificación JEL: C01, C58, G01, G11, G15, G30.

Palabras clave: Puntaje ESG, Desempeño Financiero Corporativo, Industria Automotriz, Pandemia COVID-19.

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1. Introduction

In recent years, the interest in Corporate Social Responsibility (CSR) has grown rapidly and has had a far-reaching impact on investment decisions (Mooij, 2017). Firms that follow a CSR model or framework seem to be rewarded by their stakeholders according to part of the literature, but a consensus hasn't been reached yet.

One way that companies can measure their Corporate Social Performance (CSP), is through Environmental, Social, and Governance (ESG) scores provided by sustainability rating agencies. The practice of combining ESG scores as criteria for asset selection, is defined as Socially Responsible Investing (SRI), and might also boost CSR firms' Corporate Financial Performance (CFP) as they receive funds from large financial institutions that follow SRI approaches. For example, Friede, Busch, & Bassen (2015) report that USD 60 trillion in assets under management, half of the total global institutional assets, were managed by entities that followed the Principles for Responsible Investment (PRI), i.e., investments guided by CSR-ESG criteria. Moreover, the Global Sustainable Investment Review reported that global sustainable investments represented USD 35.3 trillion, approximately 36% of all professionally managed assets covered by that review worldwide (Global Sustainable Investment Alliance, 2021).

The concept of CSR is wide and comprehensive. It refers to a large number of circumstances and factors that are internal and external to the firm, and provides information required by different types of investors, primarily long-term investors, about the potential risks to which firms are exposed, as well as the measures the managers take to protect it against such risks (Dahlsrud, 2008). CSR's main component is the Environmental, Social, and Corporate Governance (ESG) dimension, frequently measured by independent entities (Welford & Frost, 2006). From an overview of the literature, apparently there is more agreement on ESG components than on CSR components (Widyawati, 2020). ESG scores represent an external evaluation of the legislative, regulatory, reputational, and operational risks and opportunities faced by investors and are expressed as a metric needed to improve their understanding of the strengths and opportunities of those firms in which they invest, as they have reputational and legal implications (Boffo & Patalano, 2020). They may also be seen as a predictor of a firm's prospects to develop a competitive edge based on the attention managers provide to those dimensions.

Financial markets participants clearly understand that the adoption of CSR-ESG criteria in making investment decisions is appealing to individual investors as it offers them the opportunity to support their personal preferences about what sectors of the economy should be incentivized through the allocation of their investments. Portfolio managers are very much aware that concerns on global warming, environmental pollution, or the observance of good corporate governance principles to satisfy the preferences of their customers makes good business sense.

Moreover, modern societies' concerns over CSR-ESG factors are also reflected government policies. The introduction of government sponsored conservation policies (clean energy, water management, air pollution control) that contribute to curve down the damaging effects of global warming, the creation of conditions that improve employee relations and personal satisfaction in the job, or the emphasis on improving corporate governance practices to eliminate the possibility that

managers advance their interests over their investors', are all valid targets for public policies that eventually become beneficial to shareholders.

As a logical consequence of the increasing awareness of governments, investors, and other market participants of the relevance that non-financial corporate information has for the performance evaluation of publicly traded firms, the link between CSR-ESG and Corporate Financial Performance (CFP) has become an extensively researched subject for many decades. However, the results reported by different authors may still be considered inconclusive.

Portfolios of assets with high ESG ratings have been found to outperform their benchmarks in various contexts (e.g., Orlitzky, Schmidt, & Ryne 2003; Bird, Hall, Momentè, & Reggiani, 2007; Kempf & Osthoff, 2007; Edmans, 2011; Nagy, Kassam, & Lee, 2016). This outperformance has in some cases been sufficient to absorb hypothetical transaction costs of up to 50 basis points per trade (Hoepner, 2013). However, other studies have reported that the nature of the relationship is negative, and still others find no relationship at all (Barnett & Salomon, 2006; Girerd-Potin, Jimenez-Garcès, & Louvet, 2014; McWilliams & Siegel, 2000; Nagy et al., 2016). So, an answer to the question "what is the true nature of this relationship?" is still subject to debate and analysis in the literature.

The lack of agreement among the specialists may have to do with the use that researchers make of different, non-strictly comparable measures of CSR-ESG and CFP (Dahlsrud, 2008; Semenova & Hassel, 2015); it may also be due to the different statistical methodologies used to test that relationship (McWilliams & Siegel, 2000); and, still another possibility is that the relationship is not stable, but changing over time (Oikonomou, Brooks, & Pavelin, 2012).

An increasing awareness of the potential benefits of a generalized adoption of ESG criteria to guide strategic and operational decisions has motivated portfolio managers' preference to such investments (Lisin, Kushnir, Koryakov, Fomenko, & Shchukina, 2022). However, they also are responsible to maximize the long-term value of those assets under their watch and would like to have a better understanding of the true nature of the relationship (Henisz, Koller, & Nuttall, 2019). So, most attempts to make any progress towards the solution of this apparent inconclusiveness deserves attention. Some new directions that the CSR-ESG and CFP controversy has followed more recently include the analysis of specific economic sectors (Welford & Frost, 2006), geographic areas (Lisin et al., 2022; Welford & Frost, 2006), and of certain periods characterized by extraordinary events (e.g., financial crises or the COVID-19 pandemic) (Lins, Servaes, & Tamayo, 2017; Sahut & Pasquini-Descomps, 2015; Zhang, Wang, & Dong, 2022).

The present study analyzes firm-level data for the automotive industry from a worldwide database that includes ESG scores and stock returns, and aims to measure the significance of the ESG and CFP relationship during the last decade, including a comparison among those firms with different levels of ESG scores, as well as among firms with ESG scores with respect to firms that lack ESG scores.

The econometric technique used consists of a quasi-experimental difference-in-differences (DID) design, along with a panel data analysis to examine the impact of ESG scores and ESG Combined scores on firms' stock returns before and during the COVID-19 pandemic episode. The results reported highlight the performance of our stratified sample firms' stock returns in the context of the COVID-19 sanitary emergency.

In what follows, section 2 presents a brief survey of relevant studies on the concept of CSR, ESG and Corporate Financial Performance (CFP), as well as the attempts to relate them. It also presents a few studies on the impact of the sanitary emergency on firms, from different perspectives,

although from a financial perspective, none were identified. Section 3 introduces the data and the methodology used for the analysis, and discusses the output of the estimated models. And, finally, Section 4 concludes with some reflections about the possible directions for future research on this important subject.

2. Literature review

2.1 The Definition of ESG

Quantitative ESG data has become increasingly accessible to researchers during the last decades through several online databases. Scores published by diverse ESG rating agencies (KLD, Vigeo, Asset4, and Sustainalytics, among others) are frequently included in decision making models in the financial industry (and elsewhere). However, despite numerous efforts to bring about a clear and unbiased definition of CSR, in both the corporate and the academic world, there still exists confusion as to how CSR should be defined, and this represents a potentially delicate problem because different definitions may have diverging biases in the reading of analytical results. According to Diez-Cañamero, Bishara, Otegi-Olaso, Minguez, & Fernández (2020) financial markets participants require Corporate Sustainability Systems (CSS) that objectively rate corporate performance. However, in all intellectual honesty, the development of a more generally accepted paradigm is still in the making.

The challenge is not trivial since there is no way to confirm if a measurement is right or contains a certain bias. Some progress has been achieved by studying different databases that intend to measure the environmental, social, and governance dimensions of firms. For example, Dahlsrud (2008) argues that CSR (and CSR measures) should be considered a social construction for which it is unfeasible to agree on a definition. However, that fact should not be considered an obstacle to analyze the common traits among them, so he engages on a categorization of CSR definitions into five dimensions[2] identified from a vast Google journal articles and webpages exploration that found 37 definitions of CSR, from 27 authors, for a period that goes 1980 to 2003, based on which he was able to perform frequency counts, and based on them, to provide evidence about the consistency with which such dimensions are mentioned in the literature. This author reported that the definitions were mainly congruent and that while the a universally accepted definition of CSR is still missing, that congruence among measures makes the problem less acute. While most authors CSR definitions describe an organizational dimension, they do not postulate any guidelines on how to use it from a business perspective. So, the author concludes, the greatest challenge for business is to understand how CSR is present in each specific situation, and how to respond to it from a strategic point of view, more so than to agree on a single definition.

Semenova & Hassel (2015) explored the convergence of different ESG ratings, including MSCI EST Stats, Thomson Reuters ASSET4, and Global Engagement Services (GES). The study concluded that the ratings share some dimensions, but they do not converge. They found a high correlation

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[2] The dimensions identified by Dahlsrub (2008) included: environmental, social, economic, stakeholder, and voluntariness.

between the environmental ratings of MSCI (formerly known as KLD), ASSET4 and GES during the first decade of the 21st century, but not much correlation in the Social or Governance dimensions.

Dorfleitner, Halbritter, & Nguyen (2015), recognized the relevance of ESG scores for managers and investors decision-making, and empirically compared three different approaches that measure ESG (ASSET4, Bloomberg and KLD) using a data set that includes ESG data for more than 8,500 firms on a global scale and conclude there is an obvious lack of convergence of ESG measures since the ratings of each do not coincide neither in distribution nor in risk. Drempetic, Klein, & Zwergel (2020) used the ASSET4 database of Thomson Reuters (containing more than 6000 companies) to evaluate the relationship among firm size, a company's resources allocated to providing ESG data, and the company's ESG data on its sustainability performance, and found a significant positive correlation between those three variables. Those results raised the concern of whether the way the ESG score measures corporate sustainability represents a relative advantage to those firms with more resources available, and the authors concluded that the current ESG measures do not represent realistic measures of the sustainability performance of a company, but rather depend of firm size which determines data availability and allocated resources to provide ESG information.

While the discussion on which database is more adequate continues, it becomes more and more clear that there is a serious commitment to achieve a unified understanding of the CSR and ESG dimensions.

2.2 CSR, ESG, CSP, CFP, and Business Decisions

A fundamental question in the search for a definitive answer is: why should business managers promote and accept the adoption of CSR and ESG and contribute to their diffusion? If it can be proved that CSR and ESG bring tangible benefits to businesses (in terms of financial indicators, for example), it is much easier for managers to convince their investors of the importance to allocate resources (material, financial, human) to the achievement of CSR and ESG criteria improvements. The inability to build a compelling case about their adoption in terms of tangible benefits could be contrary to their generalized adoption. The original question may be re-expressed in terms of whether or not the promotion and effective adoption of CSR criteria on managerial and strategic decisions in business also results in tangible economic benefits.

Carroll & Shabana (2010) reviewed the seminal works on CSR with the intention to build a "business case" for CSR, i.e., discussing the underlying rationality of the business community to support and adopt CSR criteria. Their conception of a business case for CSR refers to the determination of how profits benefit and other possible dimensions are affected by the pursuit of CSR strategies. They also briefly discussed the research lines that have derived from that discussion.

Research on the empirical relationship between different forms of socially responsible management (such as CSR, ESG, SRI, among others) and firms' financial performance is interested on finding evidence of whether actions that promote social and environmental improvements also have beneficial economic effects. The different measures of firms' financial performance and its relation with CSR/ESG that have been discussed in the literature include, for example, return on equity (ROE), return on assets (ROA), or return on sales (ROS) (Barnett & Salomon, 2012; Waddock & Graves, 1997). A different approach consists in the use a firm's stock returns as an unbiased estimator of its

financial performance (Girerd-Potin et al., 2014). While accounting based measurements have the benefit of making cross-comparisons among firms more consistent, since all follow common accounting principles and rules, stock returns are recognized as an immediate and efficient measure of market participants' perceptions on the firm's general performance, but particularly its financial performance.

Among other many studies that have focused their attention on the business relevance derived from the adoption of CSR, the work of Brooks & Oikonomou (2018) explore the literature on the relationship between CSR and Financial Performance (FP). According to these authors, finding evidence of financial benefits associated to responsible corporate governance is enough to transfer the discussion from the realm of moral and ethics to the arena of business economics.

The possibility that the adoption of corporate social responsibility principles to guide managerial activity may propitiate financial improvements is a strong economic argument in favor of following ESG scores as criteria to choose investments. However, while there is strong evidence in favor of that relationship, until now there is not a definitive consensus.

In what follows we review some representative empirical studies that document the existence of that relationship, and also mention those few that question its existence, whether because they empirically find a negative relationship, or because they find no relationship at all.

Among the vast number of studies that have reported a positive relationship between CSR-ESG and CSP many different conceptual and methodological approaches have been used. While the subject has been explored since at least fifty years ago, due to space concerns we limit our literature review to the two most recent decades and refer to seminal papers only exceptionally.

At the beginning of the 21st century, the generalized belief was that the relationship between corporate social/environmental performance (CSP) and corporate financial performance (CFP) was "too fractured". In response, Orlitzky et al. (2003) developed a meta-analytic review of 52 quantitative works, which represented approximately 34,000 observations on the CSP-CFP relationship, developed within a time horizon of 30 years, and found a positive association between these two constructs, so they were able to reject the hypothesis that CSP is inconsistent with shareholder value maximization. Interestingly, they reported that CSP seems to be more highly correlated with accounting-based CFP measures than with market-based measures, opening a new line of research that should attempt to answer why. Briefly, this study presented significantly stronger evidence on the existence of a positive CSP-CFP relationship than many other works on the subject. These authors derive relevant implications for decision makers, e.g., that the market does not penalize firms characterized by an outstanding corporate social performance, which supports the idea that managers can be socially responsible without contradicting the firm's value maximization objective; indeed, they may even pursue CSP objectives if they are convinced the market will respond favorably.

Managers are often said to experience a conflict between guiding their actions only by the interest of the stockholders vs. considering other stakeholders' interests, but it does not need to be the case. No conflict of interest exists if the more comprehensive stakeholder perspective is aligned with firm value (and stockholder wealth) maximization. Bird et al. (2007) examined the extent to which such a conflict exists. Instead of focusing on a single CSR score for each company, they use five

different CSR activities, to examine the strengths (defined in terms of those dimensions in which a company exceeds legal requirements) and concerns (defined in terms of the extent to which a company falls short of legal requirements or acceptable community standards) scores relationship with equity performance. Their general conclusion was that the evidence was insufficient and, for that reason, to take a wide stakeholder perspective was contrary to the interest of the stockholders. They also found that all CSR activities influence the market and that, in recent times, most firms that satisfied minimum requirements of diversity and environmental protection but were the most proactive in employee-relations were favorably valued by the market.

Welford & Frost (2006) provide an overview of CSR practices in Asia, evaluate the usefulness of codes of conduct, reviews the benefits of CSR in supply chains and reviews obstacles for companies wishing to adopt good CSR practices. In order to achieve this, interviews were undertaken with CSR managers, factory managers and other experts, conducted in confidence and anonymously. This research finds clear advantages to firms that adopt CSR practices, but that conclusion is not without caveats. For example, firms that have reached a maturity phase are better able to implement CSR since during their evolution they have implemented many of the principles: they enjoy more advanced and sophisticated governance and managerial systems, can pay better salaries and count with alternative mechanisms of employee retention (training, growth opportunities, etc.).

Kempf & Osthoff (2007) implement a simple trading strategy based on socially responsible ratings (KLD Research & Analytics). By combining long position in stocks with high socially responsible ratings and short positions in stocks with low socially responsible ratings resulted in an abnormal return of 8.7% per year. These authors report that the abnormal returns obtained with their strategy remain significant even after including transaction costs.

Sharfman & Fernando (2008) found an association between environmental responsibility and firm performance, that they attribute to an adequate use of the firm's resources, and infer it manifests in the form of organizational performance. However, the conceptualization proposed by these authors, is that environmental risk management lowers the cost of capital and, thus, represent an alternative perspective of the environmental-economic performance relationship. This is explained among environmentally responsible firms by a conversion of equity into debt financing, which provide increased tax shield and reduces the effective cost of capital of the firm.

Working with a value-weighted portfolio of the "100 Best Companies to Work For in America", Edmans (2011) focused on the relationship between employee satisfaction and long-run stock returns and reported an annual alpha of 3.5% for a period of 25 years (1984-2009). His results were robust to controls for firm characteristics, different portfolio building strategies, and the removal of outlier observations. Consistent with human capital theories, the empirical evidence supports the assertion that employee satisfaction is positively correlated with shareholder returns.

An extensive literature review by Friede et al. (2015) on the same subject identified more than 2000 empirical and review studies interested in the relation between CSR-ESG and CFP. It is possible to conclude from these authors' research that the case for ESG investing has been empirically very well documented, and that a vast majority of the studies have concluded there is a positive and stable in time ESG–CFP relation.

The increasing importance attributed to ESG factors among institutional investors selection criteria for investments was documented by Nagy et al. (2016). These authors recognized portfolio managers' frequent concerns that the inclusion of ESG factors in their decision-making process comes

at the cost of weaker risk-adjusted returns. In their work they analyze two strategies for which this performance trade-off does not always occur: their first ("Tilt") strategy builds portfolios that overweight those stocks with high ESG scores; and their second ("Momentum") strategy overweighs those stocks that have recorded and improvement of their ESG scores in recent periods. Both strategies outperformed the MSCI World Index and, at the same time, increased the portfolios' ESG profile.

Two important contributions derived from the systematic literature review reported by Widyawati (2020) on Socially Responsible Investments and Environmental Social Governance metrics, were: 1) a bibliographic map that reveals a disproportionate interest on the financial performance of SRI portfolios; 2) evidence that ESG metrics are frequently used as a proxy for sustainability performance but lack transparency and convergence.

More recently, Huang (2021) reviewed 69 studies that utilize ESG and CFP metrics and, based on their analysis, suggested that most of the empirical evidence indicates "a positive, statistically significant but economically modest ESG–CFP link, concluding that ESG efforts do not seem to be motivated by any specific CFP indicators and that the problem should be approached considering ESG as "a part of overall firm activity".

From the previous review, one might conclude that the relationship between CSR/ESG and CFP/CSP is reliable and predominantly positive. However, Brooks & Oikonomou (2018) assert that the idea that socially responsible behavior brings financial benefits to the firm also has had its detractors. The Nobel Laureate in Economics, Milton Friedman, famously argued that CSR represents unjustified taxation on shareholders (Friedman, 1970).

Beyond Friedman's (1984) purely theoretical reasoning, there are a few studies that report a negative or a non-significant relationship between CSR/ESG and CFP, as well as a changing relationship that depends on the filtering process chosen by the authors. For example, McWilliams & Siegel (2000) argued that the inconsistency in the empirical results of different researches may be explained by a model specification problem. While most studies estimate the influence of CSR on firm performance using regression analysis, including a number of control variables, in almost all cases there is no control variable for Research and Development (R&D) investment. However, that variable has been extensively considered as an important determinant of firms' performance (see, for example, Boiko, 2021). When R&D is included in the model, McWilliams & Siegel (2000) find that CSR has no effect whatsoever on the financial performance of the firm. Barnett & Salomon (2006) contribute to the debate by measuring the significance of that link in a sample of 61 mutual funds that practiced Socially Responsible Investing (SRI) from 1972 through the year 2000. Their proposed hypothesis was that the financial losses due to poor diversification in a certain fund are compensated by a more exhaustive "screening" that includes better and more stable firms in its portfolio. Their results, in effect, confirmed that as more social screens are used by a fund, financial returns tend to diminish first, but as the number of screens increases and reaches a maximum, it improves again. Such findings suggest that positive and negative evidence on the relationship may be correct and complementary after all. Moreover, community relations screening was positive for financial performance, but that environmental and labor relations screening diminished financial performance. What becomes clear from Barnett & Salomon's (2006) contribution is that the focus on

the relationship between financial performance and CSR should move towards a more detailed analysis of different screening strategies results instead of attempting to confirm whether there is a financial benefit on following CSR guidelines. Another example of these seemingly contradictory reports is the study by Oikonomou et al. (2012), who were interested on the wealth protective consequences of firms' CSR behavior and studied the relationship between Corporate Social Performance and financial risk using a large sample of firms from the S&P 500 for a period from 1992 through 2009. Interestingly, their main finding was a negative but weak association between corporate social responsibility and systematic firm risk, at the same time that corporate social irresponsibility showed a positive strong association with financial risk. However, what matters for the present discussion is that, according to the results reported, there seems not to be a significant benefit when investments are selected according to Corporate Social Performance (or CSP, equivalent to a combination of CSR and ESG criteria), i.e., portfolio managers cannot use CSR/ESG criteria to deliver superior investment performance. The study concludes that, maybe, the stock market volatility acts as a buffer to the CSP-risk relationship. Finally, referring that the abundant evidence that firms with high ESG scores show high excess returns as well as lower market volatility, La Torre, Mango, Cafaro, & Leo (2020) argue that such evidence seems to be supported by the belief that ESG factors are interpreted as proxy measures of a firm's financial quality. Using a two-step methodology, they study the market performance of Eurostoxx50 index member companies, and using different ESG indicators they find that their results contradict previous reports: the stocks in their sample seem not to be affected by the type or intensity of ESG efforts they display.

2.3 Is There a Relationship Between ESG and Financial Performance?

According to Freeman's "Stakeholder Theory" (Freeman, 1984) CSR principles provide a solid foundation to build relationships among different groups of constituencies, internal and external to the firm which, if rightly conducted can have a positive impact on the long-term financial performance of the latter. The diversity and complexity of factors involved in CSR is such that the elaboration of adequate indicators must be carefully designed to objectively measure individual entities' compliance with CSR (sustainable development, social responsibility, and good corporate governance) criteria. Otherwise, neither governments nor investors can be sure of the extent to which economic agents act responsibly (Diez-Cañamero et al., 2020).

The puzzling inconsistency with which researchers have reported a positive, negative, and neutral impact of corporate social responsibility (CSR) on financial performance may be due to a problem of definitions in the measurement of the underlying dimensions, which as mentioned before, is one of the most prolific discussion subjects in the field. Another possible explanation may lie on the differing statistical approaches used by different studies. An interesting case in point is the work of McWilliams & Siegel (2000), who estimate the effect of CSR scores by regressing CFP measures on the former along with several control variables, and demonstrate a flaw that is present in many econometric studies. According to their view, the model is mis specified because it omits the investments in R&D as a control variable that has been reported to play a significant role in the determination of a firm's financial performance. This omission results in an over estimation of the financial impact of CSR scores. When they include that variable in their estimations, they conclude that CSR has no statistically significant impact on the financial performance of their sample firms.

Furthermore, the explanation of the inconclusiveness observed may even be the outcome of a constantly changing relationship which has, until now, been elusive to empirical research.

2.4   ESG and the Automotive Industry

An interest to examine the response of firms' stock performance to ESG criteria in the automotive industry and its performance during the COVID-19 pandemic is justified by the high degree of globalization that that industry has attained, as well as because of the growing economic importance that it represents today for many countries. The evolution of the industry during the pandemic requires a contrasting analysis of the evolution of the ESG and CFP relationship during a period of great uncertainty and significant market volatility, relative to the previous period. As an immediate antecedent, the sales of automotive products came to a serious slow-down during the first months of the COVID-19 pandemic with sales dropping by 71% in China, 47% in the United States, and 80% in Europe (Hensley, Maurer, & Padhi, 2021). The disruptive implications of the COVID-19 crisis for automotive manufacturers were unparalleled by any standards (Hoeft, 2021). Wang & Wells (2020) discuss the significant transformation of the public's behavior in what respects the physical mobility and the increasing use of virtual mobility during the pandemic. They postulate that the period may be considered an extraordinary experimental set to explore the consequences of deep changes in the structure and practices that have long characterized the automobile use. Hojdik (2021), for example, assessed how the extraordinary conditions detonated by the pandemic affected the automotive industry in the European region. His analysis highlights the economic importance of the industry for the European Union (EU), where it employs 2.7 million people and produces approximately 20% of all vehicles produced worldwide, not to mention the relevance that the industry has for the innovation process and technological advance of the region. The analysis he presents makes an evaluation across the EU members of the automotive industry performance after the pandemic.

Dealerships around the world muddled through the sanitary emergency to respond to the obligatory isolation of customers with the use of technology. However, as the isolation restrictions were gradually lifted, customers massively came back to the dealers' floors. Most dealerships are now combining their physical sales floor along with internet-based platforms to reactivate the industry (Hensley et al., 2021). The initiative and creativity of the industry has become a valuable asset used by industry participants to scout, develop and capture market opportunities in extraordinary times. Hoeft (2021) provided insights into the crisis management of automotive industry in Asia and, based on 18 interviews with market participants, he identified six principles that can leverage the resources and improve business outcomes. This study was a valuable contribution to understand industry participants' adoption of extraordinary measures that included flexible and adaptive organizational design, leadership structures interacting with the environment to respond to new and continuously changing goals, etc., and the findings are likely to represent a valuable input for regulators as it may suggest new ways into which the regulation may be improved.

Several studies have focused on more regional impacts of the pandemic on the automotive industry. Navavongsathian, Trimetsoontorn, Rungruang, & Janthongpan (2020), for example, study the impact of the pandemic on the supply side performance of the auto part industry in Thailand

based on a questionnaire on a stratified sample of auto parts manufacturers. This study concluded that the pandemic and the environmental consequences derived from it negatively affected the supply chain performance.

Wang & Wells (2020) examined the COVID-19 pandemic impact on the European automotive industry from the perspective of the socio-technical transitions literature. The authors conclude that mobility sharing is likely to diminish, as the use of electric cars increases.

The analysis of the relationship between the effects of the COVID-19 provoked pandemic, the CFP and the ESG of automotive industry firms has, until now, not been subject of a detailed analysis. The present study aims to successfully fill that gap in the literature.

3. Data and Methodological Aspects

3.1 Data

The database that supported the model's estimation was obtained from the ASSET4[3], and consisted of quarterly data on 422 automotive companies listed in 29 different countries[4], covering a period that goes from 2017Q4 through 2022Q1. The definition of automotive industry comprised (1) auto and truck manufacturers; (2) vehicles, parts and service retailers; (3) auto, truck, and motorcycle parts; and (4) tires and rubber products.

The research focuses on the impact of the ESG and ESG combined scores on these companies' stock returns before and during the COVID-19 pandemic. However, some firms reported their ESG only at some points of the period of interest, while others did not report their ESG ratings at any time. Additionally, the database was continuously updated, excluding firms that no longer qualified, and adding new companies as they were listed. Thus, the analysis examines all the firms in the dataset, as well as the 98 firms that consistently disclosed their ESG scores for the period of interest.

3.2   Econometric Specifications

We estimated a quasi-experimental difference-in-differences (DID) model and a panel data design to examine the impact of ESG scores and ESG combined scores on firms' stock return before and during the COVID-19 pandemic period. The quarterly stock return for each company ($r_{i,t}$) is computed as:

$$r_{i,t} = \left(\frac{P_{i,t}}{P_{i,t-1}} - 1 \right) \times 100 \tag{1}$$

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[3] ASSET4 was founded in 2003, taken over by Thomson Reuters in 2009 and their headquarters are located in Zurich Switzerland. The ASSET4 universe includes over 3000 public world companies and covers major indices: S&P 500, MSCI World Index, Nasdaq, FTSE350 and MSCI World Index. The main customers of ASSET4 are from the financial sector. The company collects and analyzes data from company reports, company websites, NGO websites, newspapers, journals, and trade publications but the sources of most ESG data are CSR reports created by the company themselves (Graafland & Smid, 2012).

[4] The countries where the sample's firms are listed is the following: Australia, Belgium, Bermuda, Brazil, British Virgin Islands, Canada, Cayman Islands, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Jersey, Luxembourg, Mexico, Netherlands, Norway, Portugal, South Korea, Spain, Sweden, Switzerland, United Kingdom, United States.

Where $P_{i,t}$ is the closing price of the stock on quarter t and $P_{i,t-1}$ is the previous quarter closing price.

The DID approach estimates different results between control and treatment groups in the presence of shocks. So, we apply the DID model to examine the impact of the COVID-19 pandemic economic effects on the stock returns of automotive firms. Following Zhang (2021), the following DID model was specified:

$$
\begin{aligned}
r_{i,t} = \alpha &+ \beta_1(CVD_t) + \beta_2\big(DMK_{i,t}\big) + \beta_3\big(CVD_t \times DMK_{i,t}\big) + \beta_4\big(NDX_{i,t}\big) \\
&+ \beta_5\big(lnMK_{i,t}\big) + v_i + v_t + \varepsilon_{i,t}
\end{aligned}
\tag{2}
$$

The event dummy variable for the COVID-19 pandemic period was CVD_t, which takes a value of 1 from the first quarter of 2020 to the first quarter of 2022 and 0 otherwise. The treatment group includes companies that were most affected by the COVID-19 pandemic economic ripple waves. Such companies were defined as those whose total market capitalization during the first quarter of 2020 was reduced by more than the average decrease in market capitalization for all firms in the sample when compared to the first quarter of 2019[5]. DMK_i is equal to 1 if a firm belongs to the treatment group and 0 otherwise. Accordingly, in the context of the DID approach, DMK_i is the treatment group, while CVD_t is the pre- and after-treatment time variable. Our focus on the DID estimation design is on the combined effect of CVD_t x DMK_i.

Previous studies report evidence that firm size influences its financial performance (Breitz & Partapuoli, 2020; Zhang, 2021). For that reason, the logarithm of each firm's market capitalization ($lnMK_i$) was included to capture its size. The returns of the stock market index also influence individual companies' stock returns (Ivanovski, Ivanovska, & Narasanov, 2016). Accordingly, the market index returns for the market where the firm is incorporated was included as a control variable ($NDXi$).

The key explanatory variables are the ESG combined ($ESGC_i$) and ESG (ESG_i) scores which are assigned a value from 0 to 100. The ESG score reflects companies' publicly available data to measure their performance on environmental, governance, and social issues. The combined score is a weighted average of the ESG and the controversies score, which includes 23 controversial subjects. So, when a company is not involved in any controversies, both scores are the same. To examine the influence of these scores on stock returns of the automotive industry before and during the COVID-19 episode, we set our econometric specification as follows:

$$
\begin{aligned}
r_{i,t} = \alpha &+ \beta_1(CVD_t) + \beta_2\big(DMK_{i,t}\big) + \beta_3\big(CVD_t \times DMK_{i,t}\big) \\
&+ \beta_4\big(CVD_t \times DMK_{i,t} \times S_{i,t-1}\big) + \beta_5\big(S_{i,t-1}\big) + \beta_6\big(NDX_{i,t}\big) \\
&+ \beta_7\big(lnMK_{i,t}\big) + v_i + v_t + \varepsilon_{i,t}
\end{aligned}
\tag{3}
$$

Where $S_{i,t-1}$ alternatively represents either the ESG combined score or the raw ESG score. In other words, Equation (3) represents a general model that the study uses for either the ESGC or the

---

[5] The average change in market capitalization in 2020Q1 was -30.04%.

raw ESG scores represented by the variable $S_{i,t-1}$ in the model. ESG data is updated once a year in most cases. However, individual firms' scores may be published at different dates, e.g., the ESG score for company P is published in the third quarter, while company's Q score is published in the first quarter. Thus, the company's stock return of quarter t reflects the ESG score corresponding to quarter t-1.

We also examine the stock returns of the 98 companies that published their ESG scores for the period of interest and split that period into two subperiods: one before the COVID-19 pandemic (2017Q4-2019Q4) and the other corresponding to that episode (2020Q1-2022Q4). In the panel data specifications, the interaction of the company's ESG with its size (as measured by lnMK_i) was included to examine their combined effect on stock returns. The panel regression model is represented as:

$$r_{i,t} = \alpha + \beta_1\big(S_{i,t-1}\big) + \beta_2\big(S_{i,t-1} \times lnMK_{i,t}\big) + \beta_3\big(NDX_{i,t}\big) + \beta_4\big(lnMK_{i,t}\big) \\ + v_i + v_t + \varepsilon_{i,t} \tag{4}$$

3.3 Empirical Analysis

Table 1 presents a statistical summary of the main variables of the study. The ESGC's skewness is negative, while the ESG is right-skewed; i.e., a larger proportion of the companies have a higher ESG. The left-skewness of the ESGC may be related to the negative impact of effect of unfavorable media on the controversies score (Breitz & Partapuoli, 2020).

Table 1. Summary Statistics of the Panel Data Analysis

|	Stocks Return	Indices Return	ln(Market Cap.)	ESG Combined Score	ESG Score	COVID Pandemic Period (Post)	Change in Market Cap. (Treat)
Mean	1.681	2.392	20.272	45.567	48.455	0.527	0.485
Median	-1.250	3.050	19.839	46.619	48.445	1	0
Maximum	860.774	31.853	27.739	84.550	93.585	1	1
Minimum	-99.734	-37.194	17.728	0.921	0.921	0	0
Std. Dev.	32.257	9.593	1.853	17.076	19.844	0.499	0.500
Skewness	8.145	-0.475	0.827	-0.118	0.076	-0.107	0.058
Kurtosis	170.745	3.763	2.966	2.494	2.355	1.012	1.003
Jarque-Bera (*p*-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	6,439	6,517	6,517	2,592	2,592	6,517	6,517

Source: Authors' own elaboration.

Table 2 presents some descriptive statistics of different groups of companies and subperiods. The Wilcoxon test and the *t*-test reject the null of equal mean and equal median returns for the group of firms with and the group of firms without ESG. Similarly, the median and mean returns in 2017Q4-2019Q4 are not the same as in 2020Q1-2022Q1. However, average returns of the treatment and control groups are significantly different at a 5.5% level, while their medians are not significantly different at conventional levels.

Table 2. Descriptive Statistics by Groups (Returns Comparisons)

	ESG Available	ESG Unavailable	Treatment Group	Control Group	2017Q4 - 2019Q4	2020Q1 - 2022Q1
Mean	3.477	0.476	0.896	2.437	-1.303	4.365
Median	0.766	-2.700	-1.382	-1.122	-1.895	-0.012
Maximum	860.774	816.667	378.986	860.774	275.000	860.774
Minimum	-75.754	-99.734	-75.754	-99.734	-98.000	-99.734
Std. Dev.	34.073	30.926	27.296	36.390	19.085	40.421
Coeff. Var.	9.801	64.972	30.476	14.935	-14.641	9.261
Skewness	8.098	8.158	2.847	9.956	2.303	7.492
Kurtosis	172.329	167.009	28.276	197.666	26.018	128.450
Jarque-Bera (*p*-value)	0.000	0.000	0.000	0.000	0.000	0.000
Observations	2,585	3,854	3,159	3,280	3,049	3,390
Equality tests:						
Mean (*t*-test)	0.000		0.055		0.000	
Median (Wilcoxon)	0.000		0.407		0.000	
F-test (variance)	0.000		0.000		0.000	

Source: Authors' own elaboration.

Figure 1 presents the automotive sector's quarterly stock returns from 2017Q4 to 2022Q1. Panel A compares the returns of the treatment and control groups. The returns of both groups fell drastically in the first quarter of 2020 and then recovered during the next quarter. However, the average return of the treatment group fell almost two times (-42%) as much as the control group's (-24%), but they recovered from their losses over the next quarter. Panel B contrasts the returns of companies that disclosed their ESG scores with those that did not. Average returns of the former plunged by 40% during 2020Q1, while those of the latter dropped by 29%. Average returns of companies with ESG increased by 43% in the next quarter, and those of companies that did not publish their ESG score raised only by 19%.
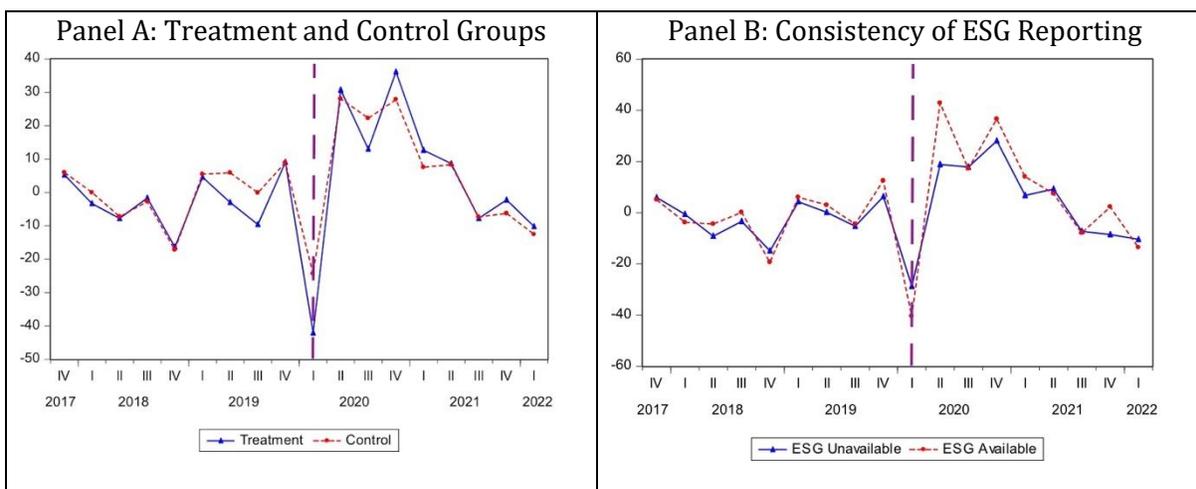
Figure 1. Automotive sector's average stock returns
Source: Authors' own elaboration.

Section A of Table 3 presents the results of DID regressions for the full sample of automotive companies. Section B displays the outcomes of those firms that consistently reported their ESG scores from 2017Q4 to 2022Q1. The estimated results of columns 1A and 1B correspond to Equation (2), the outcomes of columns 2A and 2B relate to Equation (3), and the findings in columns 3A and 3B concern Equation (4).

The dummy variable representing the COVID-19 period has a positive coefficient, indicating a direct relationship between stock returns and the pandemic episode. However, such a relationship was not statistically significant. The interaction term of the COVID-19 (Post) and change in market capitalization (Treat) dummies was positive in all cases but statistically significant only in the baseline model that does not consider ESG scores. The coefficient of $\ln MK_i$ was substantially positive and significant in all models. Thus, firm size directly affected stock returns during the COVID-19 episode. The interaction of CVD and DMK_i baseline results displayed in columns 1A and 1B are significantly positive. So, as expected, the outbreak of the COVID-19 pandemic had a positive impact on automotive firms' stock returns.

The results in columns 2A and 2B show a significantly negative relationship between the ESGC score and stock returns. Columns 3A and 3B present a similar result for the ESG score, although the magnitude of the coefficients is lower in the second case. Accordingly, the estimations suggest that ESG scores reduced stock returns. All models indicate that the interaction term of CVD, DMK_i, and $ESGS_i$ is marginal and not significant, which implies that during the COVID-19 pandemic, ESG scores did not play a role in determining the treatment group's stock returns.

Table 3. DID regression results of ESGC and ESG

A: All Automotive Firms						
			ESGC		**ESG**	
Variable	**(1A)**		**(2A)**		**(3A)**	
α	-18.807	***	-24.645	***	-33.527	***
CVD_t	1.257		2.720		2.869	
DMK_i	-3.051	***	-3.004	*	-2.731	
$CVD_t \times DMK_i$	3.442	**	4.407		5.110	
$CVD_t \times DMK_i \times S_{i,t-1}$			0.007		-0.007	
$S_{i,t-1}$			-0.169	***	-0.156	***
$\ln MK_i$	0.846	***	1.365	***	1.755	***
NDX_i	1.400	***	1.693	***	1.688	***
Observations	6,439		2,543		2,543	
Cross-sections	422		172		172	
Adjusted R^2	0.184		0.251		0.251	
Durbin-Watson	1.993		2.055		2.050	
B: Firms with ESG Scores						
			ESGC		**ESG**	
	(1B)		**(2B)**		**(3B)**	
α	-14.593	**	-19.109	***	-29.440	***
CVD_t	1.322		0.795		1.643	
DMK_i	-3.344	***	-2.964	**	-2.880	**

$CVD_t \times DMK_i$	6.034	***	10.032	***	10.783	***
$CVD_t \times DMK_i \times S_{i,t-1}$			-0.076		-0.076	
$S_{i,t-1}$			-0.101	***	-0.101	***
$\ln MK_i$	0.645	**	0.987	***	1.522	***
NDX_i	0.747	***	1.519	***	0.759	***
Observations	1,762		1,757		1,757	
Cross-sections	98		98		98	
Adjusted R^2	0.040		0.381		0.054	
Durbin-Watson	2.026		2.044		2.038	

***, **, and * denote significance levels of 1%, 5%, and 10%, respectively.

Source: Authors' own elaboration.

The dummy variable representing the COVID-19 period has a positive coefficient, indicating a direct relationship between stock returns and the pandemic episode. However, that relationship was not statistically significant. The interaction term of the COVID-19 (Post) and change in market capitalization (Treat) dummies was positive in all cases but statistically significant only in the baseline model. So, the outbreak of the COVID-19 pandemic had a positive impact on automotive firms' stock returns. The coefficient of $\ln MK_i$ was substantially positive and significant in all models. Thus, firm size directly influenced stock returns during the COVID-19 episode.

The results in columns 2A and 2B show a significantly negative relationship between the ESGC score and stock returns. Columns 3A and 3B present similar results for the ESG raw score, although the magnitude of the coefficients is lower for the raw score. Accordingly, the estimations suggest that ESG scores reduced stock returns. All models indicate that the interaction term of CVD, DMK_i, and $ESGS_i$ is marginal and not significant, which implies that during the COVID-19 pandemic, ESG scores did not play a role in determining the treatment group's stock returns.

Table 4 shows the regression results of Equation (4) for the ESGC and ESG scores as independent variables for (A) all automotive firms in our sample and (B) those with ESG scores in the complete period of interest. Before the COVID-19 episode, such scores had no significant influence on stock returns. During the pandemic, however, the ESGC score was significantly negative for all firms, and the negative coefficient of ESG was also significant for those firms that consistently reported the score.

Table 4. Panel data results of ESGC and ESG

A: All Automotive Firms							
	2017Q4 - 2019Q4				2020Q1 - 2022Q1		
	ESGC		ESG		ESGC		ESG	
Variable	(1A)		(2A)		(3A)		(4A)	
α	-532.567	***	-48.514	***	-9.648		-145.165	
$S_{i,t-1}$	2.244		-0.046		-6.597	***	-2.511	
$S_{i,t-1} \times \ln MK_i$	-0.089		-0.005		0.254	**	0.063	

lnMK_i	23.512	***	2.423	***	2.661		9.257	*
NDX_i	0.946	***	1.042	***	1.769	***	1.788	***
Observations	1,124		1,124		1,419		1,419	
Cross-sections	142		142		172		172	
Adjusted R^2	0.221		0.185		0.250		0.248	
Durbin-Watson	2.011		1.993		2.251		2.244	
B: Firms with ESG Scores								
	2017Q4 - 2019Q4				**2020Q1 - 2022Q1**			
	ESGC		**ESG**		**ESGC**		**ESG**	
	(1B)		**(2B)**		**(3B)**		**(4B)**	
α	-48.985	**	-50.707	***	7.122		50.122	
$S_{i,t-1}$	0.301		0.067		-0.334		-1.167	**
$S_{i,t-1} \times$ lnMK_i	-0.018		-0.008		0.009		0.048	**
lnMK_i	2.368	**	2.426	***	-0.013		-2.022	
NDX_i	0.291	*	0.929	***	1.765	***	1.765	***
Observations	875		875		882		882	
Cross-sections	98		98		98		98	
Adjusted R^2	0.272		0.217		0.436		0.436	
Durbin-Watson	1.976		1.998		2.051		2.051	

***, **, and * denote significance levels of 1%, 5%, and 10%, respectively.

Source: Authors' own elaboration.

The outcomes in column 4A suggest that ESGC and firm size interaction was significantly positive for the automotive sector's returns during the COVID-19 episode. Similarly, the results in column 4B indicate that the interaction between ESG and lnMK_i was significant. Nonetheless, its positive effect was marginal on the returns of ESG reporting companies. These results confirm the DID outcomes regarding the negative relationship between ESG scores and stock returns during the pandemic. Also, the outcomes of the DID and panel data models suggest that the influence of the market as a whole was significantly positive on individual firms' stock returns.

4. Conclusions

The analysis of the relationship between the effects of the COVID-19 pandemic, the CFP and the ESG of automotive industry firms has, until now, not been submitted to a careful analysis. The present study aims to successfully fill that gap in the literature as it investigates the impact of the COVID-19 outbreak on the stock returns of automotive firms worldwide, using as explanatory variables the ESGC and ESG scores from ASSET4.

During the first quarter of 2020, auto industry firms' returns plunged, but they then quickly recovered the next quarter. Due to the shock of the pandemic during that quarter, including compulsory lockdown restrictions, automobile sales plummeted as customers could not even visit dealerships. However, many dealers swiftly adapted to reach customers online, while private

vehicles became preferred over public transportation due to a reduced risk of infection transmission. Also, in some countries, governments introduced support measures for the automotive industry manufacturers. The result was a positive effect on automotive industry firms' stock returns. However, the results of our DID estimations indicate that the impact of the COVID-19 pandemic on automotive companies' stock returns was positive but not significant.

Regarding the role of ESG scores the estimation results suggest they significantly decreased stock returns during the pandemic, although the impact was marginal. Still, it was more pronounced in those companies that did not consistently report ESGC and ESG scores during the period of analysis. Thus, ESG disclosures reduced stock returns in the COVID-19 episode, but the lack of systematic information on such scores represented an additional uncertainty factor for investors.

The results of the panel data specifications suggest that taking sustainable actions during the pandemic lessened stock returns, as evidenced by the negative coefficients of the ESGC and ESG scores. These outcomes agree with the conclusions reached by Breitz & Partapuoli (2020) regarding the relationship between ESG scores and stock returns during periods of crisis. The negative coefficients are larger for the ESGC than for the ESG, which might be a consequence of the uncertainty perceived by investors due to adverse media reports related to firms' involvement in controversies. Through the interaction terms with firm size, we found that ESGC and ESG scores had a positive relationship with stock returns during the pandemic. Thus, larger firms' returns benefited from higher ESG scores in the COVID-19 crisis.

Besides the repercussions for automotive companies and investors, our findings also concern policymakers. Since the lack of systematic information on ESG-related scores entailed an additional source of uncertainty, policymakers should more proactively encourage and regulate firms to disclose their ESG information. As previously discussed, our results suggest that ESG scores did not have a significant impact on the automotive industry's stock returns and that such scores had a significantly negative, although marginal, effect on such returns. However, as evidenced by recent natural and social events, the need for compromise with the environment and firms' stakeholders is imperative and urgent. So, we consider it highly likely that the positive relationship between ESG scores and returns identified for large companies during the COVID-19 episode will become more widespread.

More research on this subject using alternative measures for ESG, as well as the environmental, social, and governance individual scores, the pillars of ESG, will consolidate our understanding of the role of ESG. It is also feasible to study the impact of ESG scores and the COVID-19 pandemic on the stock performance of other industries or define treatment groups differently for further DID analysis. Likewise, it would be worthwhile examining if the present results are robust once the COVID-19 pandemic is over and to compare such findings with other crisis periods.

References

[1]   Barnett, M. L., & Salomon, R. M. (2006). Beyond Dichotomy: The Curvilinear Relationship Between Social Responsibility and Financial Performance. *Strategic Management Journal*, *27*(11), 1101–1122. https://doi.org/10.1002/smj.557

[2]   Barnett, M. L., & Salomon, R. M. (2012). Does It Pay to Be Really Good? Addressing the Shape of the Relationship Between Social and Financial Performance. *Strategic Management Journal*, *33*(11), 1304–1320. https://doi.org/10.1002/smj.1980

[3]   Bird, R., Hall, A. D., Momentè, F., & Reggiani, F. (2007). What Corporate Social Responsibility Activities Are Valued by the Market? *Journal of Business Ethics*, *76*(2), 189–206. https://doi.org/10.1007/s10551-006-9268-1

[4]   Boffo, R., & Patalano, R. (2020). ESG Investing Practices, Progress Challenges. In *OECD Paris*. Retrieved from www.oecd.org/finance/ESG-Investing-Practices-Progress-and-Challenges.pdf.

[5]   Boiko, K. (2021). R&D Activity and Firm Performance: Mapping the Field. *Management Review Quarterly*, 1–37. https://doi.org/10.1007/s11301-021-00220-1

[6]   Breitz, C., & Partapuoli, P. J. (2020). *How is ESG Affecting Returns? A Portfolio- and Panel Data Analysis of US Firms in the S&P 500*. Lund University. Retrieved from: http://lup.lub.lu.se/student-papers/record/9022586/file/9022590.pdf

[7]   Brooks, C., & Oikonomou, I. (2018). The Effects of Environmental, Social and Governance Disclosures and Performance on Firm Value: A Review of the Literature in Accounting and Finance. *British Accounting Review*, Vol. 50, pp. 1–15. https://doi.org/10.1016/j.bar.2017.11.005

[8]   Carroll, A. B., & Shabana, K. M. (2010). The Business Case for Corporate Social Responsibility: A Review of Concepts, Research and Practice. *International Journal of Management Reviews*, Vol. 12, pp. 85–105. https://doi.org/10.1111/j.1468-2370.2009.00275.x

[9]   Dahlsrud, A. (2008). How Corporate Social Responsibility Is Defined: An Analysis of 37 Definitions. *Corporate Social Responsibility and Environmental Management*, *15*(1), 1–13. https://doi.org/10.1002/csr.132

[10] Diez-Cañamero, B., Bishara, T., Otegi-Olaso, J. R., Minguez, R., & Fernández, J. M. (2020). Measurement of Corporate Social Responsibility: A Review of Corporate Sustainability Indexes, Rankings and Ratings. *Sustainability*, *12*(5), 2153. https://doi.org/10.3390/su12052153

[11] Dorfleitner, G., Halbritter, G., & Nguyen, M. (2015). Measuring the Level and Risk of Corporate Responsibility – An Empirical Comparison of Different ESG Rating Approaches. *Journal of Asset Management*, *16*(7), 450–466. https://doi.org/10.1057/jam.2015.31

[12] Drempetic, S., Klein, C., & Zwergel, B. (2020). The Influence of Firm Size on the ESG Score: Corporate Sustainability Ratings Under Review. *Journal of Business Ethics*, *167*(2), 333–360. https://doi.org/10.1007/s10551-019-04164-1

[13] Edmans, A. (2011). Does the Stock Market Fully Value Intangibles? Employee Satisfaction and Equity Prices. *Journal of Financial Economics*, *101*(3), 621–640. https://doi.org/10.1016/j.jfineco.2011.03.021

[14] Freeman, R. E. (1984). *Strategic Management: A Stakeholder Approach*. Marshfield, MA: Pitman. https://doi.org/10.1017/cbo9781139192675.003

[15] Friede, G., Busch, T., & Bassen, A. (2015). ESG and Financial Performance: Aggregated Evidence From More Than 2000 Empirical Studies. *Journal of Sustainable Finance and Investment*, *5*(4), 210–233. https://doi.org/10.1080/20430795.2015.1118917

[16] Friedman, M. (1970). The Social Responsibility of Business Is to Increase Its Profits. *New York Times Magazine*, pp. 122–126. https://doi.org/10.1007/978-3-540-70818-6_14

[17] Girerd-Potin, I., Jimenez-Garcès, S., & Louvet, P. (2014). Which Dimensions of Social Responsibility Concern Financial Investors? *Journal of Business Ethics*, *121*(4), 559–576. https://doi.org/10.1007/s10551-013-1731-1

[18]   Global Sustainable Investment Alliance. (2021). Global Sustainable Investment Review 2020. In *Global Sustainable Investment Review*. Brussels. Retrieved from: http://www.gsi-alliance.org/wp-content/uploads/2021/08/GSIR-20201.pdf

[19]   Boffo, R., & Patalano, R. (2020). ESG Investing Practices, Progress Challenges. In *OECD Paris*. Retrieved from www.oecd.org/finance/ESG-Investing-Practices-Progress-and-Challenges.pdf

[20]   Graafland, J., & Smid, H. (2012). *Impact Measurement and Performance Analysis of CSR (IMPACT)*. Retrieved from https://www.nottingham.ac.uk/business/who-we-are/centres-and-institutes/iccsr/research-projects/impact-measurement-and-performance-analysis-of-csr.aspx.

[21]   Henisz, W., Koller, T., & Nuttall, R. (2019). Five Ways That ESG Creates Value. In *McKinsey Quarterly*. Retrieved from https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/five-ways-that-esg-creates-value

[22]   Hensley, R., Maurer, I., & Padhi, A. (2021). How the Automotive Industry is Accelerating Out of the Turn. *McKinsey Quarterly*, (July), 1–3. Retrieved from https://www.mckinsey.com.br/industries/automotive-and-assembly/our-insights/how-the-automotive-industry-is-accelerating-out-of-the-turn.

[23]   Hoeft, F. (2021). The Case of Sales in the Automotive Industry During the COVID-19 Pandemic. *Strategic Change*, *30*(2), 117–125. https://doi.org/10.1002/jsc.2395

[24]   Hoepner, A. G. F. (2013). *Environmental, Social, and Governance (ESG) Data: Can It Enhance Returns and Reduce Risks?* Detsche Bank – Global Financial Institute Retrieved from: https://www.longfinance.net/documents/1151/DGFI_ESG_2013.pdf

[25]   Hojdik, V. (2021). Current Challenges of Globalization in the Automotive Industry in European Countries. *SHS Web of Conferences*, *92*, 1–10. https://doi.org/10.1051/shsconf/20219201015

[26]   Huang, D. Z. X. (2022). An Integrated Theory of the Firm Approach to Environmental, Social and Governance Performance. *Accounting and Finance*, *62*(S1), 1567–1598. https://doi.org/10.1111/acfi.12832

[27]   Ivanovski, Z., Ivanovska, N., & Narasanov, Z. (2016). The Regression Analysis of Stock Returns at MSE. *Journal of Modern Accounting and Auditing*, *12*(4), 217–224. https://doi.org/10.17265/1548-6583/2016.04.003

[28]   Kempf, A., & Osthoff, P. (2007). The Effect of Socially Responsible Investing on Portfolio Performance. *European Financial Management*, *13*(5), 908–922. https://doi.org/10.1111/j.1468-036X.2007.00402.x

[29]   La Torre, M., Mango, F., Cafaro, A., & Leo, S. (2020). Does the ESG Index Affect Stock Return? Evidence from the Eurostoxx50. *Sustainability*, *12*(16), 6387. https://doi.org/10.3390/su12166387

[30]   Lins, K. V., Servaes, H., & Tamayo, A. (2017). Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility During the Financial Crisis. *Journal of Finance*, *72*(4), 1785–1824. https://doi.org/10.1111/jofi.12505

[31]   Lisin, A., Kushnir, A., Koryakov, A. G., Fomenko, N., & Shchukina, T. (2022). Financial Stability in Companies with High ESG Scores: Evidence from North America Using the Ohlson O-Score. *Sustainability*, *14*(1), 479. https://doi.org/10.3390/su14010479

[32]   McWilliams, A., & Siegel, D. (2000). Corporate Social Responsibility and Financial Performance: Correlation or Misspecification? *Strategic Management Journal*, *21*(5), 603–609. https://doi.org/10.1002/(SICI)1097-0266(200005)21:5<603::AID-SMJ101>3.0.CO;2-3

[33]   Mooij, S. (2017). The ESG Rating and Ranking Industry; Vice or Virtue in the Adoption of Responsible Investment? *Journal of Environmental Investing*, *8*(1), 331–358. https://doi.org/10.2139/ssrn.2960869

[34]   Nagy, Z., Kassam, A., & Lee, L.-E. (2016). Can ESG Add Alpha? An Analysis of ESG Tilt and Momentum Strategies. *The Journal of Investing*, *25*(2), 113–124. https://doi.org/10.3905/joi.2016.25.2.113

[35]   Navavongsathian, A., Trimetsoontorn, J., Rungruang, P., & Janthongpan, S. (2020). The Impact of the COVID-19 Pandemic on Supply Chain Performance of the Auto Parts Industries of Thailand. *Acta Logistica*, *7*(4), 245–251. https://doi.org/10.22306/al.v7i4.185

[36]   Oikonomou, I., Brooks, C., & Pavelin, S. (2012). The Impact of Corporate Social Performance on Financial Risk and Utility: A Longitudinal Analysis. *Financial Management*, *41*(2), 249–258. https://doi.org/10.1111/j.1755-053X.2012.01190.x

[37]   Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). Corporate Social and Financial Performance: A Meta-Analysis. *Organization Studies*, *24*(3), 403–441. https://doi.org/10.1177/0170840603024003910

[38]   Sahut, J.-M., & Pasquini-Descomps, H. (2015). ESG Impact on Market Performance of Firms: International Evidence. *Management International*, *19*(2), 1–30. https://doi.org/10.7202/1030386ar

[39]   Semenova, N., & Hassel, L. G. (2015). On the Validity of Environmental Performance Metrics. *Journal of Business Ethics*, *132*(2), 249–258. https://doi.org/10.1007/s10551-014-2323-4

[40]   Sharfman, M. P., & Fernando, C. S. (2008). Environmental Risk Management and the Cost of Capital. *Strategic Management Journal*, *29*(6), 569–592. https://doi.org/10.1002/smj.678

[41]   Waddock, S. A., & Graves, S. B. (1997). The Corporate Social Performance-Financial Performance Link. *Strategic Management Journal*, *18*(4), 303–319. https://doi.org/10.1002/(SICI)1097-0266(199704)18:4<303::AID-SMJ869>3.0.CO;2-G

[42]   Wang, L., & Wells, P. (2020). Automobilities After SARS-CoV-2: A Socio-Technical Perspective. *Sustainability (Switzerland)*, *12*(15), 1–14. https://doi.org/10.3390/su12155978

[43]   Welford, R., & Frost, S. (2006). Corporate Social Responsibility in Asian Supply Chains. *Corporate Social Responsibility and Environmental Management*, Vol. 13, pp. 166–176. https://doi.org/10.1002/csr.121

[44]   Widyawati, L. (2020). A systematic literature review of socially responsible investment and environmental social governance metrics. *Business Strategy and the Environment*, *29*(2), 619–637. https://doi.org/10.1002/bse.2393

[45]   Zhang, D. (2021). Does a Designed Financial System Impact Polluting Firms' Employment? Evidence of an Experimental Economic Policy. *Finance Research Letters*, *38*, 101500. https://doi.org/10.1016/j.frl.2020.101500

[46]   Zhang, D., Wang, C., & Dong, Y. (2022). How Does Firm ESG Performance Impact Financial Constraints? An Experimental Exploration of the COVID-19 Pandemic. *The European Journal of Development Research*. https://doi.org/10.1057/s41287-021-00499-6