International Journal of Business and Social Research

Volume 13, Issue 01, 2023: 01-24
Article Received: 13-12-2022
Accepted: 05-02-2023
Available Online: 04-03-2023
ISSN 2164-2540 (Print), ISSN 2164-2559 (Online)
DOI: https://doi.org/10.18533/ijbsr.v13i01.1456

# All you need is G(overnance): Sustainable finance following Ambrogio Lorenzetti's frescoes

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**ABSTRACT**

This paper takes at firm level the inspiration of the *Allegory of the Good and Bad Government*, the 14th century series of frescoes by Ambrogio Lorenzetti. As in the frescoes the effects of a good government on the city of Siena and its countryside are portrayed, the goal of this paper is to analyze the effect of a good (corporate) governance on stabilizing financial performance and improving sustainability resilience once controversies related to sustainability issues occur. Focusing on the governance dimension and relating our study to the masterpiece of Ambrogio Lorenzetti allow us to highlight the different philosophical basis between the governance, on one side, and the environmental and social dimension. While the latter are linked to practice, governance is at the connection between practice and ethics. Using a large sample of European listed companies from 2006 to 2019, our results, validated by various robustness checks, confirm that that good (corporate) governance is the key factor not only in getting sustainability controversies managed, therefore increasing firm sustainability resilience, but also in reducing equity volatility, therefore stabilizing firm financial performance.

JEL codes: G30, G32, G34, G39.
Keywords: Sustainable finance, ESG, Corporate Governance, Risk, Equity volatility, Ambrogio Lorenzetti.


## 1. Introduction

*The Allegory of the Good and Bad Government* is a series of three fresco panels painted between 1338 and 1339 by Ambrogio Lorenzetti and hosted within Siena's City Hall. The frescoes, commissioned by the administrators of the city, then governed by nine citizens, portray an allegory of the Good Government and the effects of good and bad government on Siena and its countryside. Placed high on three walls of the Sala del Consiglio – the true heart of the institutional life of the city – the painting was meant to guide the local government, inspiring leaders to rule Siena wisely and profitably. The frescoes

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contain many symbolic elements and convey a series of important political-institutional messages consistent with the traditional philosophical doctrine.

Inspired by those frescoes, we explore at firm level whether governance stabilizes financial performance and improves 'ESG resilience' (Environmental, Social, Governance resilience), a proxy of sustainability risk, that we define as "a firm's ability to safely withstand unpredictable threats due to sustainability issues". Indeed, the occurrence of largely unexpected major shocks – e.g., the Global Financial Crisis (GFC) of 2008-2009, the Euro sovereign crisis of 2010-2012, the COVID-19 pandemic hitting the world since early 2020, and the invasion of Ukraine by Russia in 2022 – is urging the need to achieve resilient socio-economic behavior at the macro level. At the same time, those major shocks reinforce the importance of resilience at the firm level too, and ESG resilience turns out to be most relevant since ESG performance have become the true compass of assessing a firm's value creation as well as of letting a firm tap the sustainable finance market (Henisz et al. 2019).

The role of good performance on environmental, social and governance issues in reducing a firm's risk has been underlined by both the stakeholder theory (Clarkson 1995; Donaldson and Preston 1995; Parmar et al. 2010) and the risk management theory (Godfrey 2005). Based on those theoretical perspectives and on preceding empirical research on this topic, our paper first confirms that return volatility is lower for firms having higher ESG scores.

Next, we study which one of the three dimensions of the ESG score – Environment (E), Social (S) and Governance (G) – is the most significant driver of 'ESG resilience', analyzing whether the occurrence of an ESG controversy for a firm in a certain year depresses the firm's ESG score in the following year conditional on the firm being a 'Good Environment', 'Good Social' or 'Good Governance' (i.e. with an E, S, or G score higher than the median of the sector). Our results show that ESG controversies impact least at Good Governance firms compared to Good Social or Good Environment firms.

Moreover, we find that, when ESG controversies occur, being a 'Good Governance' firm abates return volatility much more than being a 'Good Environment' firm or being a 'Good Social' firm.

Overall, our analysis shows that firms having a Good Governance enjoy greater ESG resilience, and more stable financial performance when ESG controversies occur. Hence, having a good governance is vital for firms that operate in complex ecosystems, making a parallel at the corporate level with what Ambrogio Lorenzetti envisaged for a sustainable organization at the city government level.

The results obtained through econometric methodologies are substantially confirmed by business case analyses which show that the ESG resilience was clearly stronger for comparable companies – both in the financial and non-financial sector – depending on whether they had a high G score vs low G score.

This study goes beyond previous research on this topic by not only confirming the general relationship between higher ESG scores and lower return volatility, but also examining which of the three dimensions of the ESG score - environment, social and governance - is the most significant driver of 'ESG resilience'. It finds that when ESG controversies occur, firms with 'Good Governance' experience lower return volatility compared to firms with 'Good Environment' or 'Good Social' scores. This offers a more nuanced understanding of the relationship between governance, ESG performance and financial performance.

Furthermore, the study's approach also extends the application of ESG resilience from macro level to firm level and it offers an operationalization of the concept of sustainability risk, by defining it as "a firm's ability to safely withstand unpredictable threats due to sustainability issues", this helps to provide a more measurable and actionable framework for companies to assess and manage their sustainability risk.

Overall, this study offers a unique perspective on the connection between governance, sustainability and financial performance, by using a historical art piece as an inspiration and by providing a more nuanced and operationalized understanding of the concept of ESG resilience at firm level.

The rest of the paper is structured as follows. Section 2 presents the most relevant literature and the theoretical framework backing our analysis and also formulate our testable hypotheses. Section 3 describes the database we constructed to execute our analysis and reports descriptive statistics of the variables we considered. Section 4 presents our empirical methodology as well as the main results and puts them to the test of various robustness checks, including the verification through instrumental variables that our results are not driven by endogeneity issues between ESG scores and performance.

Section 5 shows a business case analysis confirming our econometric results. Section 6 wraps up our main findings and casts new avenues for future research.

## 2. Literature review and hypotheses development

While the relationship between corporate social performance (CSP) and financial performance has been the object of a broad stream of literature, few papers have addressed the relationship between CSP and a firm's risk. Early on, Orlitzky and Benjamin (2001) performed a metanalytic review on this issue supporting the view that a higher CSP decreases a firm's financial risk. In a more recent comprehensive literature review, Sassen et al. (2015) confirms a negative relationship between a firm's non-financial performance and corporate risk at the aggregate level, whilst the picture at a disaggregate level is blurred, depending on the samples and databases employed, as well as on the non-financial performance and risk measures adopted.

Sassen et al. (2015) is crucial for us also because it reviews the impact of CSP - measured by ESG factors - on firm risk (both total, systematic and idiosyncratic) in Europe. The results of the paper suggest that social performance lowers firm total risk, environmental performance decreases idiosyncratic risk (and it has a negative effect on total and systematic risk in environmentally sensitive industries only); no specific significant effects are detected for corporate governance performance. Moved from these results our paper pays particular attention to the effect on this latter score on firms' total risk.

Among the papers addressing the relationship between non-financial performance and firm risk, Breuer et al. (2018) found evidence that good ESG performance reduces the cost of equity not through the reduction of systematic risk (reducing the Beta) but rather through the investor base channel. In turn, D'Apice et al. (2020) found a negative relationship between compliance to the Global Reporting Initiative and equity volatility as well as the Altman score.

A specific situation in which the relationship between non-financial performance and corporate risk takes on a particular twist is when a firm is exposed to ESG controversies, a case which has been studied by scholars such as Li et al. (2018) and Dorfleitner et al. (2020). ESG controversies are negative or potentially negative corporate news regarding the environmental, social, and governance dimensions such as suspicious social behavior and/or product-harm scandals that place a firm under the media spotlight and, by extension, grab investors' attention (Cai et al. 2012; Klein and Dawar 2004). By casting doubts on the future prospects of a firm and (potentially) jeopardizing its reputation, this kind of news may damage firm value.

In line with the results underlined in the literature, we therefore formulate the first hypothesis of our paper:

H1: *Overall corporate social performance measured by an aggregate ESG score (or by its three dimensions) reduces a firm's total risk, even after the outbreak of controversies.*

Indeed, over the years sustainability has become a crucial element in the business world. By and large, after increasing with the GFC and the Euro sovereign crisis, that trend has even strengthened with the outbreak of the COVID-19 pandemic (and may heighten further after the invasion of the Ukraine). This situation led to a greater degree of monitoring – both within firms and by third parties – aimed at ensuring the reliability of firms on these issues and at unmasking *greenwashing* behavior (Delmas & Burbano 2011). The complexity of a globalized socio-economic ecosystem means, however, that controversies on sustainability aspects can emerge even at the best-intentioned companies (Aouadi & Marsat 2018).

In this context, a firm's resilience to the sequence of major shocks becomes even more salient than short term performance. And the paramount dimension of a firm's resilience regards its approach to the sustainable transition (Fiksel 2006). Quickly recovering from external or internal shocks is now a challenge that firms must face also in the ESG world. The spotlight on these issues has become so intense and the reputational and operational risks is so high that firms must avoid the occurrence of disputes affecting their ESG performance or, when a dispute arrives, recover as quickly as possible (Bebbington et al 2008; Michelon 2011). In a nutshell: Firms must learn to be resilient also in terms of sustainability, in order not to lose legitimacy in an area that can no longer be considered as a *nice-to-have* but is a *must-have*.

In this framework, our hypothesis, drawn from Lorenzetti's frescoes, is that Good Governance is of prime importance for sustainability resilience. In the *Effects of Good Government in the City and Countryside* the Sienese painter documents that the city and countryside thrive only if there is a good government. Peace and harmony, flourishing trade, decent work, the gates of the city walls open to facilitate a continuous exchange with the countryside, agricultural activities that proceed energetically, all of these can only be the fruits of a government activity based on the virtues of the rulers called to govern Siena. The message of the allegory of Good Government is clear: Governing with wisdom under the protection of Christian virtues, operating to promote peace and the wealth of the city, but always with a firm hand, as testified by the presence of soldiers.

In portraying the good government and its effects in this way, Lorenzetti is referring to the political philosophy developed by St. Thomas Aquinas for whom virtues are the only channel to achieve personal happiness and the lever to have institutions capable of promoting the common good (Thomas Aquinas (1981, II-II, 47, 11). This approach to moral philosophy, also called virtue ethics, lays its foundations in Aristotle, and was significantly recovered since the second half of the twentieth century thanks to the works of Anscombe (1958) and MacIntyre (2007). More recently, the discipline of business ethics has also begun pondering the centrality of virtues in the corporate domain. In 1997, Thomas Morris published the celebrated book *If Aristotle Ran General Motors: The new soul of business*. Over the past two decades several authors have gone back to Aristotle, seeking new perspectives on organizations, management and corporate governance (e.g., Fontrodona and Melé 2002; Sison 2008, 2013; Wijnberg 2000; Dierksmeier and Pirson 2009; Sison and Fontrodona 2012, 2013).

In this sense, our work can also be interpreted as a first and partial attempt to link virtue ethics to the field of sustainable finance, at least on a theoretical level. In Lorenzetti's pictorial language, good government is the result of a life of rulers marked by the continuous search for virtues. Among these, prudence – i.e., applying the means necessary to achieve a good end – implies, at the firm level, adopting the best corporate governance practices, i.e., to have a good G score. Tsoukas and Cummings (1997) stress the importance of the Aristotelian notions of practical rationality and practical wisdom for running organizations. Later on, other authors have applied the notion of practical wisdom to different aspects of management (Schwartz and Sharpe 2006; Nonaka and Toyama 2007; Roca 2008; Melé 2010).

Recently, research on corporate governance has been enjoying renewed interest by both academics and regulators to steer firms towards new objectives (for an exhaustive review on this topic see Bebchuk & Tallarita 2020). If in 1997 the Business Roundtable – the association representing the CEOs of the top 200 US corporations – pledged to give priority to achieving the highest returns for their shareholders, in 2019, with a major U-turn, it referred to "generating long-term value for shareholders" and viewing stakeholders' interests as the main corporate priorities (Gelles & Yaffe-Bellany 2019). In turn, the European Union has also started an ambitious process of rethinking corporate governance practices trough the study on Sustainable Corporate Governance.[4]

In light of what stated above, we formulate our second hypothesis:

H2: *Good performance in the Governance dimension contributes to controversies management more than good performance in either the Environmental or the Social dimensions*.

The ferment that is currently addressing corporate governance to rethink the way businesses work suggests analyzing also the impact of corporate governance on financial stability. Moreover, we aim to understand how ESG controversies affect equity volatility so to shed light on financial resilience against the outbreak of sustainability issues.

The literature regarding the relationship between corporate governance and equity volatility is not univocal. Ferreira and Laux (2007) investigate a private information acquisition story in which governance provisions and informed trading interact to influence the incorporation of information into stock prices. They document a positive relationship between corporate governance and idiosyncratic risk, which is interpreted as a measure of information flow. On an analogous vein, Bartram et al. (2012) document a positive cross-country association between shareholder protections and equity volatility. This result is consistent with the idea that firms take more risks in an environment with better corporate governance (John et al. 2007).

[4] Which has already collected numerous comments, not always positive: https://ecgi.global/news/call-reflection-sustainable-corporate-governance.

On the opposite, Gagnon and Jeanneret (2020) exploit the exogenous time-variation in shareholder protection to assess the causal impact of governance reforms on equity volatility. They find that stronger governance reduces equity volatility, and that firms become less risky once such reforms are enforced.

Derived from the reasoning above, our third and last hypothesis runs as follows:

H3: *When ESG controversies occur, good performance in the Governance dimension curbs equity volatility more than good performance in either the Environmental or the Social dimensions.*

Following the theories reviewed in this section, we expect that firms with a good Governance score enjoy better sustainability resilience as well as more financial stability resilience.

## 3. Data and methodology

Our empirical analysis is divided into three parts related to the three hypotheses to be tested. The first one studies the association between equity volatility and ESG performance (H1); the second considers the effect of corporate governance in managing ESG controversies (H2); the third one addresses the effects of corporate governance on financial stability resilience when ESG controversies occur (H3).

### 3.1 Data

Our analysis is based on a sample of European listed companies included in the Thomson Reuters Asset4 database – now called Refinitiv – from 2006 to 2019. From the original universe we excluded those companies for which market price data was unavailable obtaining an unbalanced panel dataset covering 10,421 firm level observations from 1,097 companies. Table 1, presents, the sample construction process (Panel A), the distribution of our sample by sector (Panel B), year (Panel C), and country (Panel D).

The most represented sectors are Industrials (20.2%) followed by Financials (18.0%) and Consumer Discretionary (17.1%), with the other eight sectors more evenly represented with percentages between the maximum of 7.9% for Basic Materials and the minimum of 4.1% for Utilities.

As expected, representativeness within the final sample decays moving from the latest years to the initial years: The percentages of observations referring to 2017, 2018 and 2019 make above 9% each of the total, while the percentages drop at a level between 7 and 8% in 2013 and 2014, and reach the minimum levels between 4 and 5% for the two initial years in 2006 and 2007.

Country-wise, our sample includes twenty countries so that the equal contribution to the sample would be 5% each. Of course, as expected, the largest contribution is given by the United Kingdom – which was part of the European Union during the entire observation period since the Brexit was enacted after 2019 – reaching almost one third (32.3%) of the total observations. The importance of the UK within the sample reflects the fact that the country hosts the largest Stock Exchange in Europe. This huge share of UK firms will require specific robustness checks to make sure that any of the results obtained survive the exclusion of the UK observations. The next two top contributing countries are France (10.7%) and Germany (9.6%), in which case those high percentages reflect more the size of their domestic economies than that of their domestic Stock Exchanges. The only three other countries contributing more than 5% to the total sample are Switzerland (6.1%), Sweden (5.3%) and Italy (5.2%). While the role of Italy descends from the size of the domestic economy, the top roles of Sweden and Switzerland appear to be linked to the fact that these two countries are home to several listed multinational enterprises as well as to the fact that the two countries rank particularly high in terms of ESG rankings (e.g., Candriam 2017).

Table 1.

*Construction of the sample and firms distribution by sector and year.*

| | Panel A |
|---|---|
| Construction of the Sample | |
| Asset4EU Datastream Thomson Reuters | Companies |
| Initial universe | 1,159 |
| Less: | |
| Firms with missing Price Data | 62 |
| Final sample of EU Asset4 Universe | 1,097 |
| Observations | 1,097 (id) * 14 (years) = 15,358 |

| | | | |
|---|---|---|---|
| Less: | | | |
| Missing observations (ESG scores or financials) | 4.937 | | |
| Final sample of observations – unbalanced panel | 10,421 | | |
| | | | |
| | Panel B | | |
| Sector | Freq. | Percent | Cum. |
| Basic Materials | 824 | 7.91 | 7.91 |
| Consumer Discretionary | 1,785 | 17.13 | 25.04 |
| Consumer Staples | 691 | 6.63 | 31.67 |
| Energy | 585 | 5.61 | 37.28 |
| Financials | 1,871 | 17.95 | 55.23 |
| Health Care | 631 | 6.06 | 61.29 |
| Industrials | 2103 | 20.18 | 81.47 |
| Real Estate | 583 | 5.59 | 87.06 |
| Technology | 446 | 4.28 | 91.34 |
| Telecommunications | 474 | 4.55 | 95.89 |
| Utilities | 428 | 4.11 | 100.00 |
| Total | 10,421 | 100.00 | |
| | Panel C | | |
| Year | Freq. | Percent | Cum. |
| 2006 | 460 | 4.41 | 4.41 |
| 2007 | 515 | 4.94 | 9.36 |
| 2008 | 575 | 5.52 | 14.87 |
| 2009 | 605 | 5.81 | 20.68 |
| 2010 | 641 | 6.15 | 26.83 |
| 2011 | 692 | 6.64 | 33.47 |
| 2012 | 720 | 6.91 | 40.38 |
| 2013 | 734 | 7.04 | 47.42 |
| 2014 | 772 | 7.41 | 54.83 |
| 2015 | 863 | 8.28 | 63.11 |
| 2016 | 905 | 8.68 | 71.80 |
| 2017 | 978 | 9.38 | 81.18 |
| 2018 | 1005 | 9.64 | 90.83 |
| 2019 | 956 | 9.17 | 100.00 |
| Total | 10,421 | 100.00 | |
| | Panel D | | |
| Country | Freq. | Percent | Cum. |
| Austria | 173 | 1.66 | 1.66 |
| Belgium | 294 | 2.82 | 4.48 |
| Czech Republic | 39 | 0.37 | 4.86 |
| Denmark | 305 | 2.93 | 7.78 |
| Finland | 300 | 2.88 | 10.66 |
| France | 1113 | 10.68 | 21.34 |
| Germany | 1004 | 9.63 | 30.98 |
| Greece | 232 | 2.23 | 33.20 |
| Hungary | 35 | 0.34 | 33.54 |
| Ireland | 101 | 0.97 | 34.51 |
| Italy | 540 | 5.18 | 39.69 |
| Netherlands | 396 | 3.80 | 43.49 |
| Norway | 241 | 2.31 | 45.80 |
| Poland | 275 | 2.64 | 48.44 |
| Portugal | 84 | 0.81 | 49.25 |
| Spain | 460 | 4.41 | 53.66 |

| | | | |
|---|---|---|---|
| Sweden | 557 | 5.34 | 59.01 |
| Switzerland | 638 | 6.12 | 65.13 |
| Turkey | 271 | 2.60 | 67.73 |
| United Kingdom | 3363 | 32.27 | 100.00 |
| Total | 10,421 | 100.00 | |

Data on ESG performance, operationalized by the ESG score and its single dimensions E, S and G, were collected from the Thomson Reuters Asset4® - now Refinitv – database, while firm-level financial data were obtained from the Datastream Worldscope Thomson Reuters database. The Asset4 dataset is recognized as one of the leading databases in providing relevant and reliable information on companies' environmental (E), social (S), and governance (G) dimensions, with a broad global coverage and its use has been validated by uncountable past academic studies (e.g., Cheng et al. 2014; Ioannou and Serafeim 2012; Cupertino et al. 2019). Given the goal of this paper, the key factor in our analysis is the Governance Score which is composed of three sub-dimensions: the Management Score, which provides firm commitment and effectiveness towards best practices in corporate governance; the Shareholders Score, which measures firm effectiveness towards equal treatment of shareholders and the use of anti-takeover devices and CSR Strategy Score, which reflects a firm practices to integrate the economic (financial), social and environmental dimensions into its day-to-day decision-making processes.

To assess the role of firms' engagement to sustainability, we considered their compliance with the Global Reporting Initiative (GRI) standards as a dummy variable that equals to 1 if the firm is compliant and 0 otherwise. Indeed, literature shows that, in general, sustainability-engaged firms are more likely to perform well in the long-run and to increase market confidence, therefore reducing stock market volatility (D'Apice et al., 2020).

Firms' exposure to ESG controversies is measured by the ESG Controversy Score (Aouadi and Marsat 2018; Li et al. 2019) provided by Refinitiv which is calculated based on the number of controversies related to environmental, social, and governance issues and other negative events that firms have faced during the year, collected from diverse media sources. Like the ESG Score, the ESG Controversies Score ranges from 0 to 100. As the lower the number of controversies the firm has been exposed to, the higher will be the score (i.e., companies with a high number of controversies will have a low ESG Controversies Score), a high ESG Controversies Score must be interpreted as a favorable signal.

To empirically test our hypothesis (H2 and H3) that performance on the Governance dimension is the most relevant in curbing equity volatility and in contributing to controversies management , we included in our analysis a Good Governance variable, a binary dummy that equals 1 if the G score of a firm in year (t) is greater than or equal to the median G score of the industry to which the firm belongs and 0 otherwise (for control purposes we did the same for the E (dummy Good Environment) and S (dummy Good Social) dimensions).

To measure total equity risk, we use stock price volatility, defined as the annualized standard deviation of daily stock returns.[5]

To tackle possible endogenous effects which could affect the results, we also included a set of variables, commonly used in previous studies on equity volatility in all the analyses, to control for size, profitability, price to book ratio, leverage, and liquidity.

Variables' definitions are presented in Table 2, Panel A while Table 2, Panel B reports descriptive statistics of the variables used in the analysis, considering annual firm-level observations.

Table 2.

*Variables: Description and descriptive statistics.*

| Panel A | | |
|---|---|---|
| Variable | Definition | Description |
| ESG | ESG Score | The equally weighted average of the environmental, social, and governance sub-scores. |
| E | Environmental Score | The score of corporate environmental sustainability, as a proxy of the best management practices to avoid environmental risks and capitalize on |

[5] $equity\ volatility = \sigma(R_{it}) * \sqrt{252}$

| | | |
|---|---|---|
| | | environmental opportunities to generate long-term stakeholders' value |
| S | Social Score | The score of corporate social sustainability, as a proxy of the firm's capacity to enhance trust and loyalty with its main stakeholders, such as workforce, customers, and society, through best management practices in order to generate long-term corporate value. |
| G | Corporate Governance Score | The score of corporate governance sustainability, as a proxy of the firm's capacity to generate sustainable value through the implementation of control mechanisms and systems of responsibilities able to regulate board members' and executives' acts pursuing long-term stakeholder expectations |
| Volatility | Annualized Return Volatility | $\sigma(R_{it}) * \sqrt{252}$ |
| TA | Total Assets | Natural Logarithm of total assets. |
| LEV | Leverage | Leverage, as a proxy for firm's indebtedness calculated as the ratio of Total Debt over Total Assets |
| ROA | Return on Assets | Proxy of firm's profitability |
| PTB | Price to book ration | A measure of the market's valuation of a company relative to its book value |
| CASH | Liquidity | A firm's liquidity position, calculated as the natural logarithm of the ratio of Total Current Assets over Total Current Liabilities |
| GRI | Global Reporting Initiative | It is a dummy variable that equals 1 whether the company has been compliant with the Global Reporting Initiative, and 0 otherwise |
| ESG Controversy | ESG Controversy | The ESG controversies score is calculated based on 23 ESG controversy topics. During the year, if a scandal occurs, the company involved is penalized and this affects their overall controversies score and grading |
| Good Governance | Good Governance | It is a dummy that equals 1 if the G score of a company in year $(t)$ is greater than or equal to the median G score of the industry to which the firm belongs. |
| Good Social | Good Social | It is a dummy that equals 1 if the S score of a company in year $(t)$ is greater than or equal to the median S score of the industry to which the firm belongs. |
| Good Environment | Good Environment | dummy that equals 1 if the E score of a company in year $(t)$ is greater than or equal to the median E score of the industry to which the firm belongs. |

Panel B

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| ESG | 10,421 | 51.89393 | 20.78133 | .63 | 94.68 |
| E | 10,421 | 47.93114 | 28.44208 | 0 | 98.88 |
| S | 10,421 | 53.75441 | 24.16306 | .43 | 98.63 |
| G | 10,421 | 51.46899 | 22.50667 | .82 | 98.47 |
| Volatility | 10,421 | .34787 | .15955 | .12728 | 1.01894 |
| TA | 10,421 | 15.77744 | 1.98407 | 11.26857 | 21.04311 |
| LEV | 10,421 | .52054 | 1.40696 | 0 | 10.63905 |
| ROA | 10,421 | 5.98877 | 8.02752 | -26.68 | 36.51 |

| | | | | | |
|---|---|---|---|---|---|
| PTB | 10,421 | 2.69463 | 3.19007 | -2.18 | 20.93 |
| CASH | 10,421 | 13.07887 | 2.07861 | 7.25559 | 18.20175 |
| GRI | 5,173 | .9431664 | .2315467 | 0 | 1 |
| ESG Controversy | 10,421 | 89.45941 | 24.26018 | 0 | 100 |
| Good Governance | 10,421 | .5051378 | .4999976 | 0 | 1 |
| Good Social | 10,421 | .5059975 | .499988 | 0 | 1 |
| Good Environment | 10,421 | .5073409 | .4999701 | 0 | 1 |

To avoid the influence of possible outliers, the dependent variable and all the control variables used have been winsorized between the 1st and the 99th percentiles.

The covariance matrix in Table 3 reports the results of the linear dependence analysis suggesting that variables in our dataset are significantly (albeit not highly) dependent upon each other. The analysis shows that ESG score is in significant and negative correlated with equity volatility both at the aggregate (*r=-0.158; ρ > |z| = 0.1*) and at the single dimension level (E: *r= -0.115; ρ > |z| = 0.1;* S: *r= -0.186; ρ > |z| = 0.1;* G: *r= -0.074; ρ > |z| = 0.1*) showing that firms with a better ESG performance enjoy a lower firm risk.

Table 3.

*Pairwise correlations matrix.*

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| (1) ESG | 1.00000 | | | | | | | | | |
| (2) E | 0.860* | 1.00000 | | | | | | | | |
| (3) S | 0.904* | 0.744* | 1.00000 | | | | | | | |
| (4) G | 0.694* | 0.406* | 0.427* | 1.00000 | | | | | | |
| (5) Volatility | -0.158* | -0.115* | -0.186* | -0.074* | 1.00000 | | | | | |
| (6) TA | 0.331* | 0.329* | 0.303* | 0.192* | -0.088* | 1.00000 | | | | |
| (7) LEV | 0.115* | 0.121* | 0.082* | 0.080* | 0.050* | -0.147* | 1.00000 | | | |
| (8) PTB | -0.059* | -0.071* | -0.035* | -0.052* | -0.075* | -0.078* | -0.070* | 1.00000 | | |
| (9) ROA | -0.066* | -0.074* | -0.047* | -0.050* | -0.186* | -0.216* | -0.0210 | 0.064* | 1.00000 | |
| (10) CASH | 0.337* | 0.329* | 0.303* | 0.208* | -0.057* | 0.844* | -0.126* | -0.044* | -0.135* | 1.00000 |

**** p<0.01, ** p<0.05, * p<0.1*

Furthermore, looking at the variance inflation factors (VIF) presented in Table 4, we notice that, given the low values of the VIFs, the independent variables do not suffer from severe multicollinearity (VIF => 10) and are, therefore, suitable to be included in the OLS regression model.

Table 4.

*Variance inflation factor.*

| | VIF | 1/VIF |
|---|---|---|
| TA | 1.763 | .567 |
| CASH | 1.488 | .672 |

| | | |
|---|---|---|
| ESG | 1.164 | .859 |
| LEV | 1.067 | .938 |
| ROA | 1.055 | .948 |
| PTB | 1.018 | .982 |
| Mean VIF | 1.259 | . |

### 3.2 Methodology

The regressions estimated in the next paragraphs build on the following baseline model:

$$Y_{i,t} = \alpha_0 + \beta_1 X_{i,t} + \beta_2 Firm\ controls_{i,t} + \beta_3 Fixed\ effects_{\ i} + \varepsilon_{i,t} \quad (1)$$

where $Y_{i,t}$ is alternatively the equity volatility (H1 and H3) or the ESG score (H2), while $X_{i,t}$ is alternatively the ESG Score (H1 – H3), the E (H1 – H3), the S (H1 – H3), the G (H1 – H3) score or the ESG Controversy variable (H2). As control variables, besides size, profitability, price to book, leverage, and liquidity we also included the E, S or G scores when not considered as dependent variables.

Our coefficient of special interest is $\beta_1$, which represents the average effect of $X_{i,t}$ on the firm's $Y_{i,t}$. We predict a negative value for this coefficient for H1 and H3 indicating that firms with a high ESG score and Good Governance should have higher stability in the share price. Instead, we predict a positive coefficient for H2 since a Good Governance score should be key for sustainability resilience.

We also include fixed effects to limit the potential bias in the estimate of $\beta_1$. Firm fixed effects control for time-invariant, unobservable firm characteristics that can influence equity volatility. Time and country fixed effects are also included in the models. The term $\varepsilon_{i,t}$ represents the idiosyncratic error term.

## 4. Empirical results and discussion

### 4.1 Equity volatility and ESG score (H1)

We start verifying our first hypothesis (H1), that is the positive impact of ESG performance in reducing equity volatility. Before addressing that main issue, however, we analyze the effect of the variables used in the literature to explain equity volatility (Model 1). Our results, reported in Table 5, confirm that equity volatility is negatively related to Total Assets, the Price to Book ratio, the Return on Assets, and the Liquidity ratio, while it is positively related to the Leverage as more indebted firms are more sensitive to market changes. Moreover, inspired by the work of D'Apice et al. (2020), we confirm that equity volatility is lowered by the extent to which a firm, complies with the Global Reporting Initiative (Model 2).

Table 5.

*Equity volatility and sustainability disclosure.*

This table presents regression estimates of a firm's equity volatility on its main explicatory variables identified by the literature (Model 1) and on its GRI and control variables (Model 2). These models include firm and time fixed effects. Heteroskedasticity-consistent standard errors are reported in parentheses. *** and ** indicate that the parameters estimate is significantly different from zero at the 1% and 5% level, respectively.

| | (1) | (2) |
|---|---|---|
| | Volatility | Volatility |
| TA | -.04939*** | -.04543*** |
| | (.00403) | (.00657) |
| Debt ratio | .00665** | .00849** |
| | (.00301) | (.00345) |
| PTB | -.00711*** | -.00734*** |
| | (.00059) | (.00092) |
| ROA | -.0031*** | -.0025*** |
| | (.00021) | (.00033) |
| CASH | -.00748*** | -.00723** |
| | (.00218) | (.0032) |
| GRI | | -.0465*** |
| | | (.01005) |

| | | |
|---|---|---|
| _cons | 1.25921*** | 1.24309*** |
| | (.05534) | (.09453) |
| Observations | 1,0421 | 5,173 |
| R-squared | .06418 | .05604 |

*Standard errors are in parentheses*
*** p<.01, ** p<.05, * p<.1

To test the effect of a firm's ESG performance (both at the aggregate level and of the individual dimensions) on its equity volatility, we estimate the following base models:

$$equity\ volatility_{i,t} = \alpha_0 + \beta_1 ESG_{i,t} + \beta_2 Firm\ controls_{i,t} + \beta_3 Fixed\ effects_{\ i} + \varepsilon_{i,t} \quad (2)$$

$$equity\ volatility_{i,t} = \alpha_0 + \beta_1 E_{i,t} + \beta_2 Firm\ controls_{i,t} + \beta_3 Fixed\ effects_{\ i} + \varepsilon_{i,t} \quad (2a)$$

$$equity\ volatility_{i,t} = \alpha_0 + \beta_1 S_{i,t} + \beta_2 Firm\ controls_{i,t} + \beta_3 Fixed\ effects_{\ i} + \varepsilon_{i,t} \quad (2b)$$

$$equity\ volatility_{i,t} = \alpha_0 + \beta_1 G_{i,t} + \beta_2 Firm\ controls_{i,t} + \beta_3 Fixed\ effects_{\ i} + \varepsilon_{i,t} \quad (2c)$$

Table 6.
*Equity volatility and ESG score.*
This table presents regression estimates of a firm's equity volatility on its aggregated ESG score (Model 1) and on its single dimensione E (Model 2), S (Model 3), G (Model 4). These models include firm and time fixed effects. Heteroskedasticity-consistent standard errors are reported in parentheses. ***, ** and * indicate that the parameters estimate is significantly different from zero at the 1%, 5% and 10% level, respectively.

| | (1) Volatility | (2) Volatility | (3) Volatility | (4) Volatility |
|---|---|---|---|---|
| ESG | -.00174*** | | | |
| | (.00018) | | | |
| TA | -.03109*** | -.04245*** | -.02965*** | -.04493*** |
| | (.00593) | (.00598) | (.00598) | (.00582) |
| LEV | .0079 | .00729 | .00764 | .00699 |
| | (.00525) | (.00549) | (.00516) | (.00549) |
| PTB | -.00735*** | -.00725*** | -.0072*** | -.00721*** |
| | (.00096) | (.00097) | (.00096) | (.00096) |
| ROA | -.00336*** | -.00321*** | -.00334*** | -.00316*** |
| | (.00031) | (.00031) | (.00031) | (.00031) |
| CASH | -.0058** | -.00658** | -.00525* | -.00753** |
| | (.00293) | (.00302) | (.00292) | (.00301) |
| E | | -.00059*** | | |
| | | (.00014) | | |
| S | | | -.00157*** | |
| | | | (.00014) | |
| G | | | | -.00063*** |
| | | | | (.00013) |
| _cons | 1.04048*** | 1.16695*** | 1.00392*** | 1.22225*** |
| | (.08141) | (.08302) | (.08212) | (.07936) |
| Observations | 10,421 | 10,421 | 10,421 | 10,421 |
| R-squared | .08119 | .06784 | .08693 | .06859 |

*Robust standard errors are in parentheses*
*** p<.01, ** p<.05, * p<.1

Our results in Table 6 show that there is a negative and highly significant relationship between the ESG score and a firm's equity volatility. This relationship is illustrated by the coefficient $\beta_1$ of the independent variable ESG score, with a corresponding p-value lower than 1% in Model 1. The results are confirmed both in significance and sign when looking at the individual dimensions (Model 2, 3, 4).

This finding supports our empirical hypothesis (H1) that firms with a high ESG score have lower share price volatility. The point estimate of Model 1 means that one standard deviation increase of the

ESG score can reduce sample firms' equity volatility by 10.4%. Similarly, one standard deviation increase of the E dimension can reduce it by 4.8%, of the S by 10.9% and of the G by 4%.

Regarding firm's control variables, Model 1 shows that firm size, profitability and price-to-book have a negative and highly significant effect on a firm's equity volatility. On the contrary, the positive effect of leverage on equity volatility found above (Table 5) becomes insignificant here after we control for either aggregate ESG or any one of its three components (E, S, G) (Table 6).

*Robustness Checks*

Endogeneity could be an issue in our estimations if an unobservable variable influences our results, or if there is simultaneity or reverse causality. We used a fixed effects model that controls for time and firms' characteristics, we therefore assume that an omitted variable bias should not be a problem in our data.

Our model presumes that ESG score affects firm risk. However, reverse causality or simultaneity might be another source of endogeneity, particularly with regard to the G dimension. Hermalin and Weisbach (2003) suggest that a firm's governance structure is endogenously determined: on the one hand a higher ESG decreases firm risk, on the other hand firms that suffer from higher risk have incentives to strengthen their corporate governance to avoid potential damage to the firm. Bouslah et al. (2013) found a bidirectional causality between firm risk and some corporate social measures for a US sample.

We deal with simultaneity issues in two different ways. First, we use lagged independent variables. The use of lagged explanatory variables could at least partially address simultaneity (Harjoto and Jo 2015; Luo and Bhattacharya 2009). Using lagged explanatory variables does not eliminate simultaneity problems (Wintoki et al. 2012), however, it diminishes the impact of simultaneity since past ESG scores and current firm risk are not determined in the same period.

Table 7 shows the effect of a one period lag of the ESG score (both aggregate and in its three single dimensions) on equity volatility. The results confirm those of our base model.

Table 7.

*Equity volatility and ESG score: robustness checks.*

This table presents regression estimates of a firm's equity volatility on its aggregated ESG score lagged by one period (Model 1) and on its single dimensions E (Model 2), S (Model 3), G (Model 4) lagged by one period. These models include firm and time fixed effects. Heteroskedasticity-consistent standard errors are reported in parentheses. ***, ** and * indicate that the parameters estimate is significantly different from zero at the 1%, 5% and 10% level, respectively.

| | (1) Volatility | (2) Volatility | (3) Volatility | (4) Volatility |
|---|---|---|---|---|
| lESG | -.00262*** | | | |
| | (.00019) | | | |
| l_TA | -.00995 | -.02079*** | -.01186 | -.03213*** |
| | (.00725) | (.00734) | (.00728) | (.00727) |
| l_LEV | .01335** | .01323** | .0128** | .01212** |
| | (.00558) | (.00589) | (.00553) | (.006) |
| l_PTB | -.0017* | -.0016* | -.0014 | -.00137 |
| | (.00089) | (.00091) | (.0009) | (.00091) |
| l_ROA | -.0011*** | -.001*** | -.00103*** | -.0008** |
| | (.00031) | (.00032) | (.00031) | (.00032) |
| l_CASH | -.01372*** | -.01411*** | -.01328*** | -.01638*** |
| | (.00349) | (.00354) | (.00352) | (.00367) |
| lE | | -.00138*** | | |
| | | (.00016) | | |
| lS | | | -.00202*** | |
| | | | (.00015) | |
| lG | | | | -.00074*** |
| | | | | (.00014) |
| _cons | .82484*** | .93148*** | .8207*** | 1.11119*** |

| | | | | |
|---|---|---|---|---|
| | (.09773) | (.10116) | (.09912) | (.0975) |
| Observations | 9406 | 9406 | 9406 | 9406 |
| R-squared | .06664 | .04968 | .06585 | .03639 |

*Robust standard errors are in parentheses*
**** p<.01, ** p<.05, * p<.1*

Next, we also employ the instrumental variables (IV) approach, which requires the instrumental variable to be: (i) correlated with our test variable (i.e., the ESG score), (ii) not directly correlated with our dependent variables (i.e., firm's risk). Namely, we employ two instruments, the GRI compliance and the Controversy score described in the Data section.

As a double-check process we also built a Controversies dummy variable (D_Contr) that equals to 1 if the firm has had at least one Controversy in the period analyzed in anyone of the following topics: Anticompetitive behavior, Management Controversies, Consumption Controversies, Environment Controversies, Insider dealing Controversies and Wages Controversies; and 0 othewise.

As shown in Table 8, the correlation between the Controversies score and the ESG score is, surprisingly, negative (– 0.31), implying that companies with a high ESG score tend to have a higher number of controversies. One explanation for this result might be that companies that tend to have high ESG scores are affected more greatly by controversies because of a higher monitoring over them, this reflected by the saying "the higher you fly, the harder you fall" (Dorfleitner et al. 2020) or, referring to an ancient Latin *motto*: "corruptio optimi pessima". This data reinforces the relevance of the 'ESG resilience' concept we adopt in this paper given that even firms with high ESG scores cannot stay too comfortable.

Table 8.
*Pairwise correlations.*

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| (1) Volatility | 1.00 | | | | | | | |
| (2) ESG | -0.150 | 1.00 | | | | | | |
| (3) E | -0.11 | 0.860 | 1.00 | | | | | |
| (4) S | -0.18 | 0.90 | 0.75 | 1.00 | | | | |
| (5) G | -0.07 | 0.70 | 0.42 | 0.44 | 1.00 | | | |
| (6) GRI | -0.07 | 0.26 | 0.23 | 0.25 | 0.100 | 1.00 | | |
| (7) ESGControversies | -0.02 | -0.31 | -0.27 | -0.27 | -0.23 | -0.07 | 1.00 | |
| (8) D_Contr | -0.02 | 0.30 | 0.27 | 0.27 | 0.22 | 0.07 | -0.72 | 1.00 |

Our assumption is that companies compliant with the GRI and with fewer ESG Controversies (higher score) are also oriented towards higher ESG scores and a more stable financial performance. Indeed, econometric results support this assumption as shown in Table 9. In particular, the under-identification tests show that both GRI and ESG Controversy are good instrumental variables of our specification. Moreover, the endogeneity test has a p-value of 17.32% for equity volatility showing that an endogeneity problem is present in our specification.

Turning to the results of the IV estimates, in the volatility equation the coefficient of the ESG Score IV is only slightly higher and its statistical significance is unchanged.

Table 9.
*Equity volatility and ESG score-additional robustness checks.*

This table shows a second battery of robustness checks on the relationship between equity volatility and ESG score. Model 1 is our baseline model; Model 2 uses GRI as an instrumental variable (IV) of ESG; Model 3 uses ESG Controversy Score as IV of ESG; Models 4 use a firm's ESG Controversy Score and the compliance with GRI, as instruments for the ESG to tackle possible endogeneity in the estimate of the base models. Heteroskedasticity-consistent standard errors are presented in parentheses. *******, ****** and ***** indicate that the parameter estimate is significantly different from zero at the 1%, 5% and 10% level, respectively.

| | (1) Volatility | (2) Volatility | (3) Volatility | (4) Volatility |
|---|---|---|---|---|
| ESG | -.00174*** | -.00456*** | .00954** | -.00381*** |

| | | | | |
|---|---|---|---|---|
| | (.00018) | (.00099) | (.00396) | (.00097) |
| TA | -.03109*** | -.00915 | -.14955*** | -.01584 |
| | (.00593) | (.01092) | (.04193) | (.01072) |
| Debt ratio | .0079 | .01173*** | -.00016 | .01114*** |
| | (.00525) | (.00354) | (.00487) | (.00351) |
| PTB | -.00735*** | -.00738*** | -.0058*** | -.00736*** |
| | (.00096) | (.00092) | (.00096) | (.00091) |
| ROA | -.00336*** | -.00292*** | -.00169*** | -.00283*** |
| | (.00031) | (.00035) | (.00065) | (.00035) |
| CASH | -.0058** | -.0051 | -.01666*** | -.00544* |
| | (.00293) | (.00324) | (.00477) | (.00322) |
| _cons | 1.04048*** | .87269*** | 2.45608*** | .93763*** |
| | (.08141) | (.12717) | (.50237) | (.12531) |
| Observations | 10421 | 5173 | 10421 | 5173 |
| R-squared | .08119 | 0.1079 | .0005 | .1115 |
| Instruments | no | GRI | ESG Contr. | GRI<br>ESG Contr. |
| Instrumented | no | ESG | ESG | ESG |
| Under-identification test | | 0.000 | 0.000 | 0.000 |
| Sargan -Hansen statistic | | 0.000 | 0.000 | 0.000 |
| Endogeneity test | | no | no | 0.1732 |
| *Standard errors are in parentheses* | | | | |
| **** p<.01, ** p<.05, * p<.1* | | | | |

## 4.2 Good governance and sustainability resilience

Once underlined the role that ESG criteria have in reducing firms' total risk, our research proceeds to ask which of the three components has the largest impact on sustainability resilience (i.e., a good management of ESG controversies) and on financial stability (i.e., reducing equity volatility) introducing in the analysis the Good Governance, Good Environment and Good Social variables described above.

The descriptive evidence highlights the existence of a negative pairwise correlation between Good Governance and the ESG controversies score (see Table 10).

Table 10.

*Pairwise correlations.*

| Variables | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| (1) G | 1.00 | | | | |
| (2) Good Governance | 0.841 | 1.00 | | | |
| (3) ESG Controversies | -0.235 | -0.181 | 1.00 | | |
| (4) D_Contr | 0.216 | 0.17 | -0.724 | 1.00 | |
| (5) Volatility | -0.070 | -0.045 | -0.019 | -0.018 | 1.00 |

To test sustainability resilience, we analyzed the effect of a firm's ESG Controversy Score on its ESG Score lagged by one year, all conditioned on having had a Good E, S, G, score in the year prior the occurrence of a controversy. In particular, we estimate the following base models:

$$ESG_{i,t+1} = \alpha_0 + \beta_1 ESG\ Controversy_{i,t} + \beta_2 Firm\ controls_{i,t} + \beta_3 Fixed\ effects_{\ i} + \varepsilon_{i,t} \qquad (7)$$

Results in Table 11 show that for firms overperforming their peers (labelled as Good Governance, Good Environment and Good Social) in $t-1$ the occurrence of controversies on sustainability issues in $t$ does result into a statistically significant improvement of the ESG score in $t+1$. Moreover, for Good Governance firms its impact is statistically more significant and higher ($\beta_1$0.026; p<0.01) than that for firms labelled as Good Environment ($\beta_1$0.016; p<0.05) or Good Social ($\beta_1$. 0.017; p<0.05).

We can conclude that Good Governance implies higher sustainability resilience.

Table 11.

*ESG controversies on ESG.*

This regression analyses the effect of the ESG controversy (t) on the ESG score (t + 1) if the company (i) had a Good Governance at (t-1) – Model (1-2); a Good Environment at (t-1) – (Model 3-4); a Good Social at (t-1) – Model 5-6. These models include firm and time fixed effects. Heteroskedasticity-consistent standard errors are reported in parentheses. ***, ** and * indicate that the parameters estimate is significantly different from zero at the 1% , 5% and 10% level, respectively.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| *Dependent Variable* | ESG(t+1) | ESG(t+1) | ESG(t+1) | ESG(t+1) | ESG(t+1) | ESG(t+1) |
| | GG(t-1)= 0 | GG(t-1)= 1 | GE(t-1)= 0 | GE(t-1)= 1 | GS(t-1)= 0 | GS(t-1)= 1 |
| ESG Controversies | .0028 | .02612*** | .01189 | .01585** | .00192 | .01702** |
| | (.00927) | (.00805) | (.00968) | (.00753) | (.00983) | (.00778) |
| E | .20997*** | .12358*** | | | .33342*** | .15766*** |
| | (.01527) | (.01718) | | | (.01327) | (.01693) |
| S | .30037*** | .22566*** | .38795*** | .20789*** | | |
| | (.01504) | (.01724) | (.0128) | (.01672) | | |
| G | | | .13944*** | .08767*** | .15459*** | .10346*** |
| | | | (.01146) | (.01315) | (.01177) | (.01344) |
| TA | 2.25421*** | -.62153 | 2.6543*** | -.05485 | 4.05241*** | .72802 |
| | (.49983) | (.65806) | (.51736) | (.6435) | (.51999) | (.63618) |
| LEV | -.8991* | -.34658 | -.8436 | -.18253 | -.45421 | -.23074 |
| | (.53722) | (.34228) | (.64524) | (.31167) | (.47796) | (.34255) |
| PTB | .0436 | -.1379 | .0248 | -.12184 | .05735 | -.1729** |
| | (.06195) | (.09449) | (.06753) | (.08593) | (.06929) | (.08492) |
| ROA | .03161 | -.00239 | -.03117 | .05398* | -.0358 | .05997* |
| | (.02412) | (.03061) | (.02342) | (.03048) | (.02387) | (.03121) |
| CASH | .02716 | .26047 | .19575 | .16947 | .66333** | .11009 |
| | (.25416) | (.31917) | (.26638) | (.29128) | (.26687) | (.29871) |
| _cons | -13.46329* | 45.94456*** | -24.94451*** | 44.33788*** | -47.35263*** | 35.17443*** |
| | (6.97277) | (9.32879) | (7.06629) | (9.24201) | (7.22672) | (9.12336) |
| Obs., | 4568 | 4613 | 4568 | 4610 | 4560 | 4618 |
| R-squared | .29047 | .09899 | .30284 | .06433 | .27713 | .04988 |

*Standard errors are in parentheses*

*** p<.01, ** p<.05, * p<.1

## 4.3 Good governance and equity volatility

To test the impact of the dummy Good Governance, Good Social or Good Environment on equity volatility, as stated in our H3, we estimate the following base models:

$$Equity\ volatility_{i,t} = \alpha_0 + \beta_1 Good\ Governance_{i,t} + \beta_2 Firm\ controls_{i,t} + \beta_3 Fixed\ effects_i + \varepsilon_{i,t} \quad (8a)$$

$$Equity\ volatility_{i,t} = \alpha_0 + \beta_1 Good\ Environment_{i,t} + \beta_2 Firm\ controls_{i,t} + \beta_3 Fixed\ effects_i + \varepsilon_{i,t} \quad (8b)$$

$$Equity\ volatility_{i,t} = \alpha_0 + \beta_1 Good,Social_{i,t} + \beta_2 Firm\ controls_{i,t} + \beta_3 Fixed\ effects_i + \varepsilon_{i,t} \quad (8c)$$

Results presented in Table 12 show how the highest impact in reducing equity volatility is obtained from being a 'Good Social company' (a company that therefore obtains a score above the

industry median as regards the workforce, compliance with human rights, responsibility towards the community and regarding the product), followed by being a 'Good Governance' and finally a 'Good Environment' (this latter with insignificant results).

Table 12.
*Equity volatility and Good Governance/Environment/Social.*
This table presents regression estimates of a firm's equity volatility on a dummy Good Governance (Model 1), on a dummy Good Social (Model 2), and on a dummy Good Environment (Model 3). These models include firm and time fixed effects. Heteroskedasticity-consistent standard errors are reported in parentheses. ***, ** and * indicate that the parameters estimate is significantly different from zero at the 1%, 5% and 10% level, respectively.

| | (1) Volatility | (2) Volatility | (3) Volatility |
|---|---|---|---|
| Good Governance | -.0077* | | |
| | (.00456) | | |
| TA | -.03041*** | -.03937*** | -.02828*** |
| | (.00598) | (.00596) | (.00596) |
| ROA | -.00332*** | -.00324*** | -.00336*** |
| | (.00031) | (.00031) | (.00031) |
| PTB | -.00718*** | -.00726*** | -.00725*** |
| | (.00095) | (.00096) | (.00096) |
| Debt ratio | .00742 | .00732 | .00777 |
| | (.00517) | (.00546) | (.00516) |
| CASH | -.00554* | -.00688** | -.0054* |
| | (.00294) | (.00301) | (.0029) |
| E | .00026 | -.0004*** | |
| | (.00017) | (.00015) | |
| S | -.00169*** | | -.0015*** |
| | (.00017) | | (.00014) |
| Good Social | | -.01556*** | |
| | | (.00593) | |
| G | | -.00053*** | -.00035*** |
| | | (.00013) | (.00013) |
| Good Environment | | | .00158 |
| | | | (.00593) |
| _cons | 1.01818*** | 1.14867*** | .99757*** |
| | (.08248) | (.0821) | (.08185) |
| Observations | 10413 | 10413 | 10413 |
| R-squared | .08796 | .07229 | .08822 |

*Robust standard errors are in parentheses*
*** p<.01, ** p<.05, * p<.1

To bring our analysis one step forward, however, we asked what would happen to the equity volatility in the presence of controversies concerning ESG issues. Therefore, in studying the implications of having had a Good Governance in $t-1$, we found that the ESG score instrumented by the GRI compliance and the ESG Controversies has a more significant effect in reducing equity volatility ($\beta_1$-0.007107; p<0.05) compared to having been a Good Env ($\beta_1$-0.004821; p<0.1) or a Good Social ($\beta_1$-0.005922; p<0.05) (Table 13).

Table 13.
*Equity volatility and ESG score instrumented by ESG Controversy and GRI compliance.*
This table shows the relationship between equity volatility and ESG score instrumented if a firm has a Good Governance (Model 2); a Good Environment (Model 4); a Good Social (Model 6).

Heteroskedasticity-consistent standard errors are presented in parentheses. ***, ** and * indicate that the parameter estimate is significantly different from zero at the 1%, 5% and 10% level, respectively.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Volatility GG(t-1)= 0 | Volatility GG(t-1)= 1 | Volatility GE(t-1)= 0 | Volatility GE(t-1)= 1 | Volatility GS(t-1)= 0 | Volatility GS(t-1)= 1 |
| ESG | -.00534*** | -.0069** | -.00627*** | -.00465* | -.00435*** | -.00583** |
| | (.00144) | (.00316) | (.00143) | (.00275) | (.00155) | (.00241) |
| TA | -.0026 | -.00319 | .01403 | -.02492 | .01131 | -.02189 |
| | (.0181) | (.0219) | (.02189) | (.02026) | (.02644) | (.01642) |
| Debt ratio | .011 | .01407*** | .08755*** | .00907** | -.00421 | .01368*** |
| | (.01007) | (.00408) | (.02144) | (.00384) | (.00725) | (.00408) |
| PTB | -.00466*** | -.00964*** | -.00528** | -.00595*** | -.00497*** | -.00694*** |
| | (.00151) | (.00129) | (.00231) | (.0011) | (.0017) | (.00117) |
| ROA | -.00176*** | -.00279*** | -.00217*** | -.00267*** | -.00245*** | -.00278*** |
| | (.00062) | (.00047) | (.00062) | (.00046) | (.00064) | (.00044) |
| CASH | -.00301 | -.00907* | .00968 | -.01042*** | -.00256 | -.01003** |
| | (.00541) | (.00473) | (.00703) | (.004) | (.00671) | (.00402) |
| _cons | .73252*** | 1.02448*** | .29453 | 1.23604*** | .44191 | 1.26579*** |
| | (.22478) | (.1877) | (.28333) | (.17847) | (.33894) | (.14739) |
| Obs., | 1922 | 3081 | 1284 | 3719 | 1346 | 3657 |
| Instrumented | ESG | ESG | ESG | ESG | ESG | ESG |
| Instruments | GRI ESGControv. | GRI ESGControv. | GRI ESGControv. | GRI ESGControv. | GRI ESGControv. | GRI ESGControv. |
| R-squared | .0823 | .0312 | .0065 | .0622 | .0323 | .0766 |

*Standard errors are in parentheses*
*** p<.01, ** p<.05, * p<.1*

Nevertheless, we acknowledge that there might be an overlap among firms with a Good Governance, Good Environment and Good Social. For this reason, as a further robustness check, we disentangle that portion of the Good Environment and Good Social which are not explained by the Governance Score. We therefore estimated the residuals of a baseline regression of the Good Governance over the Good Environment and Good Social and regress these values over the Equity Volatility. Results of Table 14 confirm our principal model as even that portion of the Good Governance that does not depend on the Good Environment nor the Good Social, contributes in the Volatility reduction. More formally:

$$Good\ Governance_{i,t} = \varphi_0 + \varphi_1 Good\ Environment_{i,t} + \varphi_2 Good\ Social_{i,t} + \varphi_3\ Time\ fixed\ effects_i + \zeta_{i,t} \quad (9a)$$

$$Equity\ volatility_{i,t} = \alpha_0 + \beta_1 Good\ Governancee\ residuals_{i,t} + \beta_2 Firm\ controls_{i,t} + \beta_3 Firm\ fixed\ effects_i \quad (9b)$$

Table 14.
*Equity volatility and Good Governance residuals.*
This table shows the relationship between equity volatility and Good Governance residuals. Heteroskedasticity-consistent standard errors are presented in parentheses. ***, ** and * indicate that the parameter estimate is significantly different from zero at the 1%, 5% and 10% level, respectively.

| | (1) |
|---|---|
| | Volatility |

| | |
|---|---|
| Good Governance Residuals | -.678*** |
| | (.046) |
| TA | -.022*** |
| | (.006) |
| Debt ratio | .006 |
| | (.005) |
| PTB | -.007*** |
| | (.001) |
| ROA | -.004*** |
| | (0) |
| CASH | -.003 |
| | (.003) |
| _cons | 1.111*** |
| | (.078) |
| Observations | 10466 |
| R-squared | .101 |

Robust standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1

The role of Good Governance for financial resilience is also confirmed. Results of Table 15 show firstly that the lower the levels of ESG controversies the higher the equity volatility reduction (Model 1); secondly that the interaction between the dummy Good Governance and the ESG Controversy has also a significant effect on the reduction of volatility.

Table 15.

*Equity volatility and ESG Controversy.*

This table shows the relationship between equity volatility and ESG Controversy Score (Model 1) and with the interaction of ESG Controversy Score with the dummy Good Governance (Model 2), the dummy Good Environment (Model 3) and the dummy Good Social (Model 4). Heteroskedasticity-consistent standard errors are presented in parentheses. ***, ** and * indicate that the parameter estimate is significantly different from zero at the 1%, 5% and 10% level, respectively.

| | (1) Volatility | (2) Volatility | (3) Volatility | (4) Volatility |
|---|---|---|---|---|
| ESGControversies | -.00025*** | -.00007 | -.00014 | -.00018 |
| | (.00007) | (.00013) | (.00015) | (.00014) |
| ESG | -.00177*** | | | |
| | (.00018) | | | |
| TA | -.03127*** | -.04848*** | -.04774*** | -.04757*** |
| | (.00593) | (.0058) | (.00584) | (.00584) |
| Debt ratio | .00814 | .00691 | .00698 | .00679 |
| | (.00531) | (.0056) | (.00562) | (.00556) |
| PTB | -.00728*** | -.00712*** | -.00703*** | -.00702*** |
| | (.00096) | (.00096) | (.00097) | (.00096) |
| ROA | -.00332*** | -.00309*** | -.00309*** | -.00309*** |
| | (.00031) | (.00031) | (.00031) | (.00031) |
| CASH_w | -.00599** | -.00791*** | -.00747** | -.0076** |
| | (.00294) | (.00304) | (.00305) | (.00304) |
| Good Governance | | .00934 | | |
| | | (.01442) | | |
| ESGControv ## D_GG | | -.00025* | | |
| | | (.00015) | | |
| Good Environment | | | -.00469 | |
| | | | (.01822) | |
| ESGControv ## D_GE | | | -.00012 | |
| | | | (.00018) | |

| | | | | |
|---|---|---|---|---|
| Good Social | | | | -.01716 |
| | | | | (.01698) |
| ESGControv ## D_GS | | | | -.00005 |
| | | | | (.00017) |
| _cons | 1.06924*** | 1.26173*** | 1.25225*** | 1.25901*** |
| | (.08138) | (.07995) | (.08145) | (.0812) |
| Observations | 10421 | 10413 | 10421 | 10421 |
| R-squared | .0826 | .06671 | .06643 | .06785 |

*Robust standard errors are in parentheses*
**** p<.01, ** p<.05, * p<.1*

Our results summarized in Tables 11, 13 and 15 are of particular relevance in underlining how the application of corporate governance best practices allow not only to manage disputes on environmental and social issues but also to pursue a greater financial resilience.

## 5. Further evidence from a business case perspective

After having explored the empirical analysis, necessary to identify results that go beyond anecdotal stories, we offer the reader two cases of sustainability resilience, which can highlight what lies behind the quantitative aspects. This approach is driven by the need to provide a 'face' to our hypothesis so that practitioners and regulators, among all, may quickly understand the relevance of our findings.

The first story concerns Petra Diamonds limited (PDL)[6], a UK headquartered company active in the mining sector and present in South Africa and Tanzania with its diamond mining activities. This sector is characterized by controversies related in particular to the possible mistreatment of illegal diggers who enter the mines in search of precious stones. To completely eradicate this phenomenon is unlikely given the nature of the business, which is why mining companies are rather called upon to try to avoid the mistreatment of illegal diggers, or worse still their killing, while avoiding being robbed. In this context, PDL has been called to respond in court by some independent NGOs who have been monitoring it since 2018 for alleged breaches of human rights, personal injuries and deaths suffered at and surrounding its mine in Tanzania (i.e. WDA) from the security operations. Faced with this accusation, the PDL decided to set up a Board Sub-Committee comprised entirely of independent Non-executive Directors to oversee the matters and undertake an investigation into the allegations.

The Sub-Committee found evidence that since 2012, there were over 7,100 recorded incursions onto the SML, which resulted in more than 1,700 arrests taking place. While most of these incursions were resolved peacefully, there is evidence of many incidents of aggression, both on the side of the illegal diggers as well as that of the security providers. A further problem identified by the Committee and useful for the purpose of our analysis concerns the poor management of the communication of these facts between the management of the mine and the Board of the company. The Sub-Committee investigation, which included tracking PDL internal email communications, found no information to suggest information was escalated, substantiating the lack of PDL Board knowledge.

In light of these facts, PDL has taken steps that mainly concern the governance of the company in order to minimize similar problems in the future. Appropriate disciplinary processes have been instigated; in addition, certain individuals have left the Company. Moreover, Reporting structures at WDL and PDL have been revised to address historical gaps and ensure accountability, enabling the more timely, accurate and transparent reporting of all incursions and incidents. The revisions entail a new incident escalation procedure to PDL, including fully transparent reporting to the PDL Board, as well as to the Audit and Risk, and the Social, Ethics and Diversity Committees through two independent reporting lines. The company appointed a new security contractor. Finally, the company has also tried to act on the prevention of the illegal digging phenomenon by working with the reference communities, from an educational, cultural and health point of view.

For the purpose of our analysis, it is noteworthy to underline how PDL managed an ESG controversy linked in particular to the social pillar. In doing so, it has shown a remarkable sustainability resiliency as the result of a work carried out in terms of governance. In terms of ESG scores, this is

[6] Please find more information at Petra Diamonds Limited's ESG and Sustainability Report 2021.

shown in an ESG Controversies Score which in 2018 (the year in which the facts described were disclosed by the media) was 15.69 (underlining the seriousness of the Controversies), an S score of 65.8 and a G score of 94.95. In 2019, in the face of the changes made at the Governance level, all the score underwent an improvement: ESG Controversies of 100 (to indicate the absence of controversies), an ESG score of 78.93, an S score of 68.21, and a G score of 95.65.

The second case concerns Sofware AG, a Germany-based software developer and provider of information technology (IT) platforms for businesses and one of Europe's largest software companies[7].

The controversy that this company faced concerns the accusation of having paid bribes to secure state contracts in South Africa. In particular, in July 2017, Software AG has been caught red-handed entering questionable commission agreements with a Gupta-controlled company in the hope of securing lucrative state contracts. The Gupta family were close allies of former South Africa President Jacob Zuma and, as witnessed by the #GuptaLeaks investigations they used their influence in order to win deals with state-controlled companies or agencies or private firms.

In the case of Software AG, the German company agreed to pay Global Softech Solutions (GSS) up to 35% of the value of the contracts it secured with Transnet, the South African department of correctional services, Mangaung municipality, Sasol and MultiChoice. The Guptas' Sahara Systems was in the process of buying into GSS, an IT services company, at the time.

Software AG launched an internal investigation after the media report alleged it had paid kickbacks as part of a wide-ranging South African scandal in which fellow German software maker SAP has also been caught up. Software AG stated that "it is not aware of any non-compliant business practices in its South Africa operations," but added: "Based on current media speculations, the company has started an internal review." The spokesman said Software AG could not make further comment until its review has been completed but since then, at least to our knowledge, there has been no trace of it.

This misbehavior of Software AG together with its inaptitude to disclose any results or changes in the conduct, has been evidenced also in its ESG Score performance. When the controversy was raised in 2017, the firm had already a Governance Score (32.23 in 2016) well below the median's sector. To avoid facing what was happening resulted in a further decrease of the ESG score, from 53.52 to 47.67. This means that the company has not been able to manage correctly the controversy arose in 2017, showing a low sustainability resilience.

It is noteworthy to highlight how other companies, tangled in analogues issues, have behave differently. Let's consider the case of SAP – a Software's AG competitor – that was also involved in the #GuptaLeaks. Differently from its compatriot firm, SAP acknowledged its misconduct and acted consequently: It suspended its top four executives in South Africa and commissioned an international law firm to probe the allegations against it with the aim to cover SAP's entire South African operations and include a review of all contracts. SAP's attempt to restore confidence after a similar controversy has been appreciated by the media and the analysts. As a consequence, its ESG score increased from 93.43 in 2017 to 93.51 in 2018 notwithstanding the allegations, and that SAP Governance Score moved from 94.08 in 2017 to 96.26 in 2018.

## 6. Conclusions, Limitations, and further research

This study draws inspiration from the 14th century frescoes "Allegory of the Good and Bad Government" by Ambrogio Lorenzetti and, to the best of our knowledge, it represents the first investigations to utilize art as a source of inspiration for exploring the connection between governance, finance, and sustainability. The unique aspect of this research lies in its examination of the relationship between effective governance and financial risk at the corporate level, utilizing the concept of 'ESG resilience' as a surrogate for sustainability risk. Our inquiry was motivated by Lorenzetti's frescoes, which depict the Good Government guiding both the city and the countryside towards sustainable development. Although Lorenzetti's work was directed towards the governors of Siena, we contend that the allegory of the Good Government is also applicable to the corporate sector.

[7] Please find more information about Software AG case at: #GuptaLeaks: Another software giant implicated in 'kickback' payments - amaBhungane

We recognize, however, that in doing so, we are advancing a particular perspective of the corporation that diverges from the mainstream view and that envisions the firm as a community oriented towards the common good (Sison and Fontrodona, 2012).

Initially, the idea of treating and governing a firm with a focus on the common good may seem incompatible with the economic principle of self-interest, various business practices, and certain existing legal regulations.

Despite the increasing popularity of movements seeking to reform capitalism, particularly in response to the economic impact of the COVID-19 pandemic, the contemporary corporation remains largely unresponsive to the idea of considering the business firm as a community (Williamson, 1981). The dominant approach remains that of maximizing shareholder value. However, as Barnard (1968) has noted, the multiple connections within a firm and the need for trust and cooperation to achieve organizational effectiveness suggest the possibility of a community-based perspective. This is further reinforced by the importance of developing high levels of organizational social capital, which necessitates stability, interdependence, interaction, and closure (Nahapiet and Ghoshal, 1998). Scholars in the Aristotelian tradition have taken a holistic view of the firm (Comeau-Kirschner and Wah, 1999) and see it as a human community within society at large. Solomon (1994, 2004) drawing on Aristotle, emphasizes this idea stating "the corporation is itself a citizen, a member of the larger community and inconceivable without it" (Solomon, 2004: 1028). Other authors have argued that the business firm is specifically a "community of work" (Naughton, 2006; Sison and Fontrodona, 2012) or a "community of persons for the business mission" (Melé, 2012), that is, for providing goods and services in an efficient and profitable manner.

The idea of the firm as a community is key if we want to bring the notion of good governance, as described by financial literature, closer to Lorenzetti's good government. Along this line, to obtain positive consequences in terms of environmental, social and financial performance, sustainability and stability implies having a good governance. In turn, to have a good governance is not only a matter of good practices but also of virtuous people called to lead the business-community. It is by no coincidence that the *Allegory of the Good Government* emphasizes the centrality of the classical virtues: it is the pursuit of these that must inspire good governors (managers) if they want the prosperity of their political (business) community. In a nutshell, Lorenzetti's frescoes seem to suggest that virtues – prudence, justice, fortitude, and temperance – provide the true basis of good governance and resilience.

While our paper tried to emphasize theoretically the relevance of a Good Governance as a combination of virtuous people and good practices, at an empirical level our analysis concerns those governance practices that have been identified as positive.

We examined the connection between corporate sustainable behavior and volatility of stock returns, sustainability resilience and financial resilience in the context of controversies related to sustainability issues. Our paper demonstrates that a good governance, also at the company level, is the key factor not only in getting ESG controversies managed, therefore increasing firm sustainability resilience, but also and in reducing equity volatility, therefore stabilizing firm financial performance.

The implications of such results cannot be overstated. When companies are able to effectively manage and mitigate sustainability risks, it sends a positive signal to the market and can lead to improved investor confidence and reduced volatility in their stock prices. This is particularly important in today's rapidly changing business environment, where ESG concerns are becoming increasingly prominent and companies are under increasing pressure to demonstrate their commitment to sustainability.

For companies, the practical implications of this research are clear. In order to improve their ESG resilience and reduce stock price volatility, they must focus on building strong governance practices to effectively managing sustainability risks. This can involve implementing sustainable business practices, improving transparency and communication around ESG issues, and actively engaging with stakeholders on ESG matters.

The ethical conduct of managers remains to be assessed at a quantitative level so that the corporate community can truly flourish; this is a challenge known to business ethics scholars, but which remains difficult to solve.

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