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"Identity Crisis in ESG Investing: The Duplicitous Effect on Volatility"

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ABSTRACT IN ENGLISH (100 words)**:**

This paper studies the impact of investing preference frictions between ESG and traditional investors on stock price volatility. As these shareholder groups embody heterogeneous preferences, the resulting between-group differences cause multiplicity of price equilibria. While echoing literature that rising ESG shareholding reduces volatility, we also find that ESG-ownership dominance drives volatility more than traditional investor dominance. This suggests that within-group heterogenous definitions of ESG manifest upon achieving dominance and this subsequent fraying of the consensus results in higher volatility. We advocate further study into this apparent disconnect between ESG investor behaviour and the risk-reduction propensities of ESG for businesses.

ABSTRACT IN CATALAN/ SPANISH (100 words)

Este documento estudia el impacto de las fricciones de preferencia de inversión entre ESG e inversores tradicionales en la volatilidad del precio de las acciones. Como estos grupos de accionistas encarnan preferencias heterogéneas, las diferencias resultantes entre grupos provocan una multiplicidad de equilibrio de precios. Si bien nos hacemos eco de la literatura de que el aumento de la participación accionaria de ESG reduce la volatilidad, también encontramos que el dominio de la propiedad de ESG impulsa la volatilidad más que el dominio de los inversionistas tradicionales. Esto sugiere que las definiciones heterogéneas de ESG dentro del grupo se manifiestan al lograr el dominio y este posterior desgaste del consenso da como resultado una mayor volatilidad. Abogamos por un mayor estudio de esta aparente desconexión entre el comportamiento de los inversores ESG y las propensiones de reducción de riesgos de ESG para las empresas.

KEYWORDS IN ENGLISH (3)**:**
ESG Investing, Stock Price Volatility, Shareholder Frictions

KEYWORDS IN CATALAN/ SPANISH (3)**:**

Inversión ESG, volatilidad del precio de las acciones, fricciones de los accionistas

Identity Crisis in ESG Investing: The Duplicitous Effect on Volatility

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Abstract. This paper studies the interaction between a company's institutional shareholder composition and its stock price volatility, categorising investors into 2 groups based on their commitments to ESG investing. We hypothesise that as these different shareholder groups embody heterogeneous preferences, the resulting friction in behaviour causes multiplicity of price equilibria, reflected in stock price volatility. Consistent with prevailing research, we observe in all market conditions lower volatility when any institutional shareholder group is dominant; however, as the groups become more similar in size, volatility increases. Intriguingly, we find that ESG-committed shareholders drive volatility more than traditional investors as ESG preference dominance grows. This raises interesting postulates on the homogeneity of preferences (or lack thereof), with ESG-committed shareholders 'breaking ranks' more meaningfully than the traditional investor. The implication of this is multifold; there appears to be a 'noise effect' resulting from the divergent manner in which ESG investing is currently executed. Second, this coincides with the conflict between 'doing good' (sustainable outcomes) and 'doing well' (financial outcomes). Also, we suggest that the dampening volatility impact typically ascribed to ESG investors is a form of an 'ESG drift' effect resulting from early-stage herding into ESG stocks, which upon unwinding causes incremental volatility. In closing, our analysis advocates the inclusion of factors regarding shareholding composition and preferences in studying the subject of responsible investing.

Keywords: ESG Investing · Shareholder Frictions · Shareholding Composition · Heterogeneous Preferences · Volatility · Investor Herding · Pricing Equilibria ·

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1 Introduction

Across the last decade, a rising proportion of investments has been allocated to sustainable investing strategies amid a widening base of institutional investor commitment towards environmental, social and governance (ESG) principles[1]. Despite this momentum, markets are still in the budding stages of this transition from traditional shareholder-driven goals to more encompassing stakeholder-driven outcomes. Likewise, academics both propagate the advantages of ESG investing for positive financial or externality outcomes, or denounce its relevance due to the inherent value maximisation conflict between stakeholders and shareholders (Gillan et al., 2021; Cornell and Damodaran, 2020; Bebchuk and Tallarita, 2020). This ongoing debate results in heterogeneous ESG utility functions that in practice, can manifest in the form of equilibria multiplicity and dissonance in asset price discovery.

In this paper, we attempt to distil the interaction of heterogeneous ESG preferences with stock price volatility. While ESG reporting and ratings are increasingly prevalent, it is as dimensional as investors with different ESG utility preferences. It is consequently reasonable then that investor beliefs on the true value of an asset become ever more divergent with ESG factor incorporation. Using the composition of a company's institutional shareholding base, we categorise investors which have committed to responsible investing principles and those which have not into 2 separate groups. Based on each group's collective shareholding, we evaluate if there are group-specific effects on volatility. We further assess if there are volatility effects when there is shareholding dominance by either group, and at the margin, where neither investor group has clear dominance.

In addition to our base regressions, we also rely on 3 notable periods of heightened volatility in the last 12 years to evaluate how the different shareholder groups influence volatility in normal and stressed market conditions. We show that the presence of ESG-committed shareholders generally has a mitigating effect on volatility. More interestingly however, when they form a larger proportion of overall shareholding, their contribution to higher volatility is greater than that of non-committed shareholders, especially in times of crises. We suggest that this is due to herding and subsequent unwinding behaviour. Elsewhere, our analysis also suggests an intuitive feedback loop mechanism; through several lagged regressions, we find a causal relationship of ESG-committed shareholding on stock price volatility, which then subscribes to common empirical conclusions that ESG-centric shareholders generally both prefer, and preserve lower volatility.

The research question in this paper is intriguing as it analyses an oft-overlooked area in ESG investing and stock volatility and returns: the shareholders themselves, and their preferences. Beyond typical fundamental and technical indicators, we postulate that the subject of ESG investing has grown faster than investor acclimatisation, such that noisy herding behaviour occurs and even

[1] Refinitiv Lipper data recorded that ESG funds accounted for a tenth of global AUM in 2021 while Bloomberg projects that global ESG assets will account for a third of global AUM by 2025 (Bloomberg, 2021; Reuters, 2021).

coordinating shareholders are not fully aligned (Dimson et al., 2021). This explains the disparate effect that ESG-centric shareholders can have on volatility, as documented by our results. Our contributions shed a light on the literature from an alternate direction, and strongly suggest the addition of factors concerning shareholder composition into the ESG investing body of work, and the wider study of investment selection.

2 Literature Review & Hypothesis Formation

Throughout the iterations of ESG investing [2], myriad publications, with as many varying results, have analysed the relevance and impact of incorporating ESG factors into financial decisions. Extant research can be broadly categorised into three main themes of interest: Returns, Risk and Ownership (Gillan et al., 2021). A common approach has been to utilise ESG scores, where several researchers have shown that higher ESG ratings have a markedly positive impact on the valuation of a firm and corporate bond pricing (Yoon et al., 2018; Slimane et al., 2019). However it has been argued that the relationship between ESG scores and investor returns is tenuously linked, if only due to the variability in scoring methodology (Jacobs and Levy, 2022; Dimson et al., 2020). In concert, other academics have recommended that the transmission of ESG compliance levels onto returns is better evaluated through its effect on more fundamental drivers of firm value (Cornell and Damodaran, 2020).

One such driver considered to be an ESG value creation mechanism is risk. Assessed at the operational level, research has shown that a company which addresses its ESG risk exposure well (as captured by higher ESG scores) is better able to create value through improved competitiveness and lower tail risk from idiosyncratic ESG-related business shocks (Guido et al., 2019). Similarly, observations of an inverse relationship between ESG scores and volatility have popularised the ESG-risk-return transmission channel for value creation via asset prices and market definitions of risk (Kumar et al., 2016; Gillan et al., 2021) [3]. Empirical evidence lend strength to this, showing that ESG scores are both ex-post and ex-ante informative of stock price volatility while associating higher ESG scores with lower systematic risk (Dunn et al., 2017; Albuquerque et al., 2019). In the context of the COVID-19 pandemic crisis, several papers found a positive association between better ESG ratings and lower volatility (Zhou and Zhou, 2021; Loof et al., 2022) though (Demers et al., 2021) rebut the ESG-risk-returns transmission mechanism by finding emphatically that abnormal returns observed during the pandemic were fully identified by traditional accounting and risk measures.

A growing body of research has been dedicated to understanding the impact of shareholders who themselves are a natural causal variable for risk as defined by asset price volatility (Bushee and Noe,

[2] In this paper, we use ESG as a contemporary and consistent identifier, encompassing other monikers such as Corporate Social Responsibility (CSR), Socially Responsible Investing (SRI), etc..

[3] This includes systematic, idiosyncratic and downside risk, and cost of capital (Gillan et al., 2021).

2000; Chichernea et al., 2013; Greenwood and Thesmar, 2011). Theoretical models typically assume homogeneity across investors, which is axiomatic for the general objective of shareholder value maximisation even for investors which also have non-pecuniary agendas (Nofsinger et al., 2019; Fatemi et al., 2017). Likewise, ESG-committed investors alike subscribe to the general principle that ESG factors matter in investment decisions, with a degree of agreement from traditional investors, if only in regard to risk mitigation (Duuren et al., 2015). However, there remains clear heterogeneity in preferences for the non-pecuniary elements of stakeholderism, as demonstrated by the fact that sustainable investing is still a minority portion of global AUM (Bloomberg, 2021). Combined, this means that in the present transitory state, the distinct investor groups (ESG-committed and non-ESG committed) are different yet not as mutually-exclusive as previously believed.

It also should be noted that even though high-level homogeneity can be assumed, within-group heterogeneity is also pervasive due to varying investor behaviour in achieving the aforementioned common objectives (Che, 2018). A relevant theory here is that of investor herding behaviour, where agents 'update' their preferences by observing the behaviour of others; as decision makers ignore their own information in favour of others', each subsequent decision becomes less informative, and compounds the herding effect (Banerjee, 1992). This raises the risk of herd unwinding, where a herd may, given certain triggers, disperse and demonstrate sudden divergent behaviour, in contrast to earlier group-think. In a similar vein, there is also growing evidence of the heterogeneity within the cohort that self-identify as ESG-committed investors. Besides the wide variability in the extent and manner of integrating ESG principles into investment processes, disparity in ESG ratings has been dilutive to the usefulness of these ratings in portfolio construction, with disutility further amplified when applied in idiosyncratic regulatory environments (Jacobs and Levy, 2022; Li and Polychronopoulos, 2020; Dimson et al., 2020; Tan and Zhu, 2022). Collaborations to engage with investee companies on ESG targets can promote homogeneity through risk-sharing, though this is mitigated by investment mandate diversity and business competition between institutional investors (Dimson et al., 2021; Meng and Wang, 2020).

2.1 Hypothesis Formation

While a popular area of study, research on the interaction between ESG and finance has been subject to fairly oblique methodology: "more ESG equals lower risk" has become an axiom commonly invoked in the process of proving (or disproving) improvement in financial, portfolio, and stock returns (Kumar et al., 2016). Though this truism has some basis via the efficient market hypothesis theorem, more work has since been dedicated towards better understanding the effect of ESG on risk. Yet such research frequently employs much reliance on ESG scoring to represent firms' ESG profiles (Gillan et al., 2021), and their conclusions are susceptible to the inconsistency

across ESG rating methodologies (and the lack of visibility as to which investors actually rely on) (LaBella et al., 2019; Avramov et al., 2020; Jacobs and Levy, 2022; Dimson et al., 2020).

We opt instead to investigate risk as caused by investor groups defined by their ESG utility preferences, referred to hereafter as Responsible Investing-committed (RI) and Non-committed (XC) shareholders. Whether present *between* or *within* responsible investing and traditional shareholder groups, the dissonance earlier described widens the multiplicity of outcomes and our main interest is investigating how stock price volatility is impacted by increased heterogeneity across institutional investors due to varied application of ESG investing principles. Our research is novel as, to our knowledge, existing ESG literature has not empirically addressed this direct relationship by investor preference groupings. The closest work we have found to our research topic is by Harjoto et al. (2015) who find that institutional ownership has a moderating effect on stock return volatility, though this effect diminishes as ESG scores rise. Like them, we build upon earlier studies of the impact of institutional ownership on volatility (Bushee and Noe, 2000; Chichernea et al., 2013; Greenwood and Thesmar, 2011).

Our hypothesis development is further guided by Goldstein et al. (2022) who find that the informative power of asset prices is jointly weakened at the maximal point of heterogeneity when both investor groups are of similar size and neither are able to dominate the price discovery process. This observation of heterogeneity is echoed in Avramov et al. (2020)'s study of ESG rating disagreement which incorporates an ESG-related alpha in market risk premium that is negative when markets are 'green' [4]. However, in periods of no dominance (markets are 'green-neutral'), alpha is positive and zero with and without ESG ratings disparity respectively. These observations (and our research) are timely amid the current disruption of traditional investing dominance by responsible investing.

Formally, our hypotheses are as follows:

Proposition 1. *Responsible investing-committed institutional shareholders contribute to lower volatility in stocks held*

The incorporation of ESG factors into investing decisions in practice has been observed to be motivated by risk-aversion (Przychodzen et al., 2016). A central postulate of our analysis is that shareholders imprint their volatility preferences onto the assets they invest in through their investing behaviour (Che, 2018). As such, we hypothesise an inverse relationship between stock price volatility and the proportion of RI investors. It is instructive here to point out that a key weakness in assumptions here is related to reverse causality: we address this directionality by running several lagged regressions, detailed below.

[4] 'Green' markets refer to when ESG preferences dominate markets and asset pricing. In this context, ESG investors are willing to forgo some financial return in exchange of non-pecuniary returns.

Proposition 2. *The more dominant an institutional shareholder group, the lower the volatility exhibited by stocks held*

Heterogeneity amongst investors has been positively associated with higher volatility (Sherman et al., 1998). In this realm, by separating RI and XC investors, we hope to capitalise on their between-group differences; as either becomes more dominant, the resulting preference homogeneity results in lower volatility as the dominant group is able to impose its preference on the other with reduced trading friction (Goldstein et al., 2022; Avramov et al., 2020). A natural inverse of this is that if neither group is dominant and thus more proportionate in size, the greater the ensuing friction, leading to increased volatility.

Proposition 3. *Stocks with a dominant ESG-committed shareholding base exhibit lower volatility than stocks where traditional shareholders dominate*

Combining elements of Proposition 1 and 2, we posit that a dominant RI shareholding base will have a higher moderating effect on stock price volatility than a dominant XC shareholding base. Upon controlling for within-group concentration, the inference here is two-fold. First, that shareholder concentration does have a statistically significant effect on volatility (Ghoul et al., 2011; Bushee and Noe, 2000; Greenwood and Thesmar, 2011). More pertinently, there are other investor group characteristics that contribute to volatility outside of the concentration effect (Che, 2018).

3 Data & Methodology

For our analysis, we form a panel dataset comprising myriad collected data on the EURO STOXX 50 Index (hereinafter referred to as STOXX 50) [5], its constituents, and the institutional shareholders thereof [6]. The index is Europe's leading blue-chip index, capturing 50 sectoral leaders across European countries. Key reasons for the selection is the index's prevalence, which extends to sufficient availability of factors to be analysed [7] and high levels of trading liquidity, while the constituents are also subject to a regulatory environment that is at the forefront of ESG adoption. To compensate for the narrower sample universe, we perform data collection spanning May 2010 through to April 2022, on a monthly basis. We detail this further in the following subsections.

[5] We select the set of EURO STOXX 50 based in Europe, rather than the Eurozone; this is as the Eurozone set makes adjustments for the specific inclusion of ESG stocks.

[6] For the purposes of streamlining the empirical definition, we rely on the index constituents on 29th April 2022 as a cutoff.

[7] The index benefits from sufficiently robust and frequent institutional reporting on constituent shares held, holder transparency, and ESG scoring.

3.1 Volatility

For the purposes of our study, we use price volatility of our sample stocks obtained from Refinitiv Datastream for the period of study of May 2010-April 2022. The reliance on volatility is taken as a straightforward reflection of investor's preferences, which per our preamble, is a measure of preference heterogeneity. The underlying calculation of volatility, as standard deviation of daily prices subsequently adjusted into monthly buckets (represented by σ_{30days}), is shown below. The T refers to the number of time periods, typically 250 or 252 trading days, while μ refers to the average of daily stock prices over T period.

$$\text{Volatility of Stock Prices} = \text{Standard Deviation of Prices} \times \sqrt{T}$$

$$\sigma_{daily} = \sqrt{\frac{\Sigma(Price_t - \mu)^2}{T}}$$

$$\sigma_{30days} = \sigma_{daily} \times \sqrt{\frac{1}{12}}$$

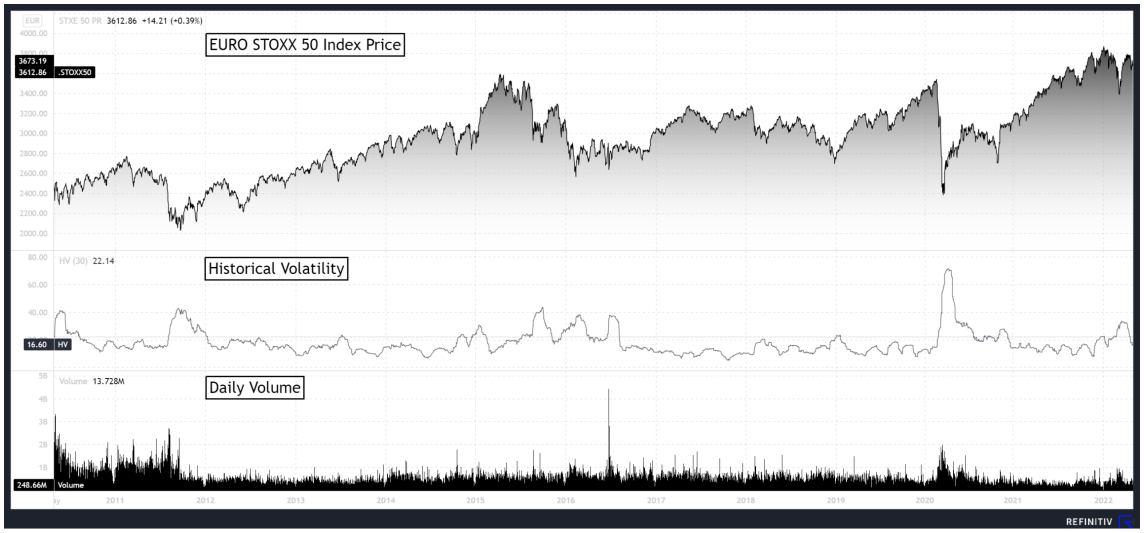
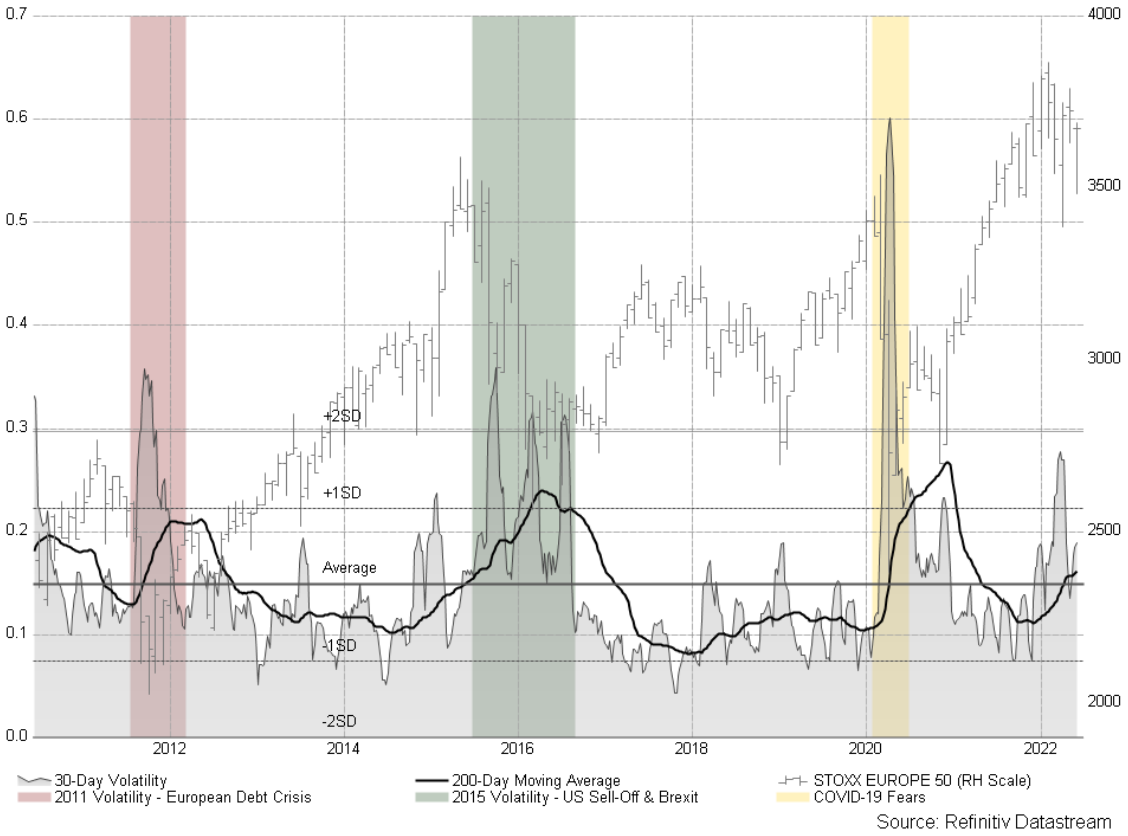


Fig. 1: STOXX 50 Index Price, Historical Volatility, and Volumes, May 2010 - April 2022 (Source: Refinitiv Workspace/.STOXX50)

Figure 1 depicts market movements for our sample period of May 2010 to April 2022. We have graphed the price volatility of our sample index in Figure 2, along with bands for key volatility events. These highlighted bands indicate the 3 notable episodes we have selected in the last decade where index volatility was over 2 standard deviations above the 200-day moving average. These events, signifying abnormal market conditions, are used in our Discontinuity Regression Models in the Empirics section, to explore our interaction of interest in times of volatility stress. Each of these events is briefly covered below.



The graph depicts index price and the median 30-day volatility and 200-day moving average volatility of index constituents, with the mean and +/-1 and +/- 2 standard deviations annotated.

Fig. 2: Volatility of STOXX 50 Constituents, May 2010 - April 2022 (Source: Refinitiv Workspace/.STOXX50)

1. COVID-19 Fears (24th January 2020 - 24th June 2020)
   - First emerging in late-2019, the COVID-19 pandemic was declared a Public Health Emergency of International Concern in January 2020, and brought financial markets to its knees as the climate of fear spread. The STOXX 50 index, which began 2020 on a somewhat strong footing, crashed to a low of 2,386 points (nearly 1,500 points off end-December 2019) in March 2020, recording volatility levels second only to those seen during the Euro sovereign debt crisis in 2008.
2. 2015 Volatility (19th June 2015 - 26th August 2016)
   - A prolonged episode of heightened volatility, this period resulted from a conjunction of multiple adverse events; overheating of the Chinese economy and subsequent devaluation of the CNY, the crash in oil prices, Greece's default, effects of the end of US quantitative easing, and turbulence from the outcome of the UK 'Brexit' referendum. The deepest drop in the STOXX 50 index during this period was 871 points.
3. 2011 Volatility (15th July 2011 - 2nd March 2012)

- A follow-on from the sovereign debt crisis which first began in 2008, this spike in volatility was caused by the breakdown of talks between Greece and the European Central Bank, which saw banks consequently frozen, and capital controls imposed. As contagion spread across the European financial sector, markets lost a collective 54% across 6 months.

3.2 Institutional Shareholder Composition

Data on our primary regressor of interest is obtained from Refinitiv's Workspace platform. For our sample group, holdings are updated on a monthly basis, based on public disclosures and asset manager reporting. The data comprises all institutional shareholders of each STOXX 50 firm, and includes also the holdings of each company's promoters. Holdings are aggregated at the holding company-level of the asset manager, and we maintain this for our analysis, rather than delving to the fund-level [8]. On the whole, this decision assumes that all funds under management is subject to, and conforms to the investment thesis, strategy, and commitments of the asset management holding company [9]. While each of the holding company or fund-level analysis has its strengths and weaknesses, our decision is mainly due to the fact that UNPRI membership, and commitment to investing responsibly is given at the holding company-level.

We pull and collate the shareholding data for all index constituents across our period of study, and decompose them into 2 specific holder groups based on our 2-factor criteria detailed below:

1. Responsible Investing-committed Shareholders (abbreviated as RI shareholders)
   - This group comprises institutional shareholders which have explicitly committed towards responsible investing.
2. Non-committed Shareholders (abbreviated as XC shareholders)
   - This group comprises institutional shareholders which have not made commitments towards responsible investing.

It is imperative here to define 'commitment' for the purposes of our study. For this, we define the commitment criteria as those institutional investors which are signatories of the United

[8] Fund-level data availability is weaker and significantly less consistent. Furthermore, UNPRI membership and ShareAction analyses is performed at the asset management company-level, rather than at the fund-level. This is understandable, given that investment managers commit at the company-level, however may still have funds which are not primarily targeted towards ESG investments. In addition, each fund may have different specific limits and constraints to asset allocation, despite being marketed as ESG-centric. Ultimately however, a more extensive, granular study may be beneficial, and attune the findings of this paper, especially in addressing the active versus passive investing divide.

[9] This may not necessarily hold true, e.g. an asset manager may have both an ESG-committed fund, and a brown-fund, while still committing to ESG-centric investments at a high-level. This suggests that there may be inherent heterogeneity, and dimensionality within each asset management company.

Nations Principles for Responsible Investing (UNPRI), and also those ranked and monitored by ShareAction.

Incorporated to foster responsible and impact investing, signatories to the UNPRI effectively commit publicly to incorporate ESG factors into their investment decision-making [10]. As of April 2022, there were 4,962 signatories to the UNPRI charter, 76% of which are investment managers. Of those domiciled in Europe, 1,914 are signatories (UNPRI, 2022). UNPRI membership represents accountability for the commitment to responsible investing as members can be delisted for failing to meet the minimum reporting requirements [11]. Similarly, several institutions have publicised their UNPRI membership which also confers a degree of public and client accountability.

As UNPRI membership alone is likely a too-elementary criteria, we also refer to ShareAction's ongoing Asset Owner's Disclosure Project [12]. Most recently completed in 2020, this project examines the largest and most influential asset managers on responsible investment governance, climate change, biodiversity, and human rights, ultimately assigning a proprietary rating (ShareAction, 2020). ShareAction's research finds that while European asset managers lead the way on responsible investment, the overall industry has room for improvement [13]. Interestingly, the world's 6 largest asset managers, which account for over USD20 trillion in AUM and are UNPRI signatories, all sit in the D and E rating band [14].

We form a 2-layer criteria, given that being a signatory to the UNPRI alone may itself be insufficient to be defined as a commitment, instead may be a greenwashing effort by asset managers (Kaustia and Wenjia, 2021; Liang et al., 2020). We rely on ShareAction's 75 largest rated asset managers, and hand-map these against the list of UNPRI signatories. We define the resulting group as RI shareholders; the remaining institutional shareholding is therefore recognised as XC shareholders. We then sum each group's shareholding in the constituents of STOXX 50. Based on our criteria, we have 75 investment managers which are classified as RI shareholders, while their

[10] UNPRI memberships are renewed annually, and signatories pay a nominal fee based on institutional category and assets under management (AUM).

[11] https://www.unpri.org/reporting-and-assessment/minimum-requirements-for-investor-membership/315.article.

[12] As has been noted in numerous studies including Liang et al. (2020), no 2 ESG-centric investors are the same. There is enormous dispersion across UNPRI signatories on how they invest responsibly; ShareAction's project is targeted at assessing the fund managers themselves on ESG matters.

[13] 19 of the highest-rated asset managers are domiciled in Europe, including the only 5 asset managers rated in the AAA-A band. Over 50% of asset managers received a D or E rating.

[14] These findings are consistent with similar studies, including InfluenceMap's extensive 2021 report documenting that 421 out of 723 ESG-marketed funds were negatively aligned to the Paris Agreement (InfluenceMap, 2021).

diversity in ESG effectiveness as rated by ShareAction mitigates selection bias. Summary data is provided in Table 1.

Shareholding	**2020**				**2011**			
Composition	**Mean**	**Median**	**High**	**Low**	**Mean**	**Median**	**High**	**Low**
Institutional (Total)	48.2%	45.3%	91.6%	25.6%	18.8%	15.4%	57.5%	4.5%
RI shareholders	23.2%	20.7%	50.1%	<1%	1.2%	<1%	16.9%	<1%
XIC shareholders	25.0%	24.6%	41.6%	21.0%	17.6%	14.8%	40.6%	4.5%
HHI	443	148	5480	32	269	47	2754	2

Table 1: Shareholding and holder concentration data of STOXX 50 constituents in 2020 and 2011, averaged monthly.

As expanded in our Hypothesis Formation section, we surmise that each of the 2 shareholder groups have varying preferences, which ultimately imply multiple valuation equilibria in stock-investing, and investing behaviour. This results in differing impacts on stock volatility; we expect that RI shareholders generally contribute to lower volatility in the company stock, and vice versa for XC shareholders [15].

We then isolate for occurrences of dominance of one shareholder group over the other, and when neither are dominant. We identify dominance when the cumulative shareholding percentage of RI exceeds that of XC by at least 10% and vice versa. When neither exceed the other by 10%, we identify those occurrences as 'Neither' Dominant for the purposes of our regression [16]. As before, we infer homogeneity within and heterogeneity between each shareholder group. However, these variables allow us to test if dominance enables a shareholder group to impose its preferences on the other with minimal friction or if the absence of dominance reduces price informativeness and raises trading frictions (Pastor et al., 2020; Goldstein et al., 2022; Avramov et al., 2020).

In an extended iteration of the dominance analysis above, we also explore the effect of dominance by either the RI and XC groups. In this realm, we consider as dominant whichever group's shareholding exceeds the other; we do not impose the 10% band here, as the research question

[15] It is instructive to address here that our analysis is limited to institutional shareholding only, effectively relying on the assumption that volatility is caused by these holders rather than retail investors. Although sufficiently justified by the lack of granularity on retail shareholders, we note also the incidence of dominance by institutional investors over retail investors (Coffee, 2021). This assumption is further supported by the reasoning that while in some cases retail shareholding may outsize that of institutions, retail investors are characteristically disperse and uncoordinated, and do not, by way of ability, intention, or holding power, materially fuel volatility as a collective.

[16] We apply the 10% level arbitrarily, however in our models, we also perform the same analysis for 5%, 15%, and 20% dominance as discussed in the Empirics section. As demonstrated below, we find that our results hold for the various levels applied.

alters instead towards understanding how each group responds and behaves when dominant [17]. The central posit here is that as each group embodies different preferences, this would also be reflected in behaviour given dominance.

Elsewhere, we also compute the degree of concentration of each firm's shareholding structure to include as a control in our regression as this has been observed to have an incremental effect on volatility (Ghoul et al., 2011; Bushee and Noe, 2000; Greenwood and Thesmar, 2011). To estimate shareholding concentration, we opt to apply the Herfindahl-Hirschman Index (HHI) calculation, a widely-accepted method typically applied towards assessing concentration of market power, customer agglomeration, or even cross-ownership (in a modified format) (Corporate Finance Institute, 2020) [18]. While typically situational, its use here is appropriate to provide a sense of shareholder composition diversity, concentration, and perhaps most importantly, size [19]. Our application of the HHI to institutional shareholding concentration is displayed in the equation below, with SH representing the shareholding of each institutional investor, up to the N-th institutional shareholder.

$$\text{HHI}_{it} = \text{SH}_{1it}^2 + \text{SH}_{2it}^2 + \text{SH}_{3it}^2 + \cdots + \text{SH}_{Nit}^2$$

For further dissection, we also calculate the HHI *within* each shareholder group by rebasing each shareholder's proportional ownership of the stock to the sum of its shareholder group's ownership of the stock, thus capturing within group concentration (illustrated for the XC group below; we perform the same for the RI group).

$$\text{XC Concentration}_{it} = \left(\frac{\text{XC\_SH}_{1it}}{\sum_{n=1}^{N} \text{XC\_SH}_{nit}}\right)^2 + \left(\frac{\text{XC\_SH}_{2it}}{\sum_{n=1}^{N} \text{XC\_SH}_{nit}}\right)^2 + \cdots + \left(\frac{\text{XC\_SH}_{Nit}}{\sum_{n=1}^{N} \text{XC\_SH}_{nit}}\right)^2$$

3.3 Company & Stock Characteristics

In detailing our empirical testing, and consistent with papers studying the drivers of a stock's risk and volatility, we list in Table 2 several company or stock-specific data points across categories

[17] That said, we also perform our analysis with different dominance bands, as mentioned above. Our results hold across the different bands.

[18] The HHI ranges from 1 to 10,000 (most concentrated). As a general rule of thumb, a HHI of <1,500 represents low concentration, 1500-2,500 represents moderate concentration, and >2,500 represents high concentration.

[19] We are wary that size may be a key factor in confounding the analysis; e.g., and overlarge shareholder may have a disproportionate influence on volatility, and thus is able to exact their preference with minimal friction. To control for size, we considered removing the top largest and smallest institutional shareholders; however, this route is group-agnostic, and would provide only limited information on how the different preferences interact. We thus opt for the HHI as a measure of shareholder size, dispersion, and concentration.

that we have selected to serve as controls [20]. To these, we also add each stock's dividend yield to recognise Shareholder Repatriation, which in the literature has also been documented to indirectly affect stock volatility via the shareholder transmission mechanism (Rubin and Smith, 2008).

Category	Indicator	Mean	Median	High	Low	Source
Profitability	Return on Assets	7.6%	6.8%	47.5%	-10.0%	Worldscope
Firm Size	Market Capitalisation (EUR 'mil)	81,041	63,930	296,201	23,190	Datastream
Firm Value	Price/ Book	1.98x	2.43x	73.7x	*n.m.*	Datastream
Leverage	Net Debt/ Assets	13.8%	13.4%	58.1%	*n.m.*	Worldscope
Cash Flow Risk	Funds from Operations/ Debt	0.51x	0.24x	5.44x	*n.m.*	Datastream
Shareholder Repatriation	Dividend Yield	3.9%	3.4%	12.4%	0.6%	Datastream

Table 2: Data shown above is across the 2020 calendar year. Note: n.m. indicates non-meaningful data, i.e. negative denominator.

Primary data sources are the Refinitiv Workspace Worldscope and Datastream databases; in some cases where specific data or expressions were unavailable, expressions to obtain data were user-defined. Data frequency is monthly, and is on a trailing and annualised interim basis where necessary.

Our hypotheses for each of these interactions with volatility and firm risk is intuitive and consistent with the indicated research findings; as a firm's strength in each of these categories rises, its market risk reduces [21], resulting in lower volatility (Sadka, 2007; Perez-Quiros and Timmermann, 2000; Aharon and Yagil, 2019; Blitz and van Vliet, 2007).

3.4 Firm's ESG Profiles

Beyond focusing purely on the nature of a company's shareholders, we also obtain and consider the relevance of each company's ESG profile on its stock price volatility. In this realm, ample research has been performed to explore the interaction between ESG spending, ratings, and scores on firms' access to financing (Cheng et al., 2013), stock prices, volatility (Engelhardt et al., 2021), and even downside risk (Lööf and Stephan, 2019). However, the landscape is subject to a swathe

[20] Research into similar areas demonstrate the use of a wide range of variables identified as controls, from return on assets (ROA), valuation ratios e.g. price-book ratio (PB) and value-at-risk (VaR), and even the performance of geographically-proximate firms (Bouslah et al., 2016; Jiraporn et al., 2014; Luo and Bhattacharya, 2009). While the range of variables typically selected in similar studies is extensive, we generally find that controls can be categorised into 5 areas which adequately trace a firm's relevant financial profile; (i) Profitability, (ii) Firm Size, (iii) Firm Value, (iv) Leverage, and (v) Cash Flow Risk.

[21] Or, in the context of Shareholder Repatriations, offers more realised returns to investors.

of score and rating providers, each with divergent methodologies, varied access to the company being rated, and different areas of focus (LaBella et al., 2019); both due to a lack of standardised rules on disclosures and formal audits, but also due to the ratings agencies' goal of commercial differentiation. Due to this dimensionality and with respect to preceding literature, we elect to use ESG scores as a control variable which intuitively, adds fullness to our model identification as institutional shareholders have access to and do consider ESG scoring in the execution of their responsible investing strategies.

We elect to rely on Refinitiv's ESG Combined (ESGC) score, provided on the Refinitiv Workspace platform [22]. Refinitiv's ESG rating is aggregated from the decomposed scores for environmental (ENV), social (SOC), and governance (GOV) factors, while including a controversies component. The final rating is also industry-adjusted, with a publicly-available weight matrix. Table 3 summarises the Refinitiv ESG scores of our sample universe.

Scores	**2020**				**2011**			
(out of 100)	**Mean**	**Median**	**High**	**Low**	**Mean**	**Median**	**High**	**Low**
ESG Combined score	83.9	87.2	95.2	40.7	76.5	78.3	94.1	45.4
ENV score	81.9	86.1	98.1	24.3	81.5	85.3	98.3	42.2
SOC score	86.8	91.1	97.2	34.6	77.9	82.0	96.6	31.8
GOV score	80.3	84.5	97	41.9	71.3	75.3	97.6	15.3
Controversies score	98.4	100	100	75	*n.a.*	*n.a.*	*n.a.*	*n.a.*

Table 3: Refinitiv ESG scores of all constituents of STOXX 50 in 2020 and 2011, averaged monthly. Note: *n.a.* denotes unavailability, as the Refinitiv ESG Controversies assessment only began in 2017.

While not analysed in this paper, it is interesting to note the transition in ESG performance of STOXX 50 constituents across 2011 and 2020. Where scores for environmental performance have largely remained flat, scores on governance and social matters have demonstrated marked improvement, and are among the highest globally (as rated by Refinitiv); 20 of the index constituents are among the 50 highest-rated companies globally for ESG performance.

4 Empirics

To assess our hypotheses, we propose the following OLS regression models (from hereon dubbed the Base Regression Models). These models are not intended to be iterative, however instead flow directly in address of our hypotheses. For clearer delineation, the Base Regression Models is intended to serve as a baseline, and educate in a conditional correlation sense. Conversely,

[22] We use this platform as its complete methodology and documentation is freely- and publicly-available; on the Workspace platform, substantial granularity is also available, although the analysis of this is beyond the immediate scope of this paper.

we also form matching regression models with dummy discontinuities capturing abnormal-market conditions (which we categorise as the Discontinuous Regression Models) represented by the 3 selected events of heightened volatility discussed in the Data & Methodology section, to analyse the interactions from a clearer causation perspective.

4.1 Base Regression Models

Specification 1 (hereon addressed as the Shareholder Effect regression) is intended to simplistically analyse share price volatility by shareholder group; consistent with our summation in the Literature Review section and common research findings, ESG-centric shareholders typically serve as a buffer against volatility. Our specification thus decomposes institutional investors into the RI and XC groups detailed in the Data & Methodology section. To address the realistic risk of reverse causality, we also perform a lagged version of this specification.

$$\begin{aligned}\text{Volatility}_{it} = \alpha_i + \beta\left[\text{RI Shareholding}_{it}\right] + \beta\left[\text{XC Shareholding}_{it}\right] + \\ \beta\left[\text{Concentration}_{it}\right] + \gamma_{it} + \tau_{it} + \epsilon_{it}\end{aligned} \tag{1}$$

Specification 2 (hereon addressed as the 'Neither' and 'Either' Dominant regression) delves deeper into narrative drawn up in our postulates; if our hypothesis holds, the more alike in proportion the shareholding of the 2 groups studied, the greater the friction as each group competes for reflection in pricing. Our specification of 'Neither' Dominant and 'Either' Dominant is intended to capture this, and is detailed in the Data & Methodology section. Note that this specification is in terms of the degree of dominance, regardless of whichever shareholding group is larger than the other.

$$\begin{aligned}\text{Volatility}_{it} = \alpha_i + \beta\left[\text{'Neither' Dominant}_{it}\right] + \beta\left[\text{'Either' Dominant}_{it}\right] + \\ \beta\left[\text{Concentration}_{it}\right] + \gamma_{it} + \tau_{it} + \epsilon_{it}\end{aligned} \tag{2}$$

Finally, Specification 3 (hereon addressed as the Group Dominance regression) combines the analysis from the earlier 2 by studying the impact on volatility by dominance in terms of the shareholding groups. Ultimately, by disentangling each group's volatility impact as shareholding rises relative to the other, we hope to better understand the interaction between volatility and heterogeneity (or homogeneity) across and within each shareholding group. To accurately specify this, we also control for the respective group's concentration within themselves.

$$\begin{aligned}\text{Volatility}_{it} = \alpha_i + \beta\left[\text{RI Dominant}_{it}\right] + \left[\text{XC Dominant}_{it}\right] + \\ \beta\left[\text{RI Concentration}_{it}\right] + \beta\left[\text{XC Concentration}_{it}\right] + \gamma_{it} + \tau_{it} + \epsilon_{it}\end{aligned} \tag{3}$$

Note that for all specifications, we include variables to capture either joint or individual group dominance, as detailed in the Data & Methodology section. This is targeted at controlling for the degree of diversity of a company's shareholders, thus adjusting for the impact of over-large

shareholders. Furthermore, the models also include a battery of controls for company characteristics (denoted by γ_{it}), which include our earlier detailed indicators within the Profitability, Firm Size, Firm Value, Leverage, Cash Flow Risk and Shareholder Repatriation categories. We also include each firm's combined ESG score as a control variable. Finally, all models are run with company and time fixed effects (together signified by τ_{it}).

4.2 Discontinuous Regression Models

Each of the following specifications build on those in the Base Regression Models by including interaction variables to identify causality, and to reflect our regressor of interest in periods of heightened volatility, denoted as COVID-19, 2015 Volatility, and 2011 Volatility.

$$\begin{aligned}\text{Volatility}_{it} = \alpha_i + \beta[\text{RI Shareholding}_{it} \times \text{Post}_e] + \beta[\text{XC Shareholding}_{it} \times \text{Post}_e] + \\ \beta\left[\text{Concentration}_{it}\right] + \gamma_{it} + \tau_{it} + \epsilon_{it}\end{aligned} \tag{4}$$

$$\begin{aligned}\text{Volatility}_{it} = \alpha_i + \beta\left[\text{`Neither' Dominant}_{it} \times \text{Post}_e\right] + \beta\left[\text{`Either' Dominant}_{it} \times \text{Post}_e\right] + \\ \beta\left[\text{Concentration}_{it}\right] + \gamma_{it} + \tau_{it} + \epsilon_{it}\end{aligned} \tag{5}$$

$$\begin{aligned}\text{Volatility}_{it} = \alpha_i + \beta\left[\text{RI Dominant}_{it} \times \text{Post}_e\right] + \beta\left[\text{XC Dominant}_{it} \times \text{Post}_e\right] + \\ \beta\left[\text{RI Concentration}_{it}\right] + \beta\left[\text{XC Concentration}_{it}\right] + \\ \gamma_{it} + \tau_{it} + \epsilon_{it}\end{aligned} \tag{6}$$

Each of the fixed effects models above are effectively expansions of Specifications 1, 2, and 3, with the addition of the interaction variable. Post_e indicates a dummy variable taking the form of 1 if the time period is within the defined dates of the 3 heightened volatility events, and 0 otherwise.

4.3 Findings & Observations

We first run the Base Regression Models as specified, to assess as a 'catch-all' the relationships between our variables of interest. Results are presented in Table 4, with key observations detailed below. Generally across both the Base and Discontinuous Regression Models, we find that amongst our control variables, the fundamental drivers of volatility among the included variables are Firm Size, Firm Value, and Cash Flow risk. Across all variables, point estimates and their directionality is intuitive; as a firm's Profitability, Firm Value, or Cash Flow risk ratio rises [23], its stock price volatility reduces. Interestingly, we find that a firm's ESG score was largely statistically insignificant except in COVID-19, with its directionality consistent with wider research.

Observation 1. *Stock price volatility is only conditionally reducing in RI shareholding; RI shareholding drives greater volatility in crises*

[23] Recall that the indicator applied here is Funds from Operations/ Debt. Therefore, a higher ratio indicates reducing cash flow risk, and vice versa.

Table 4: Base Regressions Summary

	Dependent Variable: Log (Volatility)		
	(1)	(2)	(3)
Log(RI_SH)	-0.063^{***}		
	(0.015)		
Log(XC_SH)	-0.038		
	(0.027)		
Log(Neither_Dominant)		0.169^{***}	
		(0.046)	
Log(Either_Dominant)		-0.016	
		(0.038)	
Log(Concentration)	0.012^{***}	0.003^{**}	
	(0.002)	(0.001)	
Log(RI_Dominant)			0.249^{***}
			(0.026)
Log(XC_Dominant)			0.088^{***}
			(0.018)
Log(RI_Concentration)			0.0001
			(0.001)
Log(XC_Concentration)			0.011^{***}
			(0.002)
Log(ESG_Score)	-0.001^{*}	-0.001	-0.001
	(0.001)	(0.001)	(0.001)
Log(Profitability)	-0.006^{*}	-0.007^{**}	-0.005
	(0.004)	(0.004)	(0.003)
Log(Firm_Size)	0.024^{***}	0.023^{***}	0.018^{***}
	(0.002)	(0.002)	(0.002)
Log(Firm_Value)	-0.018^{***}	-0.017^{***}	-0.014^{***}
	(0.004)	(0.004)	(0.004)
Log(Leverage)	-0.006	-0.003	0.013
	(0.010)	(0.010)	(0.011)
Log(Cash_Flow_Risk)	-0.007^{*}	-0.006^{*}	-0.008^{**}
	(0.003)	(0.003)	(0.003)
Log(Div_Yield)	0.007^{*}	0.006	0.005
	(0.004)	(0.004)	(0.004)
Fixed Effects	Yes	Yes	Yes
Observations	7,182	7,182	7,182
R^2	0.102	0.110	0.119

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

Corroborating Proposition 1, the results of the Shareholding Regression (column 1 of Table 4) show RI shareholding is statistically significant, and effectively accounts towards to lower volatility. The point estimates also suggest that RI shareholders have a greater dampening effect on volatility than XC shareholders, consistent with findings in the literature documenting that ESG-centric shareholders prefer, and themselves enact low volatility [24]. However, we believe this to be conditional; as shown in our Discontinuous Regression Models (columns 1, 2, and 3 of Table 5), RI shareholding actually contributes to equal or higher volatility in times of crises, relative to XC shareholders [25]. This is a caveat addition to our hypothesis, and we reason this as being due to RI shareholders 'blinking first' in times of stress (Greenwood and Thesmar, 2011). Amid apparently strong demand for ESG investing and continuous regulatory development, it may be the case that institutional investors herd into ESG investing to meet these demands, but disperse in times of stress during which their true preferences come to the fore [26]. We also find parallels of this inference with Avramov et al. (2020)'s documentation of zero ESG alpha in a 'green-neutral' market.

To assess directionality of causality, we also perform 2 forms of lagged regressions, presented in columns 1 and 2 of Table 7, in the Appendix section. Results show that lagged shareholding does in fact hold strong explanatory power, implying that RI shareholders do contribute to lower volatility, at a rate of more than double that of XC shareholders. This result is robust and holds for lags of 3 months, 6 months, and 12 months. Separately, we also use 12-month lagged RI shareholding as the regressand, against volatility as the regressor of interest, and find that stocks with lower volatility also drive RI shareholding higher, supporting summations that ESG-centric investors tend to prefer reduced volatility. While identification for the latter is likely weaker, this paints an interesting view of a feedback loop mechanism, rather than of simplistic reverse causality; ESG-centric investors do prefer lower volatility, and also preserve lower volatility in behaviour.

This has important ramifications for investee companies juxtaposed with Shareholder Salience Theory; as ESG-centric shareholders endeavour to influence investees, they also directly impact the risk and volatility of the investee company itself (Cundill et al., 2017). This lends credence to recent arguments suggesting that companies themselves be mindful of how their ESG performance is perceived by investors and ratings agencies (Zumente and Lace, 2021).

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[24] The point estimate for XC shareholding is not statistically significant, and not heavily relied upon in our onward analysis.

[25] During COVID-19 and 2011 Volatility, RI shareholding contributed markedly more to volatility than XC shareholders, although the effect was less pronounced in 2011 (potentially because ESG-centric investment was in its infancy at the time). The 2015 Volatility on the other hand showed XC shareholders to have a greater effect.

[26] We note that the true preferences of institutional investors should reflect that of their beneficiaries. The discussion of the possible agency conflict as raised by Mahoney and Mahoney (2021) is extensive but not within the scope of this paper.

Observation 2. *The absence of shareholding dominance has an incremental effect on stock price volatility*

In our 'Neither' and 'Either' Dominant Regression (shown in column 2 of Table 4 and columns 4, 5, and 6 of Table 5), we find that volatility is markedly higher when neither shareholding group is dominant, i.e. both groups are relatively comparable in shareholding proportion. This significant result supports Proposition 2, and the supposition of heterogeneity between our RI and XC groups, where as each group becomes more proportional in size, no single group's preferences 'wins out', effectively fuelling volatility. The opposite is true when either group is dominant [27], such that whenever any single group is dominant, their within-group homogeneous preferences are reflected in prices, thus keeping volatility lower. This result holds for different dominance margin cutoffs [28]. From a more theoretical point of view, this is reminiscent of heightened frictions in price discovery when neither shareholder group is able to levy its preferences on the other. On the one hand, this can be interpreted as a contest for informative pricing power. On the other, this effect could also be consistent with the narrative of a narrower shareholding base (Ghoul et al., 2011) or moderated trading liquidity conditions consequent of the weakened informative power of asset prices (Goldstein et al., 2022).

Observation 3. *As RI dominance rises, volatility is heightened, especially in crises*

Surprisingly, and an illuminating addition to Proposition 3, results from our Group Dominance regressions (presented in column 3 of Table 4, and Table 6) show that as the RI shareholding group becomes dominant, and controlling for within-group concentration, volatility actually rises by a substantially higher margin than that generated by XC investors. This result is strong and holds across all specifications, effectively capturing a caveat to our, and the literature's assumptions that preferences are homogeneous within shareholder groups. This is obvious also in our Discontinuous Regression Models; during times of heightened market stress, RI shareholders 'break ranks' more meaningfully and drive volatility. We find also that this outsized effect for RI shareholders has been increasing across the last decade.

This observation is interesting for various reasons. In relation to Goldstein et al. (2022)'s extended model, our results in RI dominance are consistent with their proposition that with sufficiently large preference divergence, a decline in price informativeness for one investor group outweighs the gain of another. Without loss of generality [29], we suggest an alternative explanation;

[27] Although the estimate for 'Either' Dominant is not statistically significant, its directionality is intuitive, and supports postulates.

[28] We apply the regressions at various dominance levels as well, including 5%, 15%, and 20%. Results hold throughout; we present what we view to be most appropriate in this context.

[29] To Goldstein et al. (2022)'s paper which models for strict and relaxed heterogeneity only *between* investor groups.

there is meaningful heterogeneity *within* the RI shareholder group at a granular level which becomes the next 'preference battleground' after ESG pricing dominance has been achieved. We draw parallels with the complexity of defining green-washing investors (Dumitrescu et al., 2022) to strengthen our suggestion of within-group heterogeneity in the RI cohort such that there are two sub-groups which we dub as 'true' and 'pseudo' ESG investors respectively.

If we accept green-washing behaviour exists, a natural follow-through would be investor herding behaviour (Teraji, 2003) which illuminates the relatively higher magnitude of the RI-volatility effect in crises. The 'pseudo' investor group could be spuriously or intentionally herding into ESG investing, which would explain the negative volatility effect noted in Observation 1. However, periods of market crisis test the mettle of all investors and unwind herding behaviour (Rubbaniy et al., 2021). In such events, each investor reverts to his own true preference in making investment decisions and the 'pseudo' sub-group potentially deviates further from the 'true' sub-group[30], thus leading to the heightened volatility effect. As such, while this volatility effect could suggest that ESG-committed shareholders have shorter investment horizons (Che, 2018; Przychodzen et al., 2016; Starks et al., 2017), this may be skewed by an identity crisis of the 'pseudo' group rather than an accurate depiction of the whole.

5 Conclusions

Our analysis and findings are interesting for several reasons; from a broader perspective, it underlines the direct and causal role that shareholders play in connection with a company's financial market performance [31], which in our view has been a somewhat neglected factor against a backdrop of ESG scores and green rhetoric. By directly targeting the analysis at shareholding composition and dominance, and differentiating investors by their ESG preferences, focus can be placed on the interaction between different investors and investee risk (as denoted by stock price volatility).

Secondly, the finding that ESG investors bring less volatility only in select conditions serves as an important reminder; in a world rapidly transitioning towards greater acceptance of ESG investing criteria, it is important to recognise that there are no permanent (or unconditional) salves. As alluded to by other researchers, the threat of green-washing (by investee companies, ESG-rating companies, and by investors themselves), and enormous disparity in ESG-centric asset managers may obfuscate true steps forwards in responsible investment. Our analysis leads us to similar conclusions, not least of which is the identification challenge that arises when regulators seek to address green-washing behaviour in asset management.

[30] Greater displacement during crisis by the 'pseudo' sub-group as they revert to their own true beliefs (unwinding of intentional herding) or because they have weaker ESG investing frameworks (unwinding of spurious herding) (Banerjee, 1992).

[31] Rather than the more indirect role they play in engaging for impact investment or on influencing company spending on ESG.

Table 5: Discontinuous Regressions Summary: Effect by Shareholding Group and 'Neither' and 'Either' Dominant

	Dependent Variable: Log (Volatility)					
	Effect by Shareholding Group			'Neither' and 'Either' Dominant		
	COVID-19	2015 Volatility	2011 Volatility	COVID-19	2015 Volatility	2011 Volatility
	(1)	(2)	(3)	(4)	(5)	(6)
Log(RI_SH_x_COVID)	0.378***					
	(0.035)					
Log(XC_SH_x_COVID)	0.229***					
	(0.031)					
Log(RI_SH_x_2015)		0.067**				
		(0.032)				
Log(XC_SH_x_2015)		0.149***				
		(0.022)				
Log(RI_SH_x_2011)			0.389**			
			(0.162)			
Log(XC_SH_x_2011)			0.347***			
			(0.023)			
Log(Neither_Dominant_x_COVID)				2.037***		
				(0.120)		
Log(Either_Dominant_x_COVID)				−1.500***		
				(0.123)		
Log(Neither_Dominant_x_2015)					0.225***	
					(0.020)	
Log(Either_Dominant)					0.112***	
					(0.014)	
Log(Neither_Dominant_x_2011)						1.225***
						(0.109)
Log(Either_Dominant_x_2011)						−0.901***
						(0.111)
Log(Concentration)	0.003***	0.006***	0.007***	0.004***	0.003**	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Log(ESG_Score)	−0.003***	−0.001	−0.001	−0.003***	−0.002*	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Log(Profitability)	−0.003	−0.002	−0.012***	−0.005	−0.005	−0.012***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)
Log(Firm_Size)	0.024***	0.025***	0.026***	0.023***	0.024***	0.025***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Log(Firm_Value)	−0.020***	−0.023***	−0.016***	−0.019***	−0.020***	−0.014***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Log(Leverage)	−0.023**	−0.010	−0.003	−0.025**	−0.005	−0.002
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Log(Cash_Flow_Risk)	−0.002	−0.007**	−0.006*	−0.001	−0.007**	−0.006*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Log(Div_Yield)	0.006*	0.005	0.003	0.006*	0.005	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Fixed Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	7,182	7,182	7,182	7,182	7,182	7,182
R^2	0.184	0.118	0.133	0.171	0.123	0.138

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

Table 6: Discontinuous Regressions Summary: Group Dominance

	Dependent Variable: Log (Volatility)		
	COVID-19	2015 Volatility	2011 Volatility
	(1)	(2)	(3)
Log(RI_Dominant_x_COVID)	0.936***		
	(0.050)		
Log(XC_Dominant_x_COVID)	0.504***		
	(0.034)		
Log(RI_Dominant_x_2015)		0.475***	
		(0.064)	
Log(XC_Dominant_x_2015)		0.215***	
		(0.021)	
Log(RI_Dominant_x_2011)			0.405
			(0.454)
Log(XC_Dominant_x_2011)			0.343***
			(0.023)
Log(RI_Concentration)	0.003**	0.001	−0.002
	(0.001)	(0.001)	(0.001)
Log(XC_Concentration)	0.011***	0.013***	0.011***
	(0.002)	(0.002)	(0.002)
Log(ESG_Score)	−0.004***	−0.003***	−0.002**
	(0.001)	(0.001)	(0.001)
Log(Profitability)	−0.009***	−0.007**	−0.016***
	(0.003)	(0.003)	(0.003)
Log(Firm_Size)	0.017***	0.022***	0.026***
	(0.002)	(0.002)	(0.002)
Log(Firm_Value)	−0.010***	−0.018***	−0.014***
	(0.004)	(0.004)	(0.004)
Log(Leverage)	0.004	0.012	0.010
	(0.010)	(0.011)	(0.010)
Log(Cash_Flow_Risk)	−0.006*	−0.009***	−0.007**
	(0.003)	(0.003)	(0.003)
Log(Div_Yield)	0.005	0.006	0.005
	(0.003)	(0.003)	(0.003)
Fixed Effects	*Yes*	*Yes*	*Yes*
Observations	7,182	7,182	7,182
R^2	0.171	0.125	0.134

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

On a related note, the implication that ESG investors show a tendency to break ranks and contribute more to higher volatility (than traditional investors) in times of uncertainty is reflective of the current maturity, and development stage of ESG-centric investment. As the space evolves further, it may become likely that there will be a degree of convergence in methodology and preferences, such that within-group homogeneity of responsible investors increases. In this realm, it may also be an engaging effort to hypothesise how volatility and financial market performance changes as increasingly more investors become ESG-centric; could volatility settle on an entirely new normal, reduced footing upon wholesale ESG adoption, or would there be dissipation of the mitigating ESG effect?

By relying on this paper's method of gauging preference heterogeneity as signalled by volatility, expansionary research can be performed on what truly drives ESG-centric investor demand, and if this is indeed different from those demanded by traditional investors. An interesting parallel to our study is analyses of shareholder impact on cost of capital; extant theoretical studies match our findings, but lack empirical testing (Goldstein et al., 2022). It may also be instructive to understand the interaction between investor preferences and investor herding behaviour, and what drives an unwinding, thus providing a more educated explanation of investor behaviour in times of crises. Finally, we also hope that this paper galvanises efforts to include and study the fundamental drivers of stock performance and investor behaviour as causal components in the context of ESG. This would ultimately advocate a more gradual, measured approach to understanding responsible investing and its budding role in financial markets.

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Appendix

Table 7: Lagged Regressions Summary

	Dependent Variable: Log(Volatility)		Dependent Var: Log(Lagged RI Shareholding)
	(1)	(2)	(3)
Log(M6Lag_RI_SH)	-0.249^{***}		
	(0.014)		
Log(M6Lag_XC_SH)	-0.110^{***}		
	(0.021)		
Log(M12Lag_RI_SH)		-0.187^{***}	
		(0.015)	
Log(M12Lag_XC_SH)		-0.034^{*}	
		(0.020)	
Log(M12Lag_Vol)			-0.062^{***}
			(0.010)
Log(Concentration)	0.022^{***}	0.016^{***}	0.053^{***}
	(0.001)	(0.001)	(0.001)
Log(ESG_Score)	-0.006^{***}	-0.006^{***}	-0.017^{***}
	(0.001)	(0.001)	(0.001)
Log(Profitability)	-0.015^{***}	-0.007^{**}	-0.047^{***}
	(0.004)	(0.004)	(0.003)
Log(Firm_Size)	0.026^{***}	0.024^{***}	-0.009^{***}
	(0.002)	(0.002)	(0.001)
Log(Firm_Value)	-0.010^{**}	-0.015^{***}	0.042^{***}
	(0.004)	(0.004)	(0.003)
Log(Leverage)	0.013	0.015	0.053^{***}
	(0.010)	(0.011)	(0.009)
Log(Cash_Flow_Risk)	-0.010^{***}	-0.011^{***}	-0.014^{***}
	(0.003)	(0.004)	(0.003)
Log(Div_Yield)	0.016^{***}	0.019^{***}	0.0001
	(0.004)	(0.004)	(0.003)
Fixed Effects	Yes	Yes	Yes
Observations	6,882	6,582	6,582
R^2	0.162	0.135	0.488

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