

**Are Sustainability Factors
Associated with Stock Price
Informativeness?
An Examination of Sustainability
Performance and Disclosure**

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INTRODUCTION

- Corporate sustainability is advancing from greenwashing and branding to, very recently, business imperative as shareholders demand, regulators require, and companies report their sustainability performance.
- Sustainability has become an economic and strategic imperative with potential to create opportunities and risks for businesses as many investors consider impact investing in their investment decisions.
- Now more than 14,000 global public companies disclose their financial economic sustainability performance (ESP), and nonfinancial environmental, social, and governance (ESG/CSR) sustainability performance information.
- European Companies are required to issue sustainability reports regarding their CSR/ESG performance as well as diversity, in 2017 and Hong Kong listed companies have reported ESG/CSR since 2015.
- The Delaware Act requires the reporting entities obtain certifications of CSR/ESG sustainability as of October 2018.

Corporate Sustainability: Winner of 2013 Axiom Gold Award

Corporate Sustainability explores business sustainability and accountability reporting and their integration into strategy, governance, risk assessment, performance management, and the reporting process. Written by renowned experts in the field of managing for sustainable performance, this important book also highlights how people, business, and resources collaborate in a business sustainability model.

A significant contribution on how to put sustainability principles to work, *Corporate Sustainability* offers real-life tools and practices for creating an authentic corporate framework for sustainability.

Joel Makower writes, “Companies seeking to embrace sustainability must navigate a thicket of policies and standards, from ethical performance to environmental protection to executive compensation – and do so transparently, comprehensively, and globally. Ann Brockett and Zabihollah Rezaee have created a valuable field guide to this brave new world of multiple bottom lines, providing guidance on how companies can engender public trust and investor confidence while pursuing their economic goals.”

Corporate Sustainability

Integrating Performance and Reporting



Ann
Brockett

Partner, Ernst & Young LLP

Zabihollah
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Professor of Accountancy,
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Business Sustainability, Greenleaf, October 2015

Review by O.C. Ferrell:

Rezaee takes a more inclusive approach to sustainability performance and reporting by recommending that businesses use a multiple bottom line (MBL) approach rather than the more basic triple-bottom line approach. An MBL approach examines economic, governance, social, ethical, and environmental performance of an organization's activities to determine sustainability. This approach expands the definition of sustainability beyond environmental or economic indicators to advocate for a holistic methodology that factors in the well-being of the organization and its impact on stakeholders.

Rezaee's view of sustainability takes a multidimensional approach incorporating organizational value, long-term performance, and stakeholder theory through the use of financial and nonfinancial measures. This unique way of viewing sustainability and the emphasis on accountability and integrated reporting has the potential to change the way researchers, companies, and public policy makers view this increasingly important field.

BUSINESS SUSTAINABILITY

Performance, Compliance, Accountability
and Integrated Reporting

ZABIHOLLAH REZAEI



Synopsis:

- **What did we do in the paper:** We examine whether the financial market prices business sustainability factors by examining the association between the stock price informativeness and sustainability factors of performance and disclosure.
- **Why did we do it:** The extant literature focus on the link between CSR and financial/market performance A growing number of investors are currently integrating non-financial environmental, social, and governance (ESG) sustainability factors of performance and disclosure into their investment strategies (IRRCi,2018).
- **What did we find:** that non-financial environmental, social and governance (ESG) sustainability performance is positively associated with stock price informativeness after controlling for financial economic performance, using a sample of 18,223 firm-year observations between 1992 and 2015. Employing a reduced sample of 6,632 firm-year observations between 2005 and 2015, we further find that the association between ESG sustainability performance and stock price informativeness is stronger for firms with higher ESG sustainability disclosure and weaker economic performance.
- **What is our Contribution:** We extend the literature by highlighting the importance of ESG sustainability factors of performance and disclosure as they are integrated into corporate culture and business models and practices. our results have implications for policymakers, regulators, and corporations as they are currently paying attention to all aspects of the sustainability factors of performance and disclosure and their value-relevance to investors. Our results are relevant and support many sustainability initiatives that have been recently taken by national and international organizations such as GRI, IIRC, SASB, PCAOB, IAASB and Delaware Act of 2018 on certification to the voluntary disclosure of ESG sustainability information.

Business Sustainability

- What is business sustainability?
 - >promotes the achievement of **ECON performance** in creating shareholder value while considering **ESG sustainability attributes** in protecting interests of other stakeholders.
 - >For ESG sustainability, we also distinguish between (1) **Performance** and (2) **Disclosure**.
 - >**ECON** and **ESG** sustainability are defined using **market data, accounting information** and **sustainability provisions** included in the MSCI (formerly KLD) ESG database.
 - >We define **sustainability performance** by considering **strengths and concerns** of different dimensions of ESG sustainability. We collect **sustainability disclosure** data from **Bloomberg disclosure database**.

Motivation

Anecdotal evidence showing that business sustainability is becoming more important:

- (a) A growing number of investors are currently integrating non-financial environmental, social, and governance (ESG) sustainability factors of performance and disclosure into their investment strategies (IRRCi [2018])
- (b) The United States Department of Labor (USDOL) recently issued the Interpretive Bulletin (2015-02) to encourage economically targeted investments (ETIs).
- (c) Impact investing (focus on both financial returns along with social and environmental consideration) is gaining momentum with socially-oriented investors (GIIN, 2018)
- (d) Global investors use both economic and ESG sustainability performance dimensions in their investment analyses - \$3.74 trillion in managed assets during the 2010–2012 period (Social Investment Forum 2012).
- (e) Business sustainability has drawn the attention of corporate directors and executives, as evidenced by 87 % of 3,795 surveyed managers agree that boards should play a strong role in sustainability development and 90% agree that executives should address sustainability challenges (Kiron et al., 2015).
- (f) More than 15,000 global public companies issue sustainability reports (Rezaee, 2017).
- (g) AS of October 2018, governed entities in the State of Delaware can voluntarily certificate to the ESG sustainability.

Basic Question

- Is business sustainability performance and disclosure associated with stock price informativeness?
- What is stock price informativeness and why do we care?
 - > Market price all value relevant information and there are evidence that market also price sustainability information.
 - > It is defined as information embedded in stock price but are not reflected in common risk factors – Firm-specific information that market prices, e.g., board structure (Ferreira et al., 2011), board gender diversity (Gul et al., 2011), corporate governance (Ferreira and Laux, 2007), etc.
 - > From an asset pricing model point of view, these idiosyncratic risks should not matter – They are diversified away
 - > Unfortunately, investors do not hold perfectly diversified portfolios. Based on this argument, Merton (1987) suggests that there should be a premium associated with portfolio under-diversification related to company-specific information.

Prior Studies

In terms of business sustainability, we examine four streams of related prior studies (mostly related to corporate social responsibility (CSR)):

1. ***Linking CSR disclosures to financial disclosure and earnings management:***

Dhaliwal et al., 2011, 2012; Kim et al. 2012; Richardson and Welker 2001; Plumlee et al., 2008

2. ***Individual attributes of corporate sustainability to stock price informativeness.***

Ferreira and Laux, 2007; Plumlee et al., 2015; Gaspar and Massa, 2006; Becchetti et al., 2015

3. ***Linking financial economic sustainability performance to non-financial ESG sustainability information.***

Watson and Huang, 2015; Lys et al., 2015, Ng and Rezaee, 2015; Jain et al., 2016

4. ***Corporate social performance and financial performance.***

Renneboog et al, 2008; Waddock and Graves, 1997; Ruf et al., 2001; Unruh et al, 2016

- However, most prior studies are conducted in a piece-meal fashion, possible interactions among different measures are ignored.

Contribution

1. Investigation the link between stock price informativeness and ESG sustainability performance and disclosure after controlling for economic sustainability.
2. Multiple dimensions of sustainability - Prior research tends to usually focus on one dimension of corporate sustainability, usually CSR.
3. Strengths and concerns - Prior studies focus on difference between the number of strengths and concerns. Price informativeness should not focus on the nature of information.
4. To the extant literature on the determinants of costs and benefits of voluntary and regulatory disclosures and their economic consequences.
5. Have implications for policymakers, regulators and corporations as they are paying attention to different sustainability attributes and their impacts on firm values.

Corporate Sustainability

Although this is not a key test variable for this study, we still need to control for all possible aspects that managers consider when making decisions.

- Economic Sustainability – not only focus on profit but also growth

- Variables include:

1. Tobin's Q (TOBINSQ);
 2. Ratio of market to book value of equity (MVBV);
 3. Sales scaled by total assets (SALES);
 4. Sales growth scaled by total assets (SALESGR);
 5. Average return on equity for the current year (ROE);
 6. Research and development expenses scaled by total assets (RD);
 7. Omission of dividends (DIVIDOMS), and
 8. Advertising expenses scaled by total assets (AD). (Not included)
-
- Growth Opportunity (GR)**
- Operational Efficiency (OP)**
- Research Effort (RES)**

Overall Measure of Economic sustainability:

$$ECON = (GR + OP + RES) / 3$$

Economic Sustainability

With these relatively high correlations, we can see that ECON is a good representation of overall economic sustainability

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)Factor1	N/A	0	0	0.97***	0.07***	0.06***	0.91***
(2)Factor2	-0.01***	N/A	0	0.09***	0.92***	0.32***	0.15***
(3)Factor3	-0.26***	0.16***	N/A	0.06***	-0.23***	0.78***	0.16***
(4)GR	0.89***	0.24***	-0.05***	N/A	0.14***	0.18***	0.88***
(5)OP	0.11***	0.89***	-0.13***	0.29***	N/A	0.07***	0.16***
(6)RES	0.03***	0.38***	0.83***	0.27***	0.12***	N/A	0.26***
(7)TOBINSQ _t	0.81***	0.32***	0.09***	0.91***	0.33***	0.37***	N/A
(8)ROE _t	0.33***	0.35***	-0.65***	0.29***	0.5***	-0.25***	0.19***
(9)SALES _t	0.05***	0.82***	0.05***	0.26***	0.93***	0.22***	0.33***
(10)SALESGR _t	0.22***	0.73***	-0.02***	0.34***	0.62***	0.15***	0.35***
(11)MVBV _t	0.88***	0.17***	-0.13***	0.97***	0.24***	0.19***	0.8***
(12)RD _t	0.34***	0.1***	0.5***	0.34***	0.03***	0.71***	0.42***
(13)AD _t	0.01	0.05***	0.03***	0.05***	0.12***	0.06***	0.04***
(14)DIVIDOMS _t	-0.18***	0.44***	0.81***	0.13***	0.12***	0.9***	0.24***
Variable	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)Factor1	0.02***	0.04***	0.16***	0.92***	0.43***	0.06***	-0.01***
(2)Factor2	0.34***	0.84***	0.84***	0.06***	-0.06***	0.11***	0.36***
(3)Factor3	-0.76***	-0.04***	-0.01*	0.02***	0.72***	0	0.7***
(4)GR	-0.03***	0.13***	0.2***	0.98***	0.36***	0.11***	0.13***
(5)OP	0.47***	0.94***	0.7***	0.12***	-0.14***	0.22***	0.1***
(6)RES	-0.26***	0.14***	0.13***	0.13***	0.46***	0.05***	0.99***
(7)TOBINSQ _t	-0.04***	0.15***	0.23***	0.76***	0.43***	0.1***	0.2***
(8)ROE _t	N/A	0.22***	0.18***	-0.02***	-0.44***	0.05***	-0.2***
(9)SALES _t	0.27***	N/A	0.55***	0.11***	-0.06***	0.24***	0.17***
(10)SALESGR _t	0.34***	0.5***	N/A	0.17***	0.06***	0.11***	0.13***
(11)MVBV _t	0.33***	0.2***	0.31***	N/A	0.31***	0.1***	0.08***
(12)RD _t	-0.17***	0.12***	0.07***	0.28***	N/A	-0.01**	0.31***
(13)AD _t	0.03***	0.13***	0.04***	0.06***	0.05***	N/A	0.06***
(14)DIVIDOMS _t	-0.23***	0.2***	0.14***	0.07***	0.33***	0.05***	N/A

ESG Sustainability

- ESG Sustainability

- >In this study, we mainly consider three areas of nonfinancial business sustainability

1. Environment - Environment

2. Social - Community, Diversity, Human rights, and Employee relations

3. Governance – Governance

4. Collectively ESG

- >ESG sustainability performance measures are collected from the MSCI (formerly KLD) ESG database.

- >We use the sum of Strengths and Concerns in each area.

Price Informativeness

- Trades are made based on information about a company
 - Current performance and future growth information determine value of firms. Nonfinancial information may also affect stock prices, independent of changes in the company's true condition and long-term performance.
- Theoretically, price informativeness is defined as information not reflected in common risk factors, and thus it can be viewed as a measure of firm-specific information (such as sustainability attributes) that is associated with lower stock returns (Becchetti et al, 2015).
- Price informativeness – related to corporate private information that affects stock prices.

Price Informativeness

We use two proxies for price informativeness

- 1) Idiosyncratic volatility (unsystematic risk; Idiorisk_t) - stock return volatility that is not related to the main pricing factors in asset pricing models and is specific to a firm that could be solved by diversification. For example,

$$r_{i,d} = \alpha_i + \beta_i r_{m,d} + \varepsilon_{i,d}$$

where $r_{m,d}$, $r_{i,d}$ = daily excess stock return of the market portfolio and for firm i . idiosyncratic volatility is calculated by:

$$\text{where } \sigma_{i,d}^2 = \text{Var}(r_{i,d}).$$

Since $(1-R^2)$ is skewed, we apply a logistic transformation to the variable and define idiosyncratic volatility at time t (idiorisk_t) as

$$\sigma_{i,e,d}^2 = \sigma_{i,d}^2 - \frac{\sigma_{i,m,d}^2}{\sigma_{m,d}^2}$$
$$\text{Idiorisk}_t = \text{Ln} \left(\frac{1 - R_{i,t}^2}{R_{i,t}^2} \right) = \text{Ln} \left(\frac{\sigma_{i,e,t}^2}{\sigma_{i,t}^2 - \sigma_{i,e,t}^2} \right)$$

Price Informativeness

- 2) Average Abnormal Annual Turnover ($ABTURN_t$)
 - Investors' activities are induced by information that is new to the market or private information.
 - Prior research shows that trading volume reflects investors' activities by summing all market trades, whereas security prices reflect a summary of investors' beliefs. (Beaver 1968; Kiger 1972; Foster 1973; Bamber 1986; Kim and Verrecchia 1992, 1994, 2001; Bamber et al. 1997)
 - Therefore, our second measure of stock price informativeness (Vol_t) is defined as the logarithm value of average monthly trade shares over the fiscal year

Theoretical Framework

- Shareholder and stakeholder theories
- Asset pricing models (e.g. CAPM) assumes that diversifiable risks are not priced.
- However, investors are also exposed to risks related to society and the environment and their investment horizon could be longer than one period.
- Hart and Zingales [2017] also question the traditional shareholders-managers setting and suggest that managers should focus on shareholders' value instead of only wealth when assessing asset pricing models

Hypotheses Development

- Stakeholders have reciprocal relationships and interactions with firms in the sense that they contribute to firm value creation (stakes) and their well-being is affected by the activities (risks) of firms.
1. global investors believe that ESG sustainability performance presents risks and opportunities that should be considered by investors;
 2. recent social, environmental and ethical scandals have driven investors to consider the ESG sustainability factors of performance and disclosure; and
 3. nonfinancial ESG sustainability performance plays an important role in their investment decisions.

Hypothesis 1: Environmental, social and governance (ESG) sustainability performance is positively associated with stock price informativeness

Hypotheses Development

- According to the signaling theory, managers have more incentives to disclose their sustainability information if they know that the information are value relevant.
- As the disclosure of sustainability information is currently not mandatory and regulated, additional disclosure on ESG sustainability would lower information asymmetry between management and investors and thus reduce uncertainty about firm value.
- Thus, we hypothesize that ESG sustainability disclosure is related to the price informativeness of the firm, and we have the following testable hypothesis:

Hypothesis 2: Business sustainability disclosure is positively associated with stock price informativeness.

Hypotheses Development

- As a systematic way to disclose sustainability performance has not yet been established, investors may find the impact of sustainability information on stock price informativeness is more prominent when the firm has higher sustainability disclosure.
- The disclosure of sustainability information can therefore have important impacts on the relationship between ESG sustainability performance and stock price informativeness.

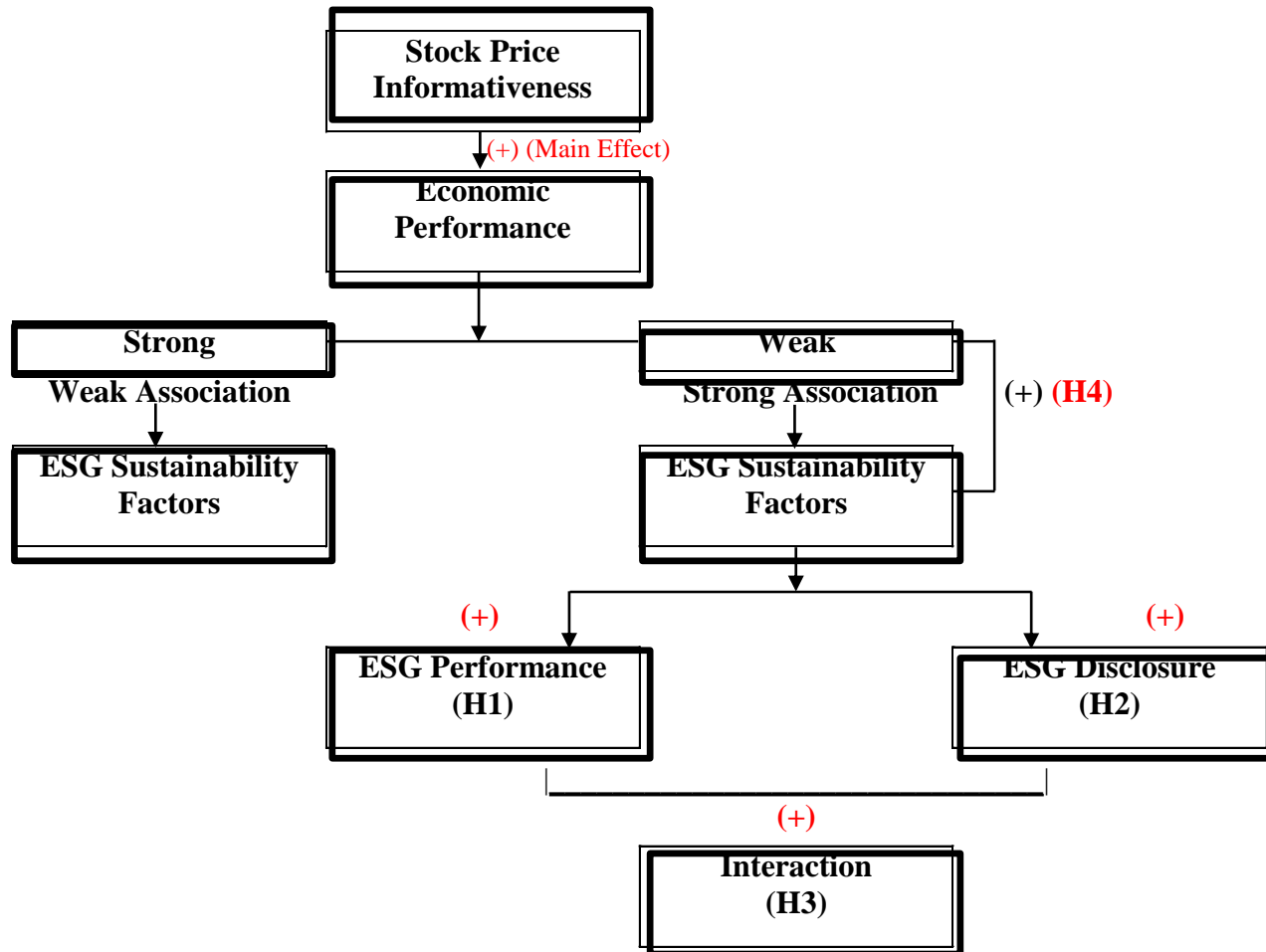
Hypothesis 3: Sustainability disclosure improves the relationship between ESG sustainability performance and stock price informativeness.

Hypotheses Development

- Since the Economic sustainability and ESG sustainability is related (Khan et al., 2016), the relationship between stock price informativeness and ESG sustainability performance can be affected by the economic performance of the firm.
- Empirically, economic performance and ESG sustainability performance/disclosure could act as complements or substitutes:
 1. First, investors mainly focus on economic performance, as economic performance is the main determinant of long-term corporate profitability. The impact of sustainability performance on stock price informativeness may therefore be reduced. Therefore, the effect of ESG sustainability disclosure on this relationship may also be moderated.
 2. Investors may tend to consider their investment opportunity in holistic manners and pay additional attention to ESG sustainability performance when economic performance is strong.

Hypothesis 4: ECON performance does not moderate the relationship between ESG sustainability performance/disclosure, and stock price informativeness.

Summary of Hypotheses



Sample

- Period: 2005 – 2015
- Price Informativeness – from CRSP
- ECON – mainly from Compustat and CRSP
- MSCI (KLD) data are relatively sparse before 2002
- Bloomberg ESG Disclosure Index
- Performance Sample Size: 18223
- Disclosure Sample Size: 6632

Descriptive Statistics

	Mean	P1	Q1	Median	Q3	P99	StdDev	N
IDIORISK_t	1.1269	-0.8380	0.4346	1.0512	1.6812	4.0704	1.0542	18223
ABTURN_t	16.9533	12.4093	15.6187	16.9285	18.3276	21.0756	1.8995	15986
ECON_{t-1}	0.0484	-0.8105	-0.4091	-0.0005	0.3863	1.7326	0.5744	18223
GR_{t-1}	0.1578	-0.7188	-0.3958	-0.1326	0.3525	3.7730	0.9066	18223
OP_{t-1}	0.0332	-1.4793	-0.5421	-0.1221	0.4092	2.8257	0.8378	18223
RES_{t-1}	-0.0462	-0.9504	-0.9504	-0.8567	0.9390	1.7743	0.9940	18223
MSCI_{t-1}	2.9279	0	1	2	4	15	2.9696	18223
SOC_{t-1}	0.4492	0	0	0	0	5	1.0363	18223
GOV_{t-1}	1.9708	0	1	2	2	10	2.0142	18223
ENV_{t-1}	0.5080	0	0	0	1	2	0.6492	18223
DISC_{t-1}	2.7342	2.2943	2.4121	2.5820	2.8539	4.0066	0.4305	6632
MSCISTR_{t-1}	1.3919	0	0	1	2	11	2.2073	18223
SOCSTR_{t-1}	0.2293	0	0	0	0	3	0.6318	18223
GOVSTR_{t-1}	1.0220	0	0	0	1	8	1.7195	18223
ENVSTR_{t-1}	0.1406	0	0	0	0	1	0.3657	18223
MSCICON_{t-1}	1.5360	0	1	1	2	7	1.4811	18223
SOCCON_{t-1}	0.2199	0	0	0	0	3	0.6515	18223
GOVCON_{t-1}	0.9487	0	0	1	2	4	0.9447	18223
ENVCON_{t-1}	0.3673	0	0	0	1	2	0.5572	18223
DLOSS_{t-1}	0.1756	0	0	0	0	1	0.3805	18223
ROE_{t-1}	0.0644	-1.2860	0.0374	0.1058	0.1706	0.5658	0.2899	18223
VROE_{t-1}	0.1596	0.0000	0.0006	0.0027	0.0147	4.9100	1.0040	18223
LEV_{t-1}	0.2041	0.0000	0.0239	0.1803	0.3244	0.7207	0.1844	18223
MVBV_{t-1}	3.2341	0.5908	1.5313	2.3058	3.7128	16.4729	3.0089	18223
LNME_{t-1}	7.4001	4.4787	6.2613	7.2533	8.3517	11.2714	1.5217	18223
DD_{t-1}	0.5563	0	0	1	1	1	0.4968	18223
AGE_{t-1}	22.3638	1.3333	8.5833	16.4167	31.5833	81.6667	18.6907	18223
DIVER_{t-1}	0.5618	0	0	1	1	1	0.4962	18223
MERGER_{t-1}	0.2066	0	0	0	0	1	0.4049	18223
MK_RET_{t-1}	1.1860	0.2405	0.8471	1.1315	1.4729	2.5679	0.4980	18223
STK_RET_{t-1}	0.1850	-0.7047	-0.1053	0.1272	0.3779	1.9799	0.5133	18223

Research Design

- The 2017 Morgan Stanley Capital International (MSCI) study suggests ESG information can be transmitted to the equity market through three channels of the “cash-flow”, the “idiosyncratic risk” and the “valuation.
- To avoid endogeneity, we use a lead lag approach
- We also control for other factors that may affect price informativeness:
 - $ROE_t - ROE$
 - $VROE_t$ – Standard Deviation of ROE over last 3 years
 - $DEBT_t$ – Long Term debt to total assets
 - $MVBV_t$ – Market to Book Value
 - $LN MVE_t$ – Log of Market Value
 - $BETA_t$ – CAPM Beta
 - AGE_t – Firm Age
 - DD_t – Dividend Dummy
 - $DIVER_t$ – Multi-segment Company
 - $BETA_t$ – Beta calculated by Market Model
 - $MERGER_t$ – involved in any merger and acquisition activities.

Methodology

- To test Hypothesis 1:

$$\begin{aligned}PI_t = & \beta_1 ECON_{t-1} + \beta_2 ENV_{t-1} + \beta_3 SOC_{t-1} + \beta_4 GOV_{t-1} + \beta_5 MSCI_{t-1} \\ & + \beta_6 DLOSS_{t-1} + \beta_7 ROE_{t-1} + \beta_8 VROE_{t-1} + \beta_9 LEV_{t-1} + \beta_{10} MVBV_{t-1} \\ & + \beta_{11} LNMVE + \beta_{12} DD_{t-1} + \beta_{13} AGE_{t-1} + \beta_{14} DIVER_{t-1} + \beta_{15} BETA_{t-1} \\ & + \beta_{16} MERGER_{t-1} + \sum \text{Industry Dummies} + \sum \text{Year Dummies} + \varepsilon\end{aligned}$$

where

ENV_t = Environmental dimension of Sustainability Information: Number of Environmental strengths plus number of Environmental concerns;

SOC_t = Social dimension of Sustainability Information: Number of Social strengths plus number of Social concerns;

GOV_t = Governance dimension of Sustainability Information: Number of Governance strengths plus number of Governance concerns;

$MSCI_t$ = Summary ESG dimension of sustainability Information: Number of strengths plus number of concerns in the MSCI database;

Results (Hypothesis 1)

- Effect of ESG Sustainability on PI ($Idiorisk_t$) (N=18223)

Variable	(1)	(2)	(3)	(4)	(5)
ECON _{t-1}	0.2996*** (12.0)	0.3009*** (12.1)	0.3029*** (12.1)	0.3031*** (12.2)	0.3021*** (12.1)
ENV _{t-1}	0.0366*** (5.60)			0.0076 (1.09)	
SOC _{t-1}		0.0380*** (12.3)		0.0331*** (9.91)	
GOV _{t-1}			0.0739*** (8.01)	0.0509*** (5.38)	
MSCI _{t-1}					0.0295*** (13.0)
Industry Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.6169	0.6195	0.6176	0.6202	0.6199
F-Stat	26.14***	26.44***	26.23***	26.46***	26.48***

Control Variables are included but not shown.

Results (Hypothesis 1)

- Effect of ESG Sustainability on PI (Vol_t)

Variable	(1)	(2)	(3)	(4)	(5)
$ECON_{t-1}$	0.0837** (2.02)	0.0868** (2.09)	0.0908** (2.19)	0.0895** (2.16)	0.0860** (2.07)
ENV_{t-1}	0.0552*** (5.03)			0.0258** (2.19)	
SOC_{t-1}		0.0391*** (7.24)		0.0287*** (4.89)	
GOV_{t-1}			0.1058*** (6.77)	0.0840*** (5.26)	
$MSCI_{t-1}$					0.0296*** (8.30)
Industry Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.6916	0.6921	0.6920	0.6928	0.6925
F-Stat	64.26***	64.43***	64.39***	64.39***	64.53***

Control Variables are included but not shown.

Results (Hypothesis 2)

- Effect of ESG Sustainability Performance and Disclosure

$$\text{on PI: } PI_t = \beta_1 ECON_{t-1} + \beta_2 MSCI_{t-1} + \beta_3 DISC_{t-1} + \beta_4 DLOSS_{t-1} + \beta_5 ROE_{t-1} \\ + \beta_6 VROE_{t-1} + \beta_7 LEV_{t-1} + \beta_8 MVBV_{t-1} + \beta_9 LNMVE_{t-1} + \beta_{10} DD_{t-1} \\ + \beta_{11} AGE_{t-1} + \beta_{12} DIVER_{t-1} + \beta_{13} BETA_{t-1} + \beta_{14} MERGER_{t-1} \\ + \sum \text{Industry Fixed Effect} + \sum \text{Year Fixed Effect} + \varepsilon$$

Panel A: PI = Idiorisk_t

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ECON _{t-1}		0.3363*** (8.79)			0.3408*** (8.96)	0.3409*** (8.92)		0.3412*** (8.97)
MSCI _{t-1}			0.0249*** (8.16)		0.0253*** (8.34)		0.0249*** (7.38)	0.0249*** (7.43)
DISC _{t-1}				0.0900*** (3.46)		0.0974*** (3.77)	0.0015 (0.05)	0.0088 (0.31)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.5969	0.6018	0.6011	0.5976	0.6062	0.6027	0.6011	0.6062
F-Stat	22.70***	23.11***	23.05***	22.71***	23.48***	23.14***	22.99***	23.42***

Control Variables are included but not shown.

Results (Hypothesis 2)

Panel B: $PI = ABTURN_t$

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$ECON_{t-1}$		0.0996* (1.75)			0.1017* (1.79)	0.1128** (1.99)		0.1120** (1.98)
$MSCI_{t-1}$			0.0254*** (6.05)		0.0255*** (6.06)		0.0140*** (3.08)	0.0139*** (3.07)
$DISC_{t-1}$				0.3093*** (8.33)		0.3113*** (8.38)	0.2612*** (6.49)	0.2634*** (6.54)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.7341	0.7342	0.7353	0.7364	0.7354	0.7365	0.7367	0.7368
F-Stat	49.75***	49.66***	49.94***	50.21***	49.85***	50.13***	50.18***	50.09***

Control Variables are included but not shown.

Result (Hypothesis 3)

- To investigate effect of sustainability disclosure on the association between ESG sustainability and stock price informativeness, an interaction between $MSCI_{t-1}$ and $DISC_{t-1}$ is added:

$$\begin{aligned}
 IDIORISK_t = & \beta_1 ECON_{t-1} + \beta_2 MSCI_{t-1} + \beta_3 DISC_{t-1} + \beta_4 MSCI_{t-1} \times DISC_{t-1} \\
 & + \beta_5 DLOSS_{t-1} + \beta_6 ROE_{t-1} + \beta_7 VROE_{t-1} + \beta_8 DEBT_{t-1} + \beta_9 LEV_{t-1} \\
 & + \beta_{10} MVBV_{t-1} + \beta_{11} LNMVE_{t-1} + \beta_{12} DD_{t-1} + \beta_{13} AGE_{t-1} + \beta_{14} DIVER_{t-1} \\
 & + \sum \text{Industry Fixed Effect} + \sum \text{Year Fixed Effect} + \varepsilon
 \end{aligned}$$

Variables	(1)
$ECON_{t-1}$	0.3424*** (9.00)
$MSCI_{t-1}$	-0.0186 (-1.2)
$DISC_{t-1}$	-0.0501 (-1.4)
$MSCI_{t-1} \times DISC_{t-1}$	0.0128*** (2.75)
Industry Dummies	Yes
Year Dummies	Yes
Adj. R ²	0.6067
F-Stat	23.40***
N	6632

Control Variables are included but not shown.

Result (Hypothesis 4)

- To investigate effect of sustainability disclosure on the association between ESG sustainability and stock price informativeness, a three-way interaction term between $ECON_{t-1}$, $MSCI_{t-1}$ and $DISC_{t-1}$ is added:

$$\begin{aligned}
 IDIORISK_t = & \beta_1 ECON_{t-1} + \beta_2 MSCI_{t-1} + \beta_3 DISC_{t-1} + \beta_4 ECON_{t-1} \times MSCI_{t-1} \\
 & + \beta_5 ECON_{t-1} \times DISC_{t-1} + \beta_6 MSCI_{t-1} \times DISC_{t-1} + \beta_7 ECON_{t-1} \times MSCI_{t-1} \times DISC_{t-1} \\
 & + \beta_8 DLOSS_{t-1} + \beta_9 ROE_{t-1} + \beta_{10} VROE_{t-1} + \beta_{11} DEBT_{t-1} + \beta_{12} LEV_{t-1} + \beta_{13} MVBV_{t-1} \\
 & + \beta_{14} LNMVE_{t-1} + \beta_{15} DD_{t-1} + \beta_{16} AGE_{t-1} + \beta_{17} DIVER_{t-1} \\
 & + \sum \text{Industry Fixed Effects} + \sum \text{Year Fixed Effects} + \varepsilon
 \end{aligned}$$

Variables	(1)	(2)	(3)
$ECON_{t-1}$	0.3741*** (9.30)	0.5782*** (5.34)	0.3642*** (9.25)
$MSCI_{t-1}$	0.0221*** (6.26)	0.0236*** (6.95)	-0.0105 (-0.64)
$DISC_{t-1}$	0.0067 (0.23)	0.0021 (0.07)	-0.0387 (-1.1)
$MSCI_{t-1} \times DISC_{t-1}$			0.0096** (1.98)
$ECON_{t-1} \times MSCI_{t-1}$	-0.0128** (-2.5)		
$ECON_{t-1} \times DISC_{t-1}$		-0.0913** (-2.3)	
$ECON_{t-1} \times MSCI_{t-1} \times DISC_{t-1}$			-0.0032** (-2.1)
Industry Dummies	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes
Adj. R ²	0.6066	0.6066	0.6070
F-Stat	23.40***	23.39***	23.37***
N	6632	6632	6632

Control Variables are included but not shown.

Result (Hypothesis 4) – Alternative Tests

- Instead of adding a three-way interaction term between $ECON_{t-1}$, $MSCI_{t-1}$ and $DISC_{t-1}$, we split the sample into High and Low $ECON_{t-1}$ subsamples and apply regressions with two-way interaction terms between $MSCI_{t-1}$ and $DISC_{t-1}$:

Parameter	High $ECON_{t-1}$		Low $ECON_{t-1}$	
	(1)	(2)	(1)	(2)
$MSCI_{t-1}$	0.0196*** (3.51)	0.0265 (0.97)	0.0263*** (5.92)	-0.0236 (-1.09)
$DISC_{t-1}$	-0.0237 (-0.54)	-0.0147 (-0.26)	0.0229 (0.59)	-0.0441 (-0.91)
$MSCI_{t-1} \times DISC_{t-1}$		-0.0021 (-0.26)		0.0143** (2.35)
Industry Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Adj. R^2	0.5802	0.5802	0.6299	0.6306
F-Stat	11.71***	11.68***	14.01***	14.01***
N	3317	3317	3315	3315

$ECON_{t-1}$ is excluded from the regressions and control Variables are included but not shown.

Additional Tests

1. Mechanisms Through Which Business Sustainability Affects Stock Price Informativeness

- Omitted correlated variables problem: The relationship between ESG sustainability and stock price informativeness may be due to some omitted variables that are relevant to firm specific characteristics and are related to stock price informativeness.
- We run the following regression to different quartiles ranked by possible omitted variable: (1) future profitability, (2) earnings quality and (3) stock returns:

$$\begin{aligned} IDIORISK_t = & \beta_1 ECON_{t-1} + \beta_2 MSCI_{t-1} + \beta_3 DLOSS_{t-1} \\ & + \beta_4 ROE_{t-1} + \beta_5 VROE_{t-1} + \beta_6 LEV_{t-1} + \beta_7 MVBV_{t-1} + \beta_8 LNMVE + \beta_9 DD_{t-1} \\ & + \beta_{10} AGE_{t-1} + \beta_{11} DIVER_{t-1} + \beta_{12} BETA_{t-1} + \beta_{13} MERGER_{t-1} \\ & + \sum \text{Industry Dummies} + \sum \text{Year Dummies} + \varepsilon \end{aligned}$$

- Results show that coefficients for $ECON_{t-1}$ and $MSCI_{t-1}$ are similar in all quartiles and this show that relation is not due to any omitted variables.

Additional Tests

Based in Future Profitability (FUTROA)

Variable	FUTROAQ1	FUTROAQ2	FUTROAQ3	FUTROAQ4
ECON_{t-1}	0.1783*** (3.15)	0.3290*** (5.86)	0.3740*** (5.41)	0.4485*** (7.06)
MSCI_{t-1}	0.0172*** (3.62)	0.0231*** (4.89)	0.0283*** (5.33)	0.0227*** (3.63)
Industry Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Adj. R²	0.7236	0.7523	0.7348	0.7047
F-Stat	10.69***	10.88***	11.13***	11.78***
N	3533	3534	3534	3533

Control Variables are included but not shown.

Additional Tests

Based in Total Accruals (TTLACCL)

Variable	TTLACCLQ1	TTLACCLQ2	TTLACCLQ3	TTLACCLQ4
ECON_{t-1}	0.1951*** (3.76)	0.3645*** (6.68)	0.3267*** (5.76)	0.2706*** (5.52)
MSCI_{t-1}	0.0273*** (5.27)	0.0235*** (5.51)	0.0342*** (7.38)	0.0187*** (3.59)
Industry Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Adj. R²	0.6753	0.7070	0.6930	0.6474
F-Stat	9.787***	11.19***	10.39***	9.524***
N	4554	4555	4555	4554

Control Variables are included but not shown.

Additional Tests

Based in Stock Return (STKRET)

Variable	STKRETQ1	STKRETQ2	STKRETQ3	STKRETQ4
ECON_{t-1}	0.1316*** (2.65)	0.3185*** (5.77)	0.2773*** (5.32)	0.3279*** (6.78)
MSCI_{t-1}	0.0236*** (4.75)	0.0261*** (5.92)	0.0251*** (5.58)	0.0235*** (4.79)
Industry Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Adj. R²	0.6538	0.6765	0.7155	0.7113
F-Stat	9.833***	10.01***	11.58***	13.45***
N	4556	4556	4556	4555

Control Variables are included but not shown.

Additional Tests

2. Importance of ECON and ESG sustainability over time and Fama-MacBeth analysis

- We run the following regression annually:

$$\begin{aligned}
 IDIORISK_t = & \beta_0 + \beta_1 ECON_{t-1} + \beta_2 MSCI_{t-1} + \beta_3 DISC_{t-1} + \beta_4 DLOSS_{t-1} \\
 & + \beta_5 ROE_{t-1} + \beta_6 VROE_{t-1} + \beta_7 LEV_{t-1} + \beta_8 MVBV_{t-1} + \beta_9 LNMVE \\
 & + \beta_{10} DD_{t-1} + \beta_{11} AGE_{t-1} + \beta_{12} DIVER_{t-1} + \beta_{13} BETA_{t-1} + \beta_{14} MERGER_{t-1} + \varepsilon
 \end{aligned}$$

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intercept	2.8712*** (14.5)	3.0460*** (15.0)	2.7869*** (12.1)	2.9823*** (14.5)	2.7383*** (11.7)	2.9331*** (11.4)	2.8835*** (11.0)
ECON_{t-1}	0.2304** (3.58)			0.2284** (3.57)	0.2207** (3.59)		0.2193** (3.57)
MSCI_{t-1}		0.0196** (2.56)		0.0189** (2.50)		0.0167** (2.02)	0.0161* (1.94)
DISC_{t-1}			0.1073 (1.61)		0.0992 (1.61)	0.0555 (0.59)	0.0495 (0.63)
Average Adj. R²	0.3106	0.2939	0.2894	0.3155	0.3120	0.2940	0.3160

Control Variables are included but not shown.

Importance of Sustainability over time

- Time Trend of coefficients

Year		ECON _{t-1}	MSCI _{t-1}	Adj. R ²	N	Year		ECON _{t-1}	MSCI _{t-1}	Adj. R ²	N
1992	Coef	-0.4197*	0.0473*	0.5138	242	2004	Coef	0.2210***	0.0213***	0.2518	1292
	T-Stat	(-1.68)	(1.74)				T-Stat	(3.35)	(2.64)		
1993	Coef	0.1103	0.0955***	0.3852	252	2005	Coef	0.3419***	0.0314***	0.2558	1191
	T-Stat	(0.42)	(3.52)				T-Stat	(4.56)	(3.29)		
1994	Coef	-0.2406	0.0693***	0.3968	251	2006	Coef	0.4011***	0.0130	0.1989	1215
	T-Stat	(-0.88)	(2.54)				T-Stat	(5.42)	(1.58)		
1995	Coef	0.3099	0.1827***	0.3616	199	2007	Coef	0.5094***	0.0059	0.3304	1214
	T-Stat	(0.57)	(3.59)				T-Stat	(7.96)	(0.80)		
1996	Coef	-0.0450	0.0840***	0.4422	218	2008	Coef	0.4465***	0.0186***	0.3070	1299
	T-Stat	(-0.17)	(3.40)				T-Stat	(6.72)	(2.54)		
1997	Coef	0.1653	0.0629***	0.5149	225	2009	Coef	0.2857***	0.0303***	0.3600	1403
	T-Stat	(0.69)	(2.88)				T-Stat	(3.69)	(3.78)		
1998	Coef	-0.1713	0.0353	0.3497	247	2010	Coef	0.6438***	0.0304***	0.4836	1424
	T-Stat	(-0.76)	(1.60)				T-Stat	(8.30)	(4.48)		
1999	Coef	-0.1145	0.0485**	0.5645	233	2011	Coef	0.3426***	0.0503***	0.4254	1426
	T-Stat	(-0.49)	(2.17)				T-Stat	(5.01)	(7.83)		
2000	Coef	0.4016	0.0869***	0.3636	212	2012	Coef	0.2475***	0.0155*	0.3345	1426
	T-Stat	(1.07)	(2.38)				T-Stat	(3.06)	(1.89)		
2001	Coef	-0.0042	-0.0209	0.2343	269	2013	Coef	0.4517***	0.0411***	0.3696	1301
	T-Stat	(-0.01)	(-0.60)				T-Stat	(6.24)	(5.14)		
2002	Coef	0.3883***	0.0144	0.3055	455	2014	Coef	0.2995***	0.0451***	0.2905	1294
	T-Stat	(2.97)	(1.11)				T-Stat	(3.82)	(5.53)		
2003	Coef	0.0260	0.0257***	0.1993	568	2015	Coef	0.3404***	0.0202	0.4622	367
	T-Stat	(0.20)	(2.04)				T-Stat	(2.31)	(1.43)		

Control Variables are included but not shown.

Additional Tests

3. We also example the effects of sustainability strengths and concerns separately.

- Strengths Only

Variable	(1)	(2)	(3)	(4)	(5)
ECON_{t-1}	0.3007*** (12.0)	0.3044*** (12.2)	0.3021*** (12.1)	0.3054*** (12.3)	0.3055*** (12.3)
ENVSTR_{t-1}	0.0317*** (3.30)			-0.0174* (-1.7)	
SOCSTR_{t-1}		0.0429*** (11.7)		0.0431*** (10.8)	
GOVSTR_{t-1}			0.0729*** (5.03)	0.0444*** (2.96)	
MSCISTR_{t-1}					0.0317*** (11.1)
Industry Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Adj. R²	0.6164	0.6192	0.6167	0.6194	0.6189
F-Stat	26.09***	26.40***	26.13***	26.37***	26.37***

Control Variables are included but not shown.

Additional Tests

- Concerns Only

Variable	(1)	(2)	(3)	(4)	(5)
ECON_{t-1}	0.2976*** (11.9)	0.2972*** (11.9)	0.3000*** (12.0)	0.2969*** (11.9)	0.2961*** (11.9)
ENVCON_{t-1}	0.0526*** (5.20)			0.0432*** (4.20)	
SOCCON_{t-1}		0.0285*** (4.76)		0.0209*** (3.43)	
GOVCON_{t-1}			0.0641*** (5.76)	0.0573*** (5.12)	
MSCICON_{t-1}					0.0328*** (7.75)
Industry Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Adj. R²	0.6168	0.6167	0.6169	0.6177	0.6175
F-Stat	26.13***	26.12***	26.15***	26.18***	26.22***

Control Variables are included but not shown.

Additional Tests

4. We also address the possibility of endogeneity using two-stage-least square regression:

First Stage:

$$\begin{aligned} ECON_{t-1} / MSCI_{t-1} / DISC_{t-1} = & \beta_1 ECON_{t-1} + \beta_2 MSCI_{t-1} + \beta_3 DISC_{t-1} + \beta_4 MKTRET_{t-1} \\ & + \beta_4 MKTSTD_{t-1} + \beta_4 DLOSS_{t-1} + \beta_5 ROE_{t-1} + \beta_6 VROE_{t-1} + \beta_7 LEV_{t-1} \\ & + \beta_8 MVBV_{t-1} + \beta_9 LNMVE + \beta_{10} DD_{t-1} + \beta_{11} AGE_{t-1} + \beta_{12} DIVER_{t-1} \\ & + \beta_{13} BETA_{t-1} + \beta_{14} MERGER_{t-1} + \sum \text{Year Fixed Effect} + \varepsilon \end{aligned}$$

Second Stage:

$$\begin{aligned} IDIORISK_t = & \beta_1 ECON_{t-1} + \beta_2 MSCI_{t-1} + \beta_3 DISC_{t-1} + \beta_4 DLOSS_{t-1} + \beta_5 ROE_{t-1} \\ & + \beta_6 VROE_{t-1} + \beta_7 LEV_{t-1} + \beta_8 MVBV_{t-1} + \beta_9 LNMVE + \beta_{10} DD_{t-1} \\ & + \beta_{11} AGE_{t-1} + \beta_{12} DIVER_{t-1} + \beta_{13} BETA_{t-1} + \beta_{14} MERGER_{t-1} \\ & + \sum \text{Year Fixed Effect} + \varepsilon \end{aligned}$$

Additional Tests

- Results

Variables	First Stage	Second Stage	First Stage	Second Stage	First Stage	Second Stage
	Dependent Variables					
	ECON _{t-1}	IDIORISK _t	MSCI _{t-1}	IDIORISK _t	DISC _{t-1}	IDIORISK _t
Intercept	.2764*** (5.54)	2.572*** (3.67)	-9.46*** (-19.49)	4.199*** (33.96)	1.343*** (24.04)	3.392*** (24.48)
ECON _{t-1}		6.139** (2.21)			-0.018 (-1.24)	
MSCI _{t-1}	0.0026** (2.10)			.0360*** (4.96)	0.0492*** (37.76)	
DISC _{t-1}	-0.013 (-1.24)		3.623*** (37.74)			0.5543*** (8.71)
MKTRET _{t-1}	-0.012 (-0.24)		-0.147 (-0.29)		0.0202 (0.35)	
MKTSTD _{t-1}	-0.522 (-0.76)		-1.41 (-0.20)		1.019 (1.27)	
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R²	0.82436	0.8244	0.57632	.5763	0.59288	.5929
F-Stat	1347.02***	1347***	408.84***	408.8***	418.64***	418.6***
N	6597	6597	6597	6597	6597	6597

Control Variables are included but not shown.

Conclusions

- Business Sustainability is becoming more important
- Investors are interested not only in profitability, but also economic sustainability and ESG sustainability
- Price informativeness measures what investors are likely to take into account when trading, but are not related to specific asset pricing models
- Using two measures of price informativeness, we show that both economic and ESG sustainability are related to price informativeness, although the relationship for different dimensions of sustainability are different and relatively small

Questions?

Thank you for your attention!

