Journal of Corporate Finance 67 (2021) 101913

Contents lists available at ScienceDirect

Journal of Corporate Finance

journal homepage: www.elsevier.com/locate/jcorpfin

ESG government risk and international IPO underpricing

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ARTICLE INFO

JEL classifications:
G12
G15
G18
M14

Keywords:
ESG
Initial public offerings
Underpricing

ABSTRACT

We study the association between environmental, social, and governance (ESG) government risk management and firm-level IPO underpricing between 2008 and 2018. Examining 7446 IPOs issued in 36 countries, we find that IPO underpricing tends to be lower in countries with higher ESG Government Ratings. When we uniquely examine the environmental, social, and governance pillars, we find that underpricing tends to be lower in countries with stronger risk management practices in each of these areas. Additional analysis indicates that the negative impact of ESG ratings on IPO underpricing is more pronounced in countries with more transparent financial disclosures, higher liability standards, and stronger shareholder protections.

1. Introduction

Corporate stakeholders are increasingly interested in the environmental, social, and governance (ESG) risks that firms face and their strategies for managing such risks.[1] The mounting evidence that a firm's ESG profile is associated with financial outcomes, in part, motivates this interest. For example, Giese et al. (2019) report a link between firm-level ESG ratings and firm performance and valuation, suggesting that ESG ratings are valuable financial indicators for investors. Accordingly, ESG investing strategies have proliferated, whereby investors consider ESG factors alongside more traditional financial factors when making investment decisions. According to the US SIF Foundation (2018), at the beginning of 2018, there was approximately $11.6 trillion in U.S. domiciled assets in which investment managers had used ESG criteria to guide their investment and portfolio allocation decisions, an increase of over 44% compared to just two years earlier. According to investment managers, client demand is one of the main forces driving the inclusion of ESG factors in their investment decisions.

The fact that ESG ratings contain value-relevant information has important implications for a range of financial market transactions. Initial public offerings (IPOs) are potentially noteworthy in that substantial information disparities often exist between IPO participants. Information about IPO issuers is often limited because, as private firms prior to the IPO event, they are not subject to the same disclosure requirements as public firms. For example, aside from the registration statement filed in conjunction with the IPO,

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[1] For consistency, we follow Starks (2009) and use the acronym ESG throughout our study to refer to corporate social responsibility actions, governance actions, and investing strategies based on these actions, which related studies alternatively label CSR (corporate social responsibility) and SRI (socially responsible investing).

https://doi.org/10.1016/j.jcorpfin.2021.101913
Received 26 June 2020; Received in revised form 7 December 2020; Accepted 15 February 2021
Available online 22 February 2021

formal regulatory disclosures are typically limited or absent for IPO firms. This may contribute to information asymmetry between issuers and their underwriters (Baron, 1982), issuers and potential IPO investors (Welch, 1989), and different investor groups (Rock, 1986). Therefore, information that alleviates uncertainty is valuable to IPO participants.

Presumably, greater transparency about a firm's environmental, social, and governance risks helps alleviate information asymmetry and creates a demand for ESG disclosure. Consistent with this argument, 52% of the respondents in a recent CFA Institute survey of quantitative analysts and portfolio managers agree that regulators should mandate ESG disclosures by firms (Singh and Peters, 2019). Additionally, 63% of the respondents believe that regulators should promote the development of ESG disclosure standards. Despite such calls for greater ESG disclosure, the regulatory response has been mixed. While the European Union has mandated disclosure of ESG information for several years, the U.S. Congress recently rejected similar ESG reporting requirements. Several companies have responded to the demand for ESG transparency by constructing proprietary ESG ratings. One of the companies at the forefront of this effort is MSCI Inc. (formerly, Morgan Stanley Capital International), which constructs both government and firm-level ESG ratings.[2] According to MSCI, their ESG Government Ratings, which have been reported annually since 2008, "identify a country's exposure to and management of environmental, social, and governance (ESG) risk factors and explain how these factors might impact the long-term sustainability of its economy."[23]

We posit that ESG ratings contain value-relevant information about IPO firms. However, as private firms, IPO issuers are unlikely to possess firm-level ESG ratings. Therefore, we exploit variations in MSCI's ESG Government Ratings to examine the relation between ESG and IPO underpricing. The supposition that ESG Government Ratings are a good proxy for firm-level ESG policies is based on Dyck et al. (2019), who find that institutional investors from countries with strong ESG norms have a positive impact on firms' ESG policies. Because institutional investors interact with firms and their representatives during the roadshow and often receive significant allocations of IPO shares, they are in a position to influence IPO firms' ESG policies. For these reasons, we expect IPO firms to conform to the ESG norms of their listing country.

If, as some studies suggest, higher ESG ratings are associated with higher quality disclosures (e.g., Lopez-de-Silanes et al., 2019) and lower information asymmetry (e.g., El Ghoul et al., 2011), underpricing should be lower in countries with higher ESG Government Ratings. On the other hand, first day returns should be larger in countries with high ESG ratings if investors are drawn to firms with high ESG ratings (e.g., Da et al., 2011; Liu et al., 2014). We test these competing hypotheses using a sample of 7446 IPOs issued in 36 countries from 2008 through 2018. In addition to MSCI's overall ESG Government Rating, we also consider the risk management ratings for the three underlying pillars to examine whether environmental, social, or governance factors drive the relation between ESG and IPO underpricing.

Consistent with the notion that higher ESG ratings are associated with lower information asymmetry, we report a negative relation between the ESG Government Ratings and firm-level IPO underpricing. For example, our main result suggests that a one standard deviation improvement in a country's ESG Government Rating, which is roughly equivalent to a move from Malaysia to Germany based on their 2018 ratings, is associated with a 7.07 percentage point decrease in first-day returns for IPOs that take place in that country. When we uniquely examine the environmental, social, and governance pillars of the ESG Government Rating, we find that underpricing tends to be lower in countries with stronger risk management practices in each of these areas. For example, we find that a one standard deviation improvement in a country's Environmental Risk Management rating is associated with an approximately 3.42 percentage point decrease in underpricing.

Subsequent tests strengthen the notion that information asymmetry is the channel that drives the negative relation between ESG ratings and underpricing. We address concerns about causality and omitted variables using a three-pronged approach. First, after exploring the correlation between ESG ratings and related country characteristics, we use several approaches to control for other country-level factors in our models. Second, we perform instrumental variable analysis using the ESG ratings of countries that share a border with our sample countries as instruments for the ESG ratings. Third, we perform Impact Threshold for a Confounding Variable analysis to determine how severe the endogeneity problem must be to invalidate our results (Frank, 2000). These tests provide additional support for the notion that ESG Government Ratings are related to firm-level IPO underpricing. We also exploit variations in financial disclosure, liability standards, and shareholder protections across our sample countries to determine whether ESG risk management is a complement or substitute for other country-level institutions. Our evidence suggests the former, as we find that the negative relation between ESG ratings and underpricing is stronger in countries with more transparent financial disclosures, higher liability standards, and stronger shareholder protections.

Our results contribute to a number of different areas of inquiry in the academic literature. First, we provide evidence that ESG ratings provide value-relevant information around new stock issues. To the best of our knowledge, we are the first to demonstrate that higher ESG ratings are associated with lower IPO underpricing. In a related study, Feng et al. (2018) find that firm-level ESG activities lower the cost of seasoned equity offerings (i.e., less negative market reactions and lower underpricing). As public firms, investors are often familiar with seasoned equity issuers due, in part, to required periodic disclosures. Private firms that do not have the same disclosure history and, therefore, are likely to suffer from greater information disparities, issue IPOs. Because underpricing is the primary cost of going public for many IPO firms (Ritter, 1987), our results imply that policies that improve a country's ESG Government Rating can lower IPO costs and improve capital market access for private firms.

Second, our results are consistent with information asymmetry explanations for IPO underpricing. After surveying the IPO

[2] Other companies that produce ESG ratings include Bloomberg, Morningstar, and Thomson Reuters.

[3] https://www.msci.com/documents/10199/5c0d3545-f303-4397-bdb2-8ddd3b81ca1b#:~:text=MSCI%20ESG%20Government%20Ratings%20assesses,and%20their%20political%20governance%20structures%3F

underpricing literature, Ljungqvist (2007) concludes that information disparities are one of the primary determinants of IPO underpricing. Our evidence suggests that information asymmetry is one channel through which ESG Government Ratings affect IPO underpricing. This complements prior studies such as Lopez-de-Silanes et al. (2019), who report a positive relation between the amount of ESG disclosure and the quality of a firm's disclosure, and El Ghoul et al. (2011), who find that higher ESG ratings are associated with lower information asymmetry. We also find that the relation between ESG ratings and underpricing is more pronounced in countries with more transparent accounting disclosures, greater liability standards, and stronger shareholder protections. Thus, efforts to improve a country's ESG Government Rating appear to be more impactful in the presence of effective country-level institutions.

Third, our findings confirm the important relation between country-level institutions and firm-level IPO underpricing. Country-level factors including accounting transparency (Boulton et al., 2011, 2017), economic integration (Marcato et al., 2018), investor protections (Boulton et al., 2010; Engelen and van Essen, 2010), and national culture (Chourou et al., 2018) have been found to help explain cross-country variation in IPO underpricing. We add to this literature by documenting the important role of country-level ESG ratings. Together, this literature suggests that firm-level outcomes are, in part, a function of the country-level institutions that influence firm behavior.

2. Literature review and hypotheses development

2.1. Environmental, social, and governance risk

In perhaps the seminal study on corporate social responsibility, Bowen (1953) poses the question "What are the social responsibilities which businessmen may be expected to assume?" Almost two decades later came Friedman's (1970) reply: "The social responsibility of a business is to increase its profits." Today, investors increasingly consider environmental, social, and governance factors in conjunction with more traditional financial indicators when making investment decisions. More and more firms recognize that prioritizing the environment, employees, and the community makes financial sense. Consequently, many firms have increased their focus on ESG in recent years, to the point where it is becoming increasingly common to have a top management team position with "CSR" or "ESG" in the position title (Strand, 2013).

There is also a growing consensus in the academic literature that attention to ESG has a positive impact on firms' financial and stock market performance. For example, Giese et al. (2019) find that higher ESG ratings are associated with lower costs of capital, higher valuations, higher profitability, and lower tail risk exposure. Using a novel field experiment, Crifo et al. (2015) find that private equity professionals pay less for firms that suffer from bad ESG practices, a telling result in light of the strong profit incentives in the private equity industry. Potential reasons for the positive link between ESG and firm performance and value are varied. According to Dimson et al. (2015), attention to ESG has a positive effect on factors such as customer and employee loyalty and corporate governance. Lins et al. (2017) further point to the positive effect that ESG activities have on firms' social capital and trust, which proves especially valuable when firms face a severe crisis of confidence, such as the 2008–2009 financial crisis.

Investor interest in ESG has resulted in the development of ESG investment strategies and investment vehicles. For example, some investors shun firms that operate in industries perceived as having weak ESG characteristics, which could have consequences for the information environment surrounding firms. Consistent with this, Hong and Kacperczyk (2009) find that companies that operate in the alcohol, tobacco, and gaming industries exhibit lower institutional ownership and analyst coverage than firms in other industries. Cao et al. (2019) directly examine the relation between ESG and stock price efficiency. They find that long-short strategies that exploit quantitative mispricing signals generate higher returns when applied to stocks favored by institutions that engage in ESG investing. They find that overpriced high-ESG stocks and underpriced low-ESG stocks drive superior returns for the long-short strategies and posit that because of their focus on ESG performance, ESG investors are less sensitive to quantitative mispricing signals than investors who discount ESG performance when evaluating investments.

2.2. MSCI ESG government ratings

MSCI Inc. developed its ESG ratings in an attempt to incorporate the United Nations' Principles for Responsible Investment (PRI) into the investment process.[4] Consequently, MSCI's ratings are commonly used to evaluate a company's exposure to and management of risks and opportunities associated with environmental, social, and governance factors. Typical company-level ESG factors incorporate a large range of topics that are not conventionally included in financial analysis but have the potential to affect the long-term risk and return of institutional portfolios. For example, the environmental factor reflects how a company responds to carbon emissions, green building opportunities, and toxic emissions and waste. The social factor considers how well a firm treats its workers and if its culture fosters innovation and sustainable procurement practices. The governance factor includes efforts against corruption and anti-competitive practices and in favor of tax transparency and business ethics.

We focus on MSCI's ESG Government Ratings, which assess a country's exposure to and management of ESG risk factors that may affect the long-term sustainability of its economy. A country's natural, human, and financial resources define its ESG risk exposure, and its practices and performance define its ESG risk management. According to MSCI, ESG risk exposure and management are important

[4] https://www.unpri.org/pri/an-introduction-to-responsible-investment/what-is-responsible-investment

Fig. 1. ESG Risk Factors.
This figure illustrates the hierarchy of the MSCI Government Rating. Beneath each of the three pillars, we report the corresponding risk factors. We suppress the sub-factors used to construct the risk factors for brevity.

determinants of the attractiveness of a country as an investment destination because they reflect a country's performance in controversial areas, including forced labor, armed conflicts, endangered species, biological diversity, and chemical weapons. As Fig. 1 illustrates, the ESG Government Rating is a summary measure that considers three underlying pillars: environmental, social, and governance risks.

Beneath each pillar are multiple risk factors and sub-factors that address a country's exposure to and management of each type of risk.[5] For example, the environmental risk pillar is based on two risk factors, natural resource risk and environmental externalities and vulnerability risk. Example sub-factors include energy security and resource conservation for natural resource risk and vulnerability to environmental events and environmental performance for environmental externalities and vulnerability risk. The social risk pillar focuses on human capital risk and economic environment risk. Example sub-factors include basic human capital and basic needs for human capital risk and economic environment and wellness for economic environment risk. Finally, the governance risk pillar focus on financial and political governance risks. Example sub-factors include financial capital and financial management for financial governance risk and judicial system and corruption control for political governance risk. Twenty-seven sub-factors based on 99 country-specific data points contribute to the construction of the six risk factors. MSCI weights each of the 27 sub-factors based on its impact on the country's long-term competitiveness and sustainability. This process culminates in the assignment of an ESG Government Rating for each country, with higher ratings indicative of lower country-level ESG risk. Appendix A contains more details on the construction of MSCI's ESG country-level measures.

Our focus is not only on the broad ESG Government Rating but also on the individual risk management pillars: Environmental Risk Management, Social Risk Management, and Governance Risk Management. We focus on risk management because it is often the case that a country's exposure to environmental, social, and governance risk is a function of resource endowments and other factors beyond the country's control. However, countries can pursue strategies to effectively manage these risks in order to improve their competitiveness and economic sustainability.

2.3. Initial public offerings

As private companies or subsidiaries of public companies, information about IPO firms is often limited. Limited information leads to information disparities between issuers and underwriters (Baron, 1982), issuers and investors (Welch, 1989), and different investor groups (Rock, 1986). Information asymmetry increases uncertainty about an IPO, which Ritter (1984) and Beatty and Ritter (1986) predict results in higher first-day returns. Consistent with this notion, studies find that underpricing is correlated with firm- and issue-characteristics that are commonly associated with information asymmetry and uncertainty. Examples of these characteristics include firm size (Ritter, 1984), industry (Ljungqvist and Wilhelm, 2003), and the involvement of financial intermediaries (Carter and Manaster, 1990; Barry et al., 1990).

Extant research suggests that higher ESG ratings can help reduce information asymmetry for IPO firms. In his model of capital

[5] We suppress the sub-factors in Figure 1 for brevity.

market equilibrium with incomplete information, Merton (1987) relies on the assumption that investors consider including a security in their portfolio only if they know about that security. Based on that model, El Ghoul et al. (2011) argue that information asymmetry is less severe for firms with higher ESG ratings because these firms attract greater attention from stock analysts and the media. Consequently, high-ESG firms have wider investor base and lower perceived risks. Dhaliwal et al. (2012) show that ESG disclosure results in greater analyst forecast accuracy because of the impact of ESG factors on firm financial performance. Lins et al. (2017) find that investors are willing to pay a premium for high-ESG firms during a severe crisis of confidence because of their greater information credibility. Feng et al. (2018) explain that ESG ratings are negatively related to SEO underpricing because firms that are more ethical are also more transparent. Finally, Lopez-de-Silanes et al. (2019) find a strong relation between the quantity and the quality of ESG data disclosed by firms and suggest that cross-country differences are due to ESG disclosure requirements for firms and stewardship codes for investors.

If, as these studies suggest, higher ESG ratings are associated with lower information asymmetry, we expect to find lower underpricing for IPOs issued in countries with higher ESG Government Ratings. We formalize this prediction in our information asymmetry hypothesis:

H1. *: ESG Government Ratings are negatively correlated with firm-level IPO underpricing.*

A recent US SIF Foundation report on sustainable and responsible investing documents tremendous growth in assets managed by money managers and institutions that consider ESG factors as part of the investment process. A number of academic studies confirm this trend and highlight some of its implications. For example, Dimson et al. (2015) find that institutional ownership increases in the year following the adoption of improved ESG practices. Hartzmark and Sussman (2019) report that compared to mutual funds with low ESG ratings, those with high ESG ratings are able to charge higher fees while attracting positive flows from investors. Additionally, Starks et al. (2018) report that investors are less prone to sell stocks with high ESG ratings following negative news or poor performance compared to stocks with low ESG ratings, suggesting that high ESG ratings dampen investor focus on more traditional factors.

An investor who wants to buy a stock has thousands of options. Studies of investors' trading decisions provide compelling evidence that investors often simplify their search by narrowing their options because of their limited ability to process information. Barber and Odean (2008), for example, report that individual investors tend to buy stocks that grab their attention, such as those that appear prominently in the news. While rational investors should recognize that stock prices might already reflect the newsworthy information, other investors may overvalue the relevance of the news and trade suboptimally. Similar investor behavior has been documented around IPOs. For example, Da et al. (2011) and Liu et al. (2014) report a positive association between measures of investor attention (Google Search Volume and pre-IPO media attention, respectively) and IPO underpricing.

The proliferation of ESG-motivated investment strategies indicates that an increasing number of investors are attracted to firms with high ESG ratings. If high ESG ratings draw the attention of investors, and investor attention is associated with higher IPO first-day returns, we predict a positive relation between ESG Government Ratings and IPO underpricing. We generalize this prediction in our investor attention hypothesis:

H2. *: ESG Government Ratings are positively correlated with firm-level IPO underpricing.*

3. Data and methodology

3.1. Sample construction

We construct a sample of IPO events to test our competing hypotheses. We use the Thomson Financial SDC Platinum New Issues database to retrieve IPOs that took place between 2008 and 2018 and were listed in countries for which we have ESG ratings. We follow prior literature and exclude closed-end funds, depositary receipts, financial firms, limited partnerships, rights offerings, trusts, and unit offerings. We use the SEDOL identifier to match IPO events to Datastream to retrieve secondary market closing prices, which we use to calculate first-day returns as the difference between the first-day secondary market closing price and the IPO offer price, divided by the IPO offer price. To eliminate extreme observations and potentially erroneous matches, we trim the top and bottom 1% of the remaining events based on underpricing. These steps result in a final sample of 7446 IPOs listed in 36 countries.

The MSCI Government ESG ratings are our measure of a country's performance on ESG issues that may affect the long-term sustainability of its economy. The risk management ratings for the three underlying pillars capture a country's management of environmental, social, and governance issues. Ratings are calculated after the relative risk exposures are assessed in relation to the corresponding risk management practices. For example, a country may be endowed with a great amount of natural, human, and financial resources but not be able to manage these resources effectively and efficiently. Scores range from zero to ten, with the lowest scores representing countries with the highest risk.

The vast majority of IPO firms list in the country in which they are located. When a firm cross-lists on an exchange located in a different country, we assign the ESG ratings for the listing country. This decision is based on several factors. First, prior research argues that firms cross-list, at least in part, to bond themselves to the institutions of the listing country. For example, Reese and Weisbach (2002) argue that firms cross-list in the U.S., which requires them to adopt U.S. security laws and reporting requirements, in order to commit to protecting minority shareholders. Second, Dyck et al. (2019) find that institutional investors from countries with strong ESG norms have a positive impact on firms' ESG policies. Because of the important role that institutional investors play in the IPO process, including receiving significant allocations of IPO shares, they are in a position to influence IPO firms' ESG policies. Third, exchanges are increasingly providing ESG guidance for listed companies. For example, the London Stock Exchange Group, NYSE, and Nasdaq all

Table 1
Country summary statistics.

Country	N	Underpricing (%)	ESG government rating	Environmental RM	Social RM	Governance RM	Total RM
Argentina	3	0.74	5.921	5.404	6.915	5.515	5.837
Australia	509	14.62	7.400	4.715	8.804	7.286	7.023
Austria	2	−2.92	7.634	6.771	9.092	8.334	8.133
Belgium	15	2.63	6.441	4.048	8.631	7.410	6.875
Brazil	36	1.81	5.739	7.113	6.258	5.218	5.952
Canada	206	18.60	7.890	6.539	8.700	8.087	7.854
China	1769	42.14	5.131	4.394	6.354	4.687	5.030
Denmark	17	7.95	8.043	6.870	9.163	8.686	8.351
Finland	23	3.35	7.802	5.850	8.733	7.920	7.606
France	175	6.05	6.551	6.463	8.574	6.426	6.972
Germany	79	3.31	7.431	5.433	9.112	8.446	7.859
Greece	3	10.17	4.984	5.997	8.011	3.676	5.340
Hong Kong	758	19.88	7.034	5.119	7.606	7.779	7.071
India	387	11.67	4.215	3.787	4.494	4.580	4.360
Indonesia	169	27.35	4.841	6.054	4.753	4.942	5.172
Ireland	2	8.19	6.349	6.536	7.416	6.917	6.946
Israel	2	−0.02	5.906	4.874	8.578	5.988	6.357
Italy	68	13.72	5.408	5.584	7.585	5.822	6.203
Japan	469	67.90	6.447	5.335	8.687	7.075	7.043
Malaysia	132	15.93	6.275	6.150	7.101	5.557	6.091
Mexico	14	2.22	5.199	5.744	6.553	4.952	5.550
Netherlands	16	10.03	7.045	4.766	8.755	7.929	7.345
New Zealand	27	5.83	7.570	6.926	8.117	7.661	7.591
Norway	49	−0.17	8.690	6.441	9.340	9.346	8.618
Philippines	30	7.33	5.048	6.345	5.160	5.005	5.379
Portugal	3	−2.07	5.520	6.395	7.931	5.280	6.222
Singapore	167	20.00	6.522	4.438	7.992	8.549	7.382
South Africa	17	6.20	5.133	3.458	4.004	4.771	4.251
South Korea	535	32.72	6.593	4.746	8.808	7.066	6.922
Spain	31	6.07	5.711	5.290	7.653	6.128	6.300
Sweden	106	11.18	8.304	6.598	8.787	8.895	8.294
Switzerland	16	6.06	8.055	7.131	9.246	8.795	8.491
Thailand	179	52.38	5.142	4.711	6.423	4.531	5.049
Turkey	71	11.91	4.754	5.971	6.430	3.927	5.064
United Kingdom	353	10.59	6.558	6.385	8.224	6.616	6.960
United States	1008	17.31	6.908	5.000	8.058	6.029	6.279

This table presents country-level descriptive statistics for the IPO sample. N reports the number of IPO observations for each country. Underpricing is the difference between the first-day secondary market closing price and the IPO offer price, divided by the IPO offer price. ESG Government Rating is the composite MSCI ESG Government Rating. Environmental RM, Social RM, and Governance RM are the risk management components of the three pillars of the ESG Government Rating. Total RM is a composite of Environmental RM, Social RM, and Governance RM.

provide ESG disclosure recommendations for listed companies. For these reasons, cross-listed firms are likely to conform to the ESG standards in the country of listing.[6]

3.2. Descriptive statistics

In Table 1, we report country-level summary statistics for our sample. The number of IPOs ranges from two in Austria, Ireland, and Israel to 1769 in China. Fifteen of our sample countries have at least 100 IPOs during our sample period. The average first day return is positive in all countries except Austria, Israel, Norway, and Portugal, where it is close to zero. IPOs in Japan experience the highest average first day return (67.90%). Other notable average underpricing observations include China (42.14%), South Korea (32.72%), and Thailand (52.38%).

In the last four columns of Table 1, we report details on each country's exposure to and management of environmental, social, and governance risks. The first column reports the average ESG Government Rating across all IPOs issued in a given country, while the final four columns report values for Environmental, Social, and Governance Risk Management and a Total Risk Management score. The average country-level ESG Government Rating ranges from 4.2 (India) to 8.7 (Norway). Higher scores identify countries that are more resistant to long-term, financially relevant environmental, social, and governance risks. The highest- (lowest-) rated country for the environmental pillar is Switzerland (South Africa). Norway ranks highest for both social and governance, while South Africa and Greece rank the worst on these two pillars, respectively.

In Fig. 2, we group sample countries into quartiles based on their 2018 ESG Government Rating. Northern European countries tend

[6] In untabulated analysis, we find that our main results are robust to excluding cross-listed IPOs. Additionally, we find that underpricing tends to be lower for cross-listings with larger ESG differences between the listing and home country.

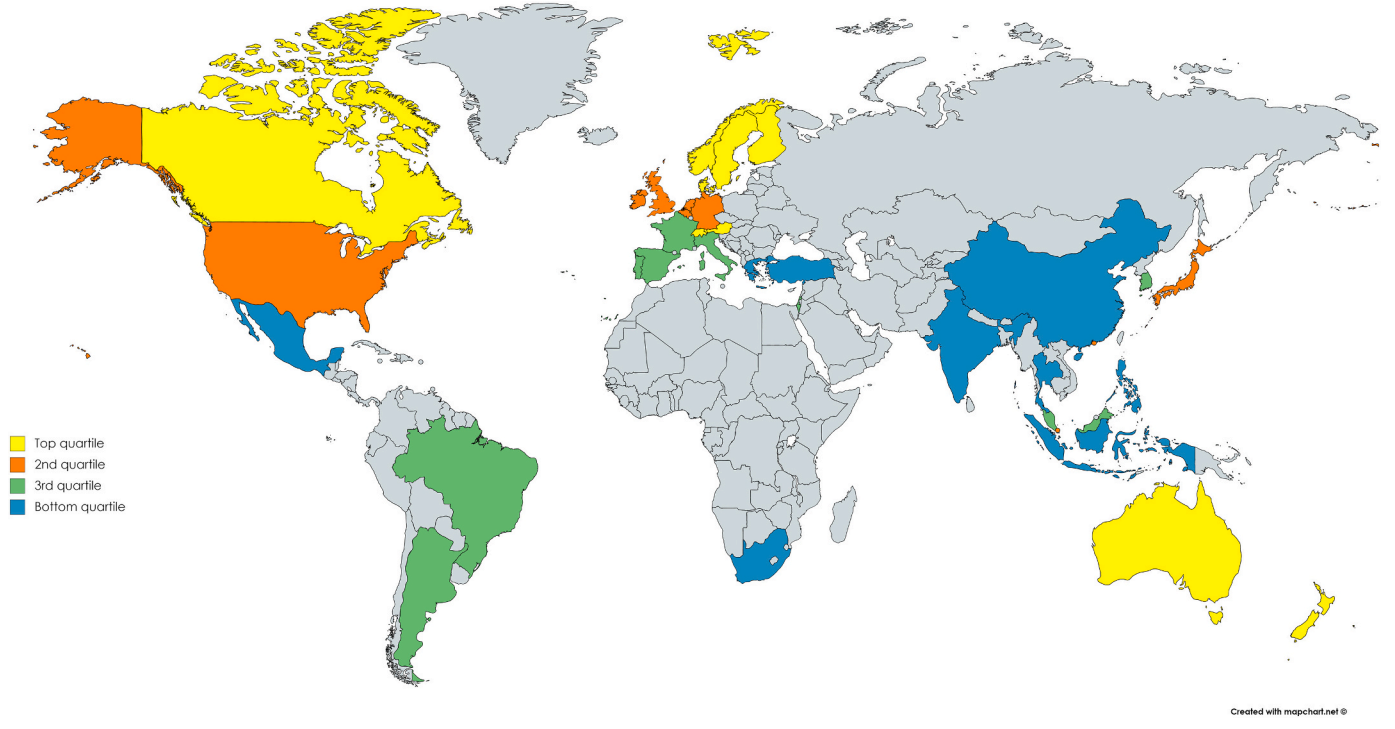

Fig. 2. Sample countries by ESG Government Rating quartile.
In this figure, we group our sample countries into quartiles based on their average ESG Government Rating. In yellow, we identify the countries that are in the top quartile (highest ratings). In orange and green, we identify the countries in the second and third quartiles, respectively. In blue, we identify the countries that are in the bottom quartile (lowest ratings). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Table 2
Descriptive statistics and correlations.

Panel A: Descriptive statistics

	N	Average	SD	Minimum	Maximum
ESG Government Rating	7446	6.219	1.070	4.087	8.866
Environmental RM	7446	5.040	0.887	2.410	8.373
Social RM	7446	7.457	1.299	3.344	9.621
Governance RM	7446	6.205	1.542	1.965	9.787
Total RM	7446	6.227	1.133	3.525	9.239
Underpricing	7446	0.270	0.436	−0.300	3.614
Market integration	7446	63.989	14.747	39.683	94.296
Price stabilization	7446	0.015	0.027	−0.056	0.088
IPO activity	7446	0.043	0.036	0.003	0.164
Market return	7446	0.015	0.084	−0.211	0.236
Stock market turnover	7446	1.339	0.921	0.178	4.803
Offer size ($MM)	7446	125.380	251.924	0.467	1778.145
Underwriter market share	7446	0.016	0.029	0.000	0.138
VC backed	7213	0.257	0.437	0.000	1.000
Lockup length (days)	7446	155.347	168.229	0.000	1094.000
Bookbuilt	7430	0.710	0.454	0.000	1.000
Firm commitment	7446	0.830	0.376	0.000	1.000
Equity carveout	7364	0.172	0.378	0.000	1.000
High-tech firm	7446	0.159	0.365	0.000	1.000

Panel B: Correlation matrix

Country-level measure	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) ESG Government Rating	1.00												
(2) Environmental RM	0.49***	1.00											
(3) Social RM	0.87***	0.42***	1.00										
(4) Governance RM	0.85***	0.34***	0.71***	1.00									
(5) Total RM	0.92***	0.55***	0.85***	1.00									
(6) Anti-director rights	0.43***	0.32***	0.33***	0.54***	0.53***	1.00							
(7) Creditor rights	−0.37***	−0.13***	−0.44***	0.00	−0.17***	0.77***	1.00						
(8) English speaking	0.26***	0.06***	0.13***	0.10***	0.12***	0.32***	−0.24***	1.00					
(9) Common law	0.37***	0.05***	0.12***	0.26***	0.22***	0.54***	0.12***	0.76***	1.00				
(10) Rule of law	0.88***	0.41***	0.81***	0.74***	0.82***	0.64***	−0.31***	0.42***	0.54***	1.00			
(11) Efficiency of judiciary	0.59***	0.02	0.46***	0.47***	0.47***	0.00	−0.19***	0.40***	0.44***	0.82***	1.00		
(12) Director liability	0.20***	−0.16***	0.06***	−0.02	−0.03*	−0.16***	−0.23***	0.58***	0.46***	0.29***	0.39***	1.00	
(13) Disclosure	0.04**	−0.32***	−0.08***	−0.08***	−0.15***	0.03*	0.03	0.52***	0.75***	0.21***	0.41***	0.62***	1.00

This table presents descriptive statistics for the full sample of IPOs (Panel A) and correlations between the ESG measures and other country-level measures commonly used in the related literature (Panel B). ESG Government Rating is the composite MSCI ESG Government Rating. Environmental RM, Social RM, and Governance RM are the risk management components of the pillars of the ESG Government Rating. All other variables are defined in Appendix B.

to dominate the top quartile, with Norway, Sweden, Denmark, Switzerland, and Finland all ranking in the top nine within our sample. Germany scores just below Austria, giving it the highest ESG Government Rating in the second quartile (7.22). In addition to Germany, the second quartile includes some of the dominant IPO markets in North America (U.S.), Europe (U.K.), and Asia (Hong Kong and Japan). The third quartile is geographically dispersed and includes countries from Asia, Europe, and South America. The bottom quartile includes the two most populous countries in the world, China and India, which have ESG Government Ratings of 4.91 and 4.19, respectively.

We report event-level descriptive statistics for our IPO sample in Panel A of Table 2. The average of the *ESG Government Rating* and its three components is 6.22, 5.04 (*Environmental RM*), 7.46 (*Social RM*), and 6.21 (*Governance RM*). The average IPO is underpriced by 27.0%, with first-day returns ranging from a 30.0% loss to a 361.4% gain. Prior research on cross-country variation in IPO underpricing motivates the remaining variables listed in Table 2. We include these variables as controls in our multivariate analysis. To systematically identify and mitigate the impact of influential observations, we winsorize each tail at 1% for all continuous control variables.

Marcato et al. (2018) report that IPOs are underpriced less in countries that are better integrated into the global economy. We use the Economic Globalization Index constructed by the KOF Swiss Economic Institute to control for market integration.[7] *Market integration* takes values between 39.68 and 94.30 in our sample, where higher scores indicate greater market integration. *Price stabilization* controls for underwriters' tendency to support IPO prices in the aftermarket. Our measure of price stabilization is the difference between the number of IPOs with initial returns between zero and 1% and the number of IPOs with initial returns between zero and negative 1%, divided by the total number of IPOs in each country. Positive values are consistent with underwriter intervention to prevent aftermarket prices from falling below the IPO offer price. The average value is slightly greater than zero across our sample (0.015), with a range of −0.056 to 0.088.

Ritter (1984) finds that underpricing tends to be higher when IPO volume and overall stock market returns are high. We calculate *IPO activity* as the ratio of the number of IPOs to the total number of listed equities reported by the World Bank, both measured at the country-year level. We report that there are 4.3 IPOs for every 100 listed companies in the typical country-year. We use the country-level Datastream indices to calculate a broad stock market return over the three months preceding each IPO. *Market returns* average 1.5% for the three months leading up to the typical IPO. We use data from the World Bank to calculate *stock market turnover*, which is the total value of shares traded divided by the average market capitalization, both measured at the country-year level. The average value is 1.3, with higher values indicative of more liquid stock markets. We include this measure to control for liquidity risk, which Ellul and Pagano (2006) suggest is an important determinant of underpricing. More information is generally available for larger firms, which reduces information asymmetry. Thus, we use inflation-adjusted *offer size* to proxy for firm size. The average sample firm raises $125.4 million at the IPO.

The involvement of high-reputation financial intermediaries can reduce uncertainty and underpricing by certifying an IPO. However, evidence is mixed on the relation between underwriter reputation and IPO underpricing. For example, early evidence reported by Carter and Manaster (1990) and Megginson and Weiss (1991) indicates that higher reputation underwriters are associated with lower first-day returns. However, Beatty and Welch (1996) and Loughran and Ritter (2004) report that underpricing is positively correlated with underwriter reputation in more recent years. We construct an underwriter reputation measure in the spirit of Megginson and Weiss (1991), who propose that reputation is positively correlated with market share. The average underwriter has a market share equal to 1.6% of the total proceeds raised for our IPO sample, with a maximum underwriter market share of 13.8%. Our underwriter reputation measure is an underwriter's market share decile-rank. Venture capital investors also have the potential to certify an IPO (Barry et al., 1990). However, Loughran and Ritter (2004) find a positive correlation between the presence of a venture capital investor and IPO underpricing. We create an indicator variable, *VC backed*, to identify IPOs that previously received venture capital funding.

Brav and Gompers (2003) suggest that share lockups may alleviate moral hazard problems surrounding IPOs. *Lockup length* measures the number of days between the IPO date and the first lockup expiration date. The average *lockup length* for our sample is 155.3 days. Seventy-one percent of our IPOs are *bookbuilt* offerings, which Sherman (2005) notes is the principal method for taking firms public around the world. Ritter (1987) finds that firm commitment offerings are underpriced less than best efforts IPOs. *Firm commitment* offerings represent 83.0% of our sample. Schipper and Smith (1986) and Prezas et al. (2000) find that equity carveouts are underpriced less than other IPOs. The variable *equity carveout* indicates that 17.2% of our IPOs are of this type. Due to greater uncertainty, IPOs of high-tech firms often exhibit greater underpricing than IPOs of firms from other industries. Within our sample, 15.9% of IPO firms are high-tech, based on the classifications reported by Ljungqvist and Wilhelm (2003). We define all variables used in our tests in Appendix B.

In Table 2 Panel B, we explore the correlation between the ESG measures and a variety of country-level variables used in related literature. Because the results indicate that the ESG measures are significantly correlated with many of these factors, it is important that we control for country-level institutions in our analysis. To do so, we construct a composite measure, *country-level institutional quality*, as the first principal component of the following variables: anti-director rights (Djankov et al., 2008), creditor rights (La Porta

[7] https://kof.ethz.ch/en/forecasts-and-indicators/indicators/kof-globalisation-index.html

Table 3
ESG and IPO underpricing.

	ESG government rating	Environmental RM	Social RM	Governance RM	Total RM
ESG measure	−0.0661***	−0.0386***	−0.1092***	−0.0148*	−0.0470***
	(−3.62)	(−2.94)	(−6.16)	(−1.95)	(−3.55)
Country-level institutional quality	0.0067	−0.0019	−0.0024	−0.0019	−0.0041
	(0.27)	(−0.08)	(−0.08)	(−0.08)	(−0.17)
Market integration	0.0031	−0.0004	0.0069***	0.0019	0.0029
	(1.46)	(−0.18)	(2.86)	(0.89)	(1.37)
Price stabilization	−1.0158	−0.8836	−1.2750	−0.4253	−0.7905
	(−1.14)	(−1.06)	(−1.26)	(−0.48)	(−0.91)
IPO activity	−0.7244***	−0.8449***	−1.0031***	−0.5746**	−0.6022**
	(−3.09)	(−3.49)	(−4.19)	(−2.40)	(−2.57)
Market return	0.3401***	0.3357***	0.3492***	0.3427***	0.3491***
	(5.50)	(5.43)	(5.66)	(5.53)	(5.64)
Stock market turnover	−0.0336***	−0.0226**	−0.0288***	−0.0367***	−0.0380***
	(−3.39)	(−2.23)	(−2.90)	(−3.52)	(−3.76)
Offer size	−0.0656***	−0.0657***	−0.0657***	−0.0649***	−0.0653***
	(−14.98)	(−15.00)	(−15.03)	(−14.83)	(−14.92)
Underwriter rank	0.0121***	0.0118***	0.0118***	0.0117***	0.0119***
	(4.61)	(4.49)	(4.52)	(4.48)	(4.53)
VC backed	−0.0199	−0.0183	−0.0191	−0.0199	−0.0194
	(−1.59)	(−1.46)	(−1.53)	(−1.59)	(−1.55)
Lockup length	−0.0106***	−0.0110***	−0.0109***	−0.0104***	−0.0104***
	(−4.28)	(−4.44)	(−4.38)	(−4.19)	(−4.18)
Bookbuilt	−0.0080	−0.0093	−0.0064	−0.0095	−0.0099
	(−0.54)	(−0.63)	(−0.43)	(−0.64)	(−0.66)
Firm commitment	−0.0052	−0.0057	−0.0111	−0.0043	−0.0049
	(−0.32)	(−0.35)	(−0.68)	(−0.26)	(−0.30)
Equity carveout	0.0175	0.0195	0.0188	0.0187	0.0177
	(1.36)	(1.52)	(1.47)	(1.45)	(1.38)
High-tech firm	0.0677*	0.0679*	0.0702**	0.0689*	0.0679*
	(1.91)	(1.92)	(1.99)	(1.94)	(1.92)
Intercept	0.6853***	0.7064***	0.8431***	0.4318***	0.5916***
	(3.97)	(4.07)	(4.46)	(2.77)	(3.66)
var(c.country)	0.0292	0.0245	0.0417	0.0298	0.0285
	(3.25)	(3.17)	(3.30)	(3.18)	(3.24)
var(e.ir)	0.1389	0.1391	0.1383	0.1391	0.1389
	(59.37)	(59.37)	(59.36)	(59.36)	(59.37)
Observations	7113	7113	7113	7113	7113
Number of groups	36	36	36	36	36

This table reports the results of HLM regressions that examine the relation between country-level ESG ratings and IPO underpricing. The dependent variable is the IPO underpricing, which is calculated as the difference between the first-day secondary market closing price and the IPO offer price, divided by the IPO offer price. All other variables are defined in Appendix B. Regressions include unreported industry controls based on Dyck and Zingales (2004) and issue year fixed effects. The numbers between parentheses below each coefficient are the *z*-statistics. *Var(c.country)* is the variance between countries, and *var(e.ir)* is the variance between individual IPOs. Respectively, ***, **, and * denote significance of the coefficient at the 1, 5, and 10% level.

et al., 1998; Allen et al., 2005), rule of law (Boulton et al., 2010), and indicator variables for English speaking countries (Stulz and Williamson, 2003) and countries with a common law legal origin (La Porta et al., 2008). The first principal component explains 53.1% of the variation in these five measures. We include *country-level institutional quality* as a control variable in all regression models.[8]

3.3. Hierarchical linear modeling

Our IPO sample clusters at the country-level, which means that individual IPO observations are unlikely to be independent. When data has a clustering structure such as this, OLS regression can result in underestimated standard errors (Garson, 2013). Prior cross-country IPO studies employ hierarchical linear modeling to solve this problem.[9] Estimation of a two-level HLM accounts for country-level clustering by modeling the intercept of the IPO underpricing regression (level 1) as a random effect of the country in which it is issued (level 2). This allows the intercept of the underpricing regression to shift between countries. We express the general

[8] In untabulated analysis, we find that the results are robust to including (i) both the first and second principal components of the five measures, (ii) the five measures individually, and (iii) the first and second principal components of an expanded set of measures that includes efficiency of the judiciary (La Porta et al., 1998), director liability (La Porta et al., 2006), and disclosure (La Porta et al., 2006). We do not use the expanded set of measures in the reported analysis because they are not available for China.

[9] See, for example, Engelen and van Essen (2010), Marcato et al. (2018), and Boulton et al. (2020).

specification used in our multivariate analysis in Eq. (1):

$$Underpricing_{ijt} = \beta_0 + \beta_1 ESG\ Measure_{jt} + \beta X_{ijt} + u_i + \varepsilon_{ijt} \quad (1)$$

where $Underpricing_{ijt}$ is the first-day return on the IPO of firm i issued in country j in year t; $ESG\ Measure_{jt}$ is the ESG measure for country j in year t; X_{ijt} is a vector of control variables; u_i is the random country effect that shifts the intercept between countries; and ε_{ijt} is the error term from the level 1 regression. In addition to the coefficient estimates, we report z-statistics, the variance between countries (*var(c.country)*), and the variance between individual IPO observations (*var(e.ir)*) for each of our models.[10]

4. Empirical results

4.1. ESG and underpricing

We develop competing hypotheses on the relation between country-level ESG and firm-level IPO underpricing. Our information asymmetry hypothesis (H1) predicts a negative relation between ESG ratings and underpricing, while our investor attention hypothesis (H2) predicts the opposite. We report the results of multivariate analysis on the relation between ESG and underpricing in Table 3. The dependent variable in each of the models is underpricing measured from the IPO offer price to the secondary market closing price on the first day of trading. The primary variables of interest are the ESG measures: *ESG Government Rating, Environmental RM, Social RM, Governance RM,* and *Total RM*. In addition to controls for the other determinants of underpricing discussed in relation to Table 2, all regressions include unreported industry and issue year fixed effects. Industry classifications are based on Dyck and Zingales (2004).[11]

In the first column, we consider whether the broad ESG Government Rating is related to firm-level underpricing. Consistent with our information asymmetry hypothesis, and counter to the prediction of the investor attention hypothesis, we find that underpricing is lower in countries with higher ESG Government Ratings. The result is both statistically and economically significant. The coefficient on *ESG Government Rating* (−0.0661) implies that a one standard deviation improvement in a country's ESG Government Rating is associated with a 7.07 percentage point decrease in underpricing. For context, a one standard deviation improvement in the ESG Government Rating is equivalent to a move from Malaysia, which has the highest 2018 ESG Government Rating in the third quartile of our sample countries, to Germany, which has the highest rating in the second quartile.

In subsequent columns in Table 3, we replace *ESG Government Rating* with its three pillars to consider the impact of the management of environmental, social, and governance risk factors on firm-level underpricing. In the second column, we replace *ESG Government Rating* with *Environmental RM*. The information asymmetry hypothesis predicts a negative relation between *Environmental RM* and firm-level underpricing. This is indeed what we find, as first-day returns tend to be significantly lower in countries with higher *Environmental RM* scores. From an economic perspective, the result suggests that a one standard deviation improvement in *Environmental RM* is associated with initial returns that are 3.42 percentage points lower. In the third column, we consider the impact of the management of social risk by including *Social RM* in the regression. Again, our evidence is consistent with our information asymmetry hypothesis. Specifically, we report that first-day returns tend to be lower in countries that manage social risk factors better. The magnitude of the effect is larger than what we observe for both *ESG Government Rating* and *Environmental RM* as a one standard deviation improvement in *Social RM* is associated with initial returns that are 14.19 percentage points lower. In the fourth column, we consider the third pillar of the ESG Government Rating, management of governance risk, by including *Governance RM* in the regression. The negative and significant coefficient suggests that governance risk management is associated with lower first-day returns. Compared to the other measures, the economic magnitude of the relation is smaller. The coefficient suggests that a one standard deviation increase in *Governance RM* is associated with a 2.28 percentage point decrease in underpricing. In the last column, we control for the *Total RM* score constructed by MSCI, which combines a country's environmental, social, and governance risk management policies. As it would be expected from the results for the individual pillars, the relation between *Total RM* and first-day returns is negative and significant.

Many of the control variables are significant in the Table 3 results. The controls for hot markets effects conflict, as underpricing is negatively (positively) correlated with IPO activity (recent market returns). Consistent with Ellul and Pagano (2006), first-day returns are lower in the presence of greater liquidity. Larger offers are underpriced less than smaller offers, which is consistent with the argument that information asymmetry is lower for larger IPO firms. The positive coefficients on underwriter rank are consistent with recent studies that find a positive relation between underwriter reputation and underpricing (Beatty and Welch, 1996; Loughran and Ritter, 2004). Finally, the negative coefficient on lockup length supports the notion that longer lockups help reduce adverse selection problems (Brav and Gompers, 2003).

Consistent with our information asymmetry hypothesis, Table 3 provides evidence that in countries with higher ESG ratings, IPOs tend to exhibit lower underpricing. At the same time, these results rule out the investor attention hypothesis. However, there are other potential explanations for the negative relation between ESG ratings and IPO underpricing. In the following section, we report the results of additional analyses aimed at strengthening the connection between ESG and information asymmetry.

[10] In untabulated tests, we confirm that the negative relation between ESG ratings and underpricing is evident in OLS regressions that employ issue year fixed effects and standard errors clustered by country and issue year.

[11] In untabulated analysis, we find that the negative relation between ESG and underpricing is marginally stronger (weaker) for IPOs of firms in the mining and transportation sectors (high-tech sector).

4.2. Omitted variable concerns

Because omitted variables are a potential concern in our study, we follow a three-pronged approach to address the issue. First, as detailed earlier, we include *country-level institutional quality* in all regression models to control for related country-level institutions. Second, we perform instrumental variable analysis using a unique instrument for each country's ESG ratings. Our approach is motivated by research that finds that a country's institutions and policies are influenced by the institutions and policies of its neighbors (Dobbin et al., 2007; Shipan and Volden, 2008). As a result, prior research uses the institutions and policies of neighboring countries as instruments (e.g., Acemoglu et al., 2019; Caselli and Reynaud, 2020). Accordingly, we instrument for each sample country's ESG ratings using the average ESG ratings for the countries with which they share a land border.[12] We estimate the following two-equation simultaneous model:

$$ESG\ measure_{jt} = \alpha_1 + \alpha_2 Average\ border\ country\ ESG_{jt} + \gamma X_{ijt} + \mu_i + \propto_t + \varepsilon_{1it}, \quad (2)$$

$$Underpricing_{ijt} = \beta_1 + \beta_2 ESG\ measure'_{jt} + \theta X_{ijt} + \mu_i + \propto_t + \varepsilon_{2it}, \quad (3)$$

where *Average border country ESG*$_{jt}$ is the average border country ESG measure of country *j* in year *t*; *ESG measure'*$_{jt}$ is the instrumented ESG measure for country *j* in year *t*; X_{ijt} is a vector of control variables measured for IPO *i* issued in country *j* in year *t*; μ_i and α_t are industry and issue year effects, respectively; and ε_{1it} and ε_{2it} are error terms. Control variables are as previously defined.

We report the instrumental variable results in Table 4. Consistent with prior research that suggests that a country's institutions and policies are influenced by their neighbors (Dobbin et al., 2007; Shipan and Volden, 2008), the first-stage results indicate that a country's ESG ratings are positively correlated with the ESG ratings of countries with which they share a land border. The second stage regressions provide additional support for a negative relation between ESG ratings and underpricing.

At the bottom of Table 4, we report statistics that provide support for our instrumental variables approach. Namely, Durbin and Wu-Hausman tests are highly significant, suggesting that the ESG measures should be treated as endogenous, while Anderson-Rubin, Cragg-Donald, and Stock-Yogo statistics verify the validity of our instruments.

Our third approach for addressing omitted variables is to perform Impact Threshold for a Confounding Variable (ITCV) analysis to determine how severe the endogeneity problem must be to invalidate our results (Frank, 2000).[13] By construction, larger (smaller) ITCV values indicate that the main results are more (less) robust to omitted variable concerns. We report the ITCV analysis in Table 5.

The first row of Table 5 reports the ITCV values for each ESG measure. These values indicate the minimum impact of a confounding variable that would be needed to make the coefficient statistically insignificant and is defined as the product of the correlation between the ESG measure and the confounding variable and the correlation between underpricing and the confounding variable. Beneath each ITCV value are impact measures based on partial and raw correlations that show the impact of each independent variable on the ESG measure.

To illustrate the interpretation of the results, consider the ITCV value for *ESG Government Rating* (−0.0394). This value implies that the correlations between *ESG Government Rating* and *underpricing* with the unobserved confounding variable each only need to be 0.1985 ($=\sqrt{0.0394}$) for the main result to be overturned. Because ESG is negatively related to underpricing, one of the two correlations would need to be negative, or else the confounding variable would strengthen the relation between ESG and underpricing.

To better understand this effect, we compare the ITCV for *ESG Government Rating* to the impact measures for the independent variables. The sign of the impact measures indicates how each control variable affects the coefficient on *ESG Government Rating*. We find that zero (four) of the measures based on partial (raw) correlations are larger than the ITCV for *ESG Government Rating*. The independent variable with the largest impact on the coefficient for *ESG Government Rating* is *country-level institutional quality* (0.0206). Therefore, we would need a confounding variable with a much stronger impact than *country-level institutional quality* to overturn our results. Inferences tend to be similar for the other ESG ratings.[14] These results, viewed together with the extensive set of control variables used in our models that are motivated by the IPO literature, provide confidence in the effect of ESG ratings on IPO underpricing.

4.3. ESG and financial disclosure

Dhaliwal et al. (2012) note that ESG disclosure complements financial disclosure. Specifically, they find that ESG disclosure improves analyst forecast accuracy by alleviating the negative effect of financial opacity. We measure financial disclosure for our sample using aggregate earnings management (Leuz et al., 2003), which is the average ranking of each sample country based on four indicators of earnings management activity. We follow Boulton et al. (2011) and construct each measure annually over our sample

[12] We use the CIA Factbook to identify countries that share a land border with each of our sample countries. Five sample countries are islands and do not share a land border with another country. In the analysis reported in Table 4, we instrument for these countries using the neighboring country deemed closest based on geographical distance and cultural similarity. Namely, we match as follows (sample country-assigned border country): Australia-New Zealand, Japan-South Korea, Philippines-Malaysia, New Zealand-Australia, and Singapore-Malaysia. In untabulated analysis, we confirm that the results are robust to the exclusion of IPOs that take place in these five countries.

[13] Representative papers that use ITCV analysis include Karampatsas et al. (2014) and Croci and Petmezas (2015).

[14] The exception is the ITCV for *Social RM*, which is smaller than the majority of the benchmark impact measures.

Table 4
Instrumental variable analysis.

	ESG government rating		Environmental RM		Social RM		Governance RM		Total RM	
	First-stage	Second-stage	First-stage	Second-stage	First-stage	Second-stage	First-stage	Second-stage	First-stage	Second-stage
ESG measure		−0.1134***		−0.3181***		−0.0911***		−0.1385***		−0.1568***
		(−5.65)		(−5.18)		(−4.33)		(−7.96)		(−7.48)
Border-country ESG	0.2340***		0.1068***		0.1944***		0.2300***		0.2332***	
	(34.49)		(10.82)		(24.19)		(27.56)		(34.43)	
Country-level institutional quality	0.1698***	−0.0125	−0.0662***	−0.0520***	0.0501***	−0.0326***	0.1268***	−0.0161**	0.0484***	−0.0247***
	(17.11)	(−1.50)	(−5.91)	(−6.90)	(3.75)	(−4.67)	(8.75)	(−2.13)	(5.11)	(−3.50)
Market integration	0.0328***	0.0023**	0.0199***	0.0042***	0.0440***	0.0030**	0.0498***	0.0059***	0.0409***	0.0053***
	(40.96)	(2.53)	(22.04)	(3.26)	(38.62)	(2.45)	(41.47)	(5.29)	(52.37)	(4.88)
Price stabilization	−10.0343***	−2.4275***	−9.1407***	−4.2130***	−12.2216***	−2.2776***	−11.7594***	−2.8630***	−11.0373***	−2.9848***
	(−26.52)	(−6.99)	(−21.52)	(−6.41)	(−23.65)	(−6.12)	(−20.98)	(−8.28)	(−30.28)	(−8.27)
IPO activity	−2.2806***	0.2428	−9.7592***	−2.6458***	−8.6263***	−0.3414	4.4296***	0.7927***	−2.1922***	−0.0924
	(−8.17)	(1.20)	(−31.07)	(−4.05)	(−22.30)	(−1.19)	(10.37)	(3.94)	(−7.95)	(−0.43)
Market return	−0.2034**	0.2432***	0.4910***	0.4065***	−0.7725***	0.1870***	−0.0919	0.2514***	−0.1035	0.2416***
	(−2.23)	(3.85)	(4.80)	(5.54)	(−6.17)	(2.84)	(−0.68)	(3.86)	(−1.17)	(3.80)
Stock market turnover	0.1038***	0.0293***	0.0957***	0.0546***	0.4126***	0.0558***	−0.3827***	−0.0327***	−0.0737***	0.0103
	(9.82)	(3.80)	(7.92)	(5.03)	(28.37)	(4.72)	(−24.28)	(−3.37)	(−7.17)	(1.40)
Offer size	−0.0300***	−0.0798***	0.0028	−0.0748***	−0.0678***	−0.0843***	−0.0990***	−0.0900***	−0.0688***	−0.0871***
	(−5.03)	(−19.34)	(0.41)	(−16.67)	(−8.30)	(−19.34)	(−11.16)	(−20.08)	(−11.93)	(−20.24)
Underwriter rank	0.0515***	0.0287***	0.0219***	0.0278***	0.0574***	0.0281***	0.0425***	0.0289***	0.0408***	0.0294***
	(14.00)	(10.10)	(5.34)	(9.31)	(11.33)	(9.43)	(7.79)	(10.42)	(11.50)	(10.63)
VC backed	0.0354**	0.0517***	0.0430**	0.0494***	0.1457***	0.0604***	−0.0601**	0.0422***	0.0089	0.0518***
	(1.98)	(4.12)	(2.18)	(3.69)	(5.88)	(4.44)	(−2.27)	(3.35)	(0.52)	(4.15)
Lockup length	0.0183***	−0.0067***	−0.0059	−0.0118***	−0.0018	−0.0081***	0.0606***	−0.0008	0.0316***	−0.0046*
	(5.28)	(−2.83)	(−1.51)	(−4.36)	(−0.38)	(−3.37)	(11.78)	(−0.31)	(9.41)	(−1.88)
Bookbuilt	0.1560***	0.0341**	−0.1892***	−0.0459**	0.1450***	0.0346**	0.2246***	0.0451***	0.1175***	0.0315**
	(7.68)	(2.44)	(−8.27)	(−2.23)	(5.22)	(2.45)	(7.45)	(3.10)	(5.99)	(2.24)
Firm commitment	−0.0608***	0.0575***	−0.3366***	−0.0279	−0.1858***	0.0519***	0.1208***	0.0764***	−0.0483**	0.0515***
	(−2.71)	(3.60)	(−13.83)	(−1.01)	(−6.00)	(3.00)	(3.66)	(4.94)	(−2.24)	(3.25)
Equity carveout	−0.0860***	0.0052	−0.0036	0.0141	−0.1255***	0.0026	−0.1343***	−0.0059	−0.1032***	−0.0020
	(−4.47)	(0.39)	(−0.17)	(0.99)	(−4.76)	(0.19)	(−4.69)	(−0.43)	(−5.56)	(−0.14)
High-tech firm	0.0979*	0.0789**	−0.0631	0.0541	0.3032***	0.0960**	0.0028	0.0725*	0.0580	0.0807**
	(1.84)	(2.14)	(−1.06)	(1.36)	(4.15)	(2.56)	(0.04)	(1.91)	(1.13)	(2.17)
Intercept	2.6323***	0.9323***	3.8476***	1.9392***	3.1099***	0.8484***	2.5355***	1.0011***	2.7350***	1.1133***
	(28.71)	(9.47)	(33.38)	(6.74)	(25.89)	(8.27)	(19.33)	(11.35)	(30.86)	(10.87)
Durbin χ^2	17.67		21.06		15.88		57.81		35.70	
Wu-Hausman *F*-statistic	17.63		21.03		15.84		58.01		35.71	
Anderson-Rubin *F*-statistic	27.99		31.7		12.91		55.64		50.07	
Crag-Donald Wald *F*-statistic	1189.43		117.12		585.32		759.56		1185.71	
Stock-Yogo critical value (10%)	16.38		16.38		16.38		16.38		16.38	
Observations	7113	7113	7113	7113	7113	7113	7113	7113	7113	7113
R-squared	0.732	0.128	0.498	−0.006	0.646	0.115	0.711	0.074	0.772	0.116

This table reports the results of two-stage least squares regressions that examine the relation between country-level ESG ratings and IPO underpricing. Border country ESG ratings are used as instruments for the ESG ratings of our sample countries. All other variables are defined in Appendix B. Regressions include unreported industry controls based on Dyck and Zingales (2004) and issue year fixed effects. The numbers in parentheses below each coefficient are heteroskedasticity-*robust t*-statistics. Respectively, ***, **, and * denote significance of the coefficient at the 1, 5, and 10% level.

Table 5
Impact Threshold for Confounding Variable (ITCV) analysis.

	ESG government rating		Environmental RM		Social RM		Governance RM		Total RM	
	Partial	Raw	Partial	Raw	Partial	Raw	Partial	Raw	Partial	Raw
ITCV	−0.0394		−0.0782		−0.0008		−0.0161		−0.0422	
Country-level institutional quality	−0.0206	−0.1344	0.0011	−0.0599	−0.0063	−0.0948	−0.0112	−0.1203	−0.0102	−0.1211
Market integration	−0.0137	−0.1300	−0.0065	−0.0744	−0.0148	−0.1123	−0.0142	−0.1298	−0.0165	−0.1354
Price stabilization	0.0174	0.2180	0.0139	0.0308	0.0142	0.0260	0.0134	0.0264	0.0180	0.0315
IPO activity	−0.0008	−0.0356	−0.0036	−0.0375	−0.0030	−0.0355	0.0014	−0.0217	−0.0010	−0.0323
Market return	0.0006	−0.0009	0.0058	0.0044	−0.0022	−0.0007	−0.0013	−0.0051	−0.0001	−0.0028
Stock market turnover	0.0040	−0.0549	0.0037	−0.0303	0.0117	−0.0239	−0.0082	−0.0765	−0.0013	−0.0651
Offer size	0.0018	0.0058	−0.0059	0.0131	0.0178	0.0096	0.0151	0.0129	0.0155	0.0142
Underwriter rank	0.0194	0.0006	0.0085	−0.0016	0.0170	0.0007	0.0111	−0.0012	0.0161	−0.0009
VC backed	0.0023	−0.0102	0.0005	−0.0114	0.0035	0.0010	−0.0005	−0.0194	0.0009	−0.0152
Lockup length	0.0002	−0.0075	0.0017	−0.0091	0.0013	−0.0065	−0.0021	−0.0075	−0.0007	−0.0088
Bookbuilt	0.0006	−0.0145	−0.0020	−0.0216	0.0007	−0.0114	0.0007	−0.0142	0.0002	−0.0172
Firm commitment	−0.0127	−0.0256	−0.0169	−0.0361	−0.0132	−0.0267	−0.0046	−0.0202	−0.0124	−0.0285
Equity carveout	−0.0016	0.0000	−0.0008	−0.0004	−0.0016	0.0004	−0.0026	0.0011	−0.0027	0.0008
High-tech firm	0.0003	0.0033	−0.0001	−0.0001	0.0009	0.0073	−0.0001	0.0001	0.0002	0.0021

This table reports Impact Threshold for Confounding Variable (ITCV) analysis for our sample. The first row reports the ITCV values for each ESG measure. These values indicate the minimum impact of a confounding variable that would be needed to render the coefficient statistically insignificant and is defined as the product of the correlation between the ESG measure and the confounding variable and the correlation between underpricing and the confounding variable. Beneath each ITCV value are impact measures based on partial and raw correlations that show the impact of each independent variable on the ESG measure.

period using accounting data from the prior five years. *Transparent financial disclosure* is an indicator variable that takes the value of one for IPOs issued in a country with an aggregate earnings management score in the bottom quartile within our sample, and zero otherwise. We introduce this variable to test the impact of financial disclosure on the relation between ESG and IPO underpricing. In addition, we interact this variable with each of the ESG measures to assess the impact of country-level ESG in countries with transparent financial disclosures. We report the results in Table 6.

As reported in prior tables, higher ESG Government Ratings are associated with lower underpricing. The negative coefficients on the interaction terms suggest that the impact of country-level ESG on underpricing is larger in countries with more transparent financial disclosures. Consider the results for *ESG Government Rating*, for example. The sum of *ESG Government Rating* and the interaction of *ESG Government Rating* and *transparent financial disclosure* represents the effect of the ESG Government Rating on underpricing in a country with an aggregate earnings management score that is in the bottom quartile. At the bottom of Table 6, we report that the sum of these coefficients is negative and statistically significant. More importantly, the magnitude is greater than the coefficient on *ESG Government Rating*, suggesting that the negative relation between *ESG Government Rating* and first-day returns is more pronounced in countries with more transparent financial disclosures.

In the remaining columns of Table 6, we report the results for the risk management pillars of the ESG Government Rating. The coefficients on the environmental, social, and total risk management pillars are negative and significant. The *F*-tests of the joint significance of the ESG ratings and their interactions with *transparent financial disclosure* confirm that the effects of environmental, social, and governance factors on first-day returns are both economically and statistically significant in countries with high disclosure requirements. Presumably, ESG information is more useful to IPO investors when accompanied by transparent financial disclosures.

4.4. ESG and liability standards

Liang and Renneboog (2017) find that firm-level ESG scores vary systematically by legal origin, with firms from civil law countries scoring significantly higher on various ESG dimensions than their common law peers. They attribute these differences, in part, to lower litigation risk in civil law countries. In Table 7, we consider whether litigation risk influences the association between ESG and underpricing. Our measure of litigation risk is from La Porta et al. (2006), who construct a liability standard index specific to security issuance. Namely, their liability standard index captures liability standards applied to issuers and directors, distributors, and accountants involved in drafting the prospectus for a security issue. We use their liability standard index to construct the variable *high liability standard* that takes a value of one for IPOs issued in a country with a liability standard index in the top quartile within our sample, and zero otherwise. In addition, we interact this variable with each of the ESG measures to assess the impact of country-level ESG in countries with high liability standards.[15]

Interestingly, when we control for liability standards in our regression model, the coefficients for the ESG measures are no longer significant. However, when we interact *high liability standard* with the ESG measures, we find that there is a strong negative relation between ESG ratings and first-day returns in countries with high liability standards. At the bottom of Table 7, we report that the sum of

[15] Because La Porta et al. (2006) do not report the liability standard index for China, we exclude China from this analysis.

Table 6
ESG and financial disclosures.

	ESG government rating	Environmental RM	Social RM	Governance RM	Total RM
ESG measure	−0.0568***	−0.0376***	−0.1099***	0.0007	−0.0318**
	(−3.03)	(−2.75)	(−5.92)	(0.07)	(−2.13)
ESG measure × Transparent financial disclosure	−0.1008***	−0.0015	−0.0143	−0.0502***	−0.0634**
	(−2.67)	(−0.09)	(−0.41)	(−2.76)	(−2.22)
Transparent financial disclosure	0.7321***	−0.0015	0.0911	0.3630**	0.4470**
	(2.58)	(−0.01)	(0.30)	(2.56)	(2.11)
Country-level institutional quality	0.0010	−0.0006	−0.0005	−0.0083	−0.0078
	(0.04)	(−0.02)	(−0.02)	(−0.32)	(−0.30)
Market integration	0.0035	−0.0003	0.0074***	0.0015	0.0030
	(1.62)	(−0.14)	(3.01)	(0.69)	(1.39)
Price stabilization	−1.3501	−0.8753	−1.3569	−0.5413	−0.9760
	(−1.46)	(−1.04)	(−1.29)	(−0.61)	(−1.09)
IPO activity	−0.8434***	−0.8481***	−1.0378***	−0.7020***	−0.6863***
	(−3.55)	(−3.49)	(−4.31)	(−2.88)	(−2.89)
Market return	0.3405***	0.3351***	0.3486***	0.3439***	0.3493***
	(5.51)	(5.42)	(5.65)	(5.55)	(5.64)
Stock market turnover	−0.0346***	−0.0225**	−0.0278***	−0.0388***	−0.0401***
	(−3.47)	(−2.21)	(−2.80)	(−3.70)	(−3.92)
Offer size	−0.0660***	−0.0657***	−0.0659***	−0.0650***	−0.0654***
	(−15.06)	(−15.00)	(−15.06)	(−14.85)	(−14.93)
Underwriter rank	0.0120***	0.0118***	0.0118***	0.0113***	0.0116***
	(4.57)	(4.49)	(4.50)	(4.32)	(4.43)
VC backed	−0.0201	−0.0182	−0.0187	−0.0193	−0.0194
	(−1.61)	(−1.45)	(−1.49)	(−1.54)	(−1.55)
Lockup length	−0.0108***	−0.0110***	−0.0108***	−0.0105***	−0.0105***
	(−4.34)	(−4.44)	(−4.38)	(−4.23)	(−4.22)
Bookbuilt	−0.0069	−0.0096	−0.0073	−0.0087	−0.0098
	(−0.47)	(−0.65)	(−0.49)	(−0.58)	(−0.66)
Firm commitment	−0.0098	−0.0058	−0.0116	−0.0072	−0.0080
	(−0.60)	(−0.35)	(−0.71)	(−0.44)	(−0.49)
Equity carveout	0.0173	0.0197	0.0191	0.0175	0.0172
	(1.35)	(1.53)	(1.49)	(1.36)	(1.34)
High-tech firm	0.0667*	0.0678*	0.0697**	0.0672*	0.0668*
	(1.88)	(1.91)	(1.97)	(1.89)	(1.89)
Intercept	0.6112***	0.6975***	0.8199***	0.3633**	0.4923***
	(3.44)	(3.96)	(4.11)	(2.29)	(2.91)
var(c.country)	0.0313	0.0247	0.0438	0.0308	0.0303
	(3.18)	(3.16)	(3.26)	(3.12)	(3.17)
var(e.ir)	0.1388	0.1391	0.1382	0.1389	0.1388
	(59.36)	(59.36)	(59.36)	(59.35)	(59.36)
ESG measure + (ESG measure × Transparent financial disclosure)	−0.1576***	−0.0392**	−0.1242***	−0.0495***	−0.0952***
	(−4.08)	(−1.99)	(−3.55)	(−3.38)	(−3.75)
Observations	7113	7113	7113	7113	7113
Number of groups	36	36	36	36	36

This table reports the results of HLM regressions that examine the relation between country-level ESG ratings and IPO underpricing. The dependent variable is the IPO underpricing, which is calculated as the difference between the first-day secondary market closing price and the IPO offer price, divided by the IPO offer price. Transparent financial disclosure is an indicator variable set equal to one for IPOs issued in a country with an aggregate earnings management score that is in the bottom quartile within the IPO sample, and zero otherwise. The aggregate earnings management score is constructed as detailed in Leuz et al. (2003). All other variables are defined in Appendix B. Regressions include unreported industry controls based on Dyck and Zingales (2004) and issue year fixed effects. The numbers between parentheses below each coefficient are the *z*-statistics. *Var(c.country)* is the variance between countries, and *var(e.ir)* is the variance between individual IPOs. Respectively, ***, **, and * denote significance of the coefficient at the 1, 5, and 10% level.

the coefficients on the ESG measures and their interaction with *high liability standard* is negative and statistically significant for all but the *Environmental RM* measure. Thus, our results suggest that countries with high liability standards drive the negative relation between ESG ratings and underpricing.

4.5. ESG and shareholder rights

Liang and Renneboog (2017) also posit that regulations related to stakeholder welfare help explain why firm-level ESG scores vary systematically by legal origin. For example, common law countries are generally more shareholder-centric, while civil law countries are more stakeholder oriented. In Table 8, we consider whether shareholder protection influences the association between ESG and

Table 7
ESG and liability standards.

	ESG government rating	Environmental RM	Social RM	Governance RM	Total RM
ESG measure	−0.0232	−0.0009	−0.0067	−0.0020	−0.0061
	(−0.81)	(−0.04)	(−0.20)	(−0.12)	(−0.24)
ESG measure × High liability standards	−0.0187	−0.0187	−0.0348	−0.0201	−0.0346
	(−0.58)	(−0.72)	(−1.00)	(−1.14)	(−1.26)
High liability standards	0.2016	0.1897	0.3513	0.2292	0.3219
	(0.89)	(1.11)	(1.23)	(1.63)	(1.59)
Country-level institutional quality	−0.0082	−0.0134	−0.0134	−0.0169	−0.0173
	(−0.30)	(−0.51)	(−0.46)	(−0.61)	(−0.62)
Market integration	0.0038*	0.0022	0.0046**	0.0038*	0.0040*
	(1.84)	(1.15)	(1.99)	(1.80)	(1.91)
Price stabilization	−0.5664	−0.3872	−0.4587	−0.3332	−0.4704
	(−0.70)	(−0.48)	(−0.53)	(−0.41)	(−0.57)
IPO activity	−0.1622	−0.0869	−0.0896	−0.0048	−0.0624
	(−0.30)	(−0.16)	(−0.17)	(−0.01)	(−0.12)
Market return	0.4919***	0.4903***	0.4922***	0.4978***	0.5000***
	(6.04)	(6.02)	(6.05)	(6.10)	(6.13)
Stock market turnover	−0.0072	−0.0031	−0.0067	−0.0155	−0.0139
	(−0.36)	(−0.15)	(−0.33)	(−0.76)	(−0.69)
Offer size	−0.0665***	−0.0664***	−0.0659***	−0.0658***	−0.0659***
	(−13.51)	(−13.53)	(−13.39)	(−13.37)	(−13.39)
Underwriter rank	0.0113***	0.0110***	0.0109***	0.0110***	0.0110***
	(3.62)	(3.53)	(3.52)	(3.53)	(3.54)
VC backed	0.0214	0.0217	0.0214	0.0220	0.0222
	(1.23)	(1.25)	(1.23)	(1.27)	(1.28)
Lockup length	−0.0057**	−0.0057**	−0.0057**	−0.0054*	−0.0055*
	(−2.03)	(−2.03)	(−2.04)	(−1.91)	(−1.94)
Bookbuilt	0.0314*	0.0303*	0.0306*	0.0297*	0.0292*
	(1.94)	(1.87)	(1.89)	(1.83)	(1.80)
Firm commitment	−0.0092	−0.0082	−0.0116	−0.0086	−0.0094
	(−0.54)	(−0.48)	(−0.67)	(−0.50)	(−0.55)
Equity carveout	0.0350**	0.0373**	0.0362**	0.0342**	0.0343**
	(2.29)	(2.45)	(2.37)	(2.24)	(2.24)
High-tech firm	0.1224***	0.1234***	0.1252***	0.1223***	0.1226***
	(2.85)	(2.88)	(2.92)	(2.85)	(2.86)
Intercept	0.0731	0.0238	−0.0868	−0.0657	−0.0496
	(0.32)	(0.10)	(−0.31)	(−0.36)	(−0.22)
var(c.country)	0.0207	0.0200	0.0255	0.0224	0.0226
	(2.92)	(2.93)	(2.72)	(2.87)	(2.86)
var(e.ir)	0.1477	0.1478	0.1475	0.1476	0.1475
	(51.53)	(51.52)	(51.49)	(51.51)	(51.51)
ESG measure + (ESG measure × High liability standards)	−0.0420**	−0.0197	−0.0416**	−0.0220**	−0.0407***
	(−1.97)	(−1.25)	(−2.16)	(−2.37)	(−2.66)
Observations	5371	5371	5371	5371	5371
Number of groups	35	35	35	35	35

This table reports the results of HLM regressions that examine the relation between country-level ESG ratings and IPO underpricing. The dependent variable is the IPO underpricing, which is calculated as the difference between the first-day secondary market closing price and the IPO offer price, divided by the IPO offer price. High liability standards is an indicator variable set equal to one for IPOs issued in a country with a liability standard index in the top quartile within the IPO sample, and zero otherwise. The liability standard index is reported in La Porta et al. (2006). All other variables are defined in Appendix B. Regressions include unreported industry controls based on Dyck and Zingales (2004) and issue year fixed effects. The numbers between parentheses below each coefficient are the *z*-statistics. *Var(c.country)* is the variance between countries, and *var(e.ir)* is the variance between individual IPOs. Respectively, ***, **, and * denote significance of the coefficient at the 1, 5, and 10% level.

underpricing. Our measure of shareholder protection is the anti-director rights index reported by Djankov et al. (2008). We use their anti-director rights index to construct the variable *strong shareholder rights* that takes a value of one for IPOs issued in a country with an anti-director rights index in the top quartile within our sample, and zero otherwise. In addition, we interact this variable with each of the ESG measures to assess the impact of country-level ESG in countries with strong shareholder rights.

When we control for shareholder rights in our model, we continue to find evidence of a negative relation between ESG ratings and underpricing. Specifically, coefficients for four of the five measures are negative and significant. The negative coefficient on four out of five interaction terms suggest that the negative relation between ESG and first-day returns is more pronounced in countries with strong shareholder rights. At the bottom of Table 8, we report that the sum of the coefficients on the ESG measures and their interaction with *strong shareholder rights* are of greater magnitude and statistical significance than the ESG measure alone. This is true for all ESG measures except *Environmental RM*. Thus, while higher ESG ratings are associated with lower first-day returns, we find that this is

Table 8
ESG and shareholder rights.

	ESG government rating	Environmental RM	Social RM	Governance RM	Total RM
ESG measure	−0.0619***	−0.0400***	−0.1084***	−0.0114	−0.0411***
	(−2.72)	(−2.80)	(−4.58)	(−1.34)	(−2.73)
ESG measure × Strong shareholder rights	−0.0253	0.0058	−0.0189	−0.0151	−0.0240
	(−0.79)	(0.24)	(−0.63)	(−1.00)	(−1.02)
Strong shareholder rights	0.0264	−0.1043	−0.0872	0.0213	0.0600
	(0.12)	(−0.64)	(−0.34)	(0.16)	(0.34)
Country-level institutional quality	0.0273	0.0122	0.0318	0.0118	0.0110
	(0.89)	(0.44)	(0.93)	(0.39)	(0.37)
Market integration	0.0031	−0.0005	0.0068***	0.0021	0.0030
	(1.45)	(−0.26)	(2.82)	(0.94)	(1.40)
Price stabilization	−0.7897	−0.7023	−0.8878	−0.2765	−0.6455
	(−0.86)	(−0.80)	(−0.86)	(−0.30)	(−0.71)
IPO activity	−0.7749***	−0.8438***	−1.0307***	−0.6433***	−0.6688***
	(−3.22)	(−3.47)	(−4.30)	(−2.59)	(−2.75)
Market return	0.3415***	0.3362***	0.3519***	0.3432***	0.3500***
	(5.53)	(5.44)	(5.70)	(5.54)	(5.65)
Stock market turnover	−0.0334***	−0.0227**	−0.0288***	−0.0348***	−0.0367***
	(−3.33)	(−2.23)	(−2.91)	(−3.25)	(−3.56)
Offer size	−0.0652***	−0.0656***	−0.0656***	−0.0645***	−0.0649***
	(−14.86)	(−14.97)	(−14.99)	(−14.68)	(−14.77)
Underwriter rank	0.0121***	0.0117***	0.0118***	0.0117***	0.0119***
	(4.62)	(4.46)	(4.52)	(4.47)	(4.53)
VC backed	−0.0198	−0.0185	−0.0189	−0.0199	−0.0195
	(−1.58)	(−1.48)	(−1.51)	(−1.59)	(−1.55)
Lockup length	−0.0106***	−0.0110***	−0.0108***	−0.0102***	−0.0103***
	(−4.26)	(−4.42)	(−4.35)	(−4.11)	(−4.13)
Bookbuilt	−0.0081	−0.0093	−0.0063	−0.0095	−0.0100
	(−0.54)	(−0.62)	(−0.42)	(−0.64)	(−0.67)
Firm commitment	−0.0047	−0.0055	−0.0105	−0.0043	−0.0047
	(−0.29)	(−0.34)	(−0.65)	(−0.26)	(−0.29)
Equity carveout	0.0165	0.0198	0.0185	0.0175	0.0165
	(1.28)	(1.54)	(1.44)	(1.36)	(1.28)
High-tech firm	0.0675*	0.0681*	0.0709**	0.0685*	0.0677*
	(1.90)	(1.92)	(2.00)	(1.93)	(1.91)
Intercept	0.6871***	0.7421***	0.9001***	0.4120**	0.5624***
	(3.33)	(4.01)	(3.86)	(2.45)	(3.10)
var(c.country)	0.0302	0.0256	0.0407	0.0323	0.0306
	(3.13)	(3.07)	(3.27)	(3.09)	(3.14)
var(e.ir)	0.1389	0.1391	0.1382	0.1391	0.1389
	(59.36)	(59.36)	(59.37)	(59.35)	(59.36)
ESG measure + (ESG measure × Strong shareholder rights)	−0.0872***	−0.0342	−0.1273***	−0.0264*	−0.0651***
	(−3.26)	(−1.49)	(−5.43)	(−1.93)	(−3.06)
Observations	7113	7113	7113	7113	7113
Number of groups	36	36	36	36	36

This table reports the results of HLM regressions that examine the relation between country-level ESG ratings and IPO underpricing. The dependent variable is the IPO underpricing, which is calculated as the difference between the first-day secondary market closing price and the IPO offer price, divided by the IPO offer price. Strong shareholder rights is an indicator variable set equal to one for IPOs issued in a country with an anti-director rights index in the top quartile within the IPO sample, and zero otherwise. The anti-director rights index is reported in La Porta et al. (2006). All other variables are defined in Appendix B. Regressions include unreported industry controls based on Dyck and Zingales (2004) and issue year fixed effects. The numbers between parentheses below each coefficient are the *z*-statistics. *Var(c.country)* is the variance between countries, and *var(e.ir)* is the variance between individual IPOs. Respectively, ***, **, and * denote significance of the coefficient at the 1, 5, and 10% level.

particularly the case when accompanied by stronger shareholder protections.

4.6. Robustness – Exclude outlier countries

To rule out the possibility that individual countries with large numbers of IPOs or extreme levels of underpricing drive our results, in Table 9, we report the results of tests after we exclude select countries from our sample. In the first row of results, we report coefficients and *z*-statistics for the ESG measures after we exclude China. We choose China because nearly one-fourth of our sample IPOs are from companies located in China. The middle rows of results verify that our results are robust to the exclusion of Japan, which has the highest average underpricing of any country in our sample, and the large and liquid U.S. market, which has the second highest number of IPOs in our sample. When we exclude China, Japan, and the U.S., we continue to report a negative and significant relation

Table 9
Exclude China, Japan, and United States.

	ESG government rating	Environmental RM	Social RM	Governance RM	Total RM
			Exclude China		
ESG measure	−0.0322*	−0.0171	−0.0300*	−0.0171**	−0.0321**
	(−1.73)	(−1.19)	(−1.66)	(−2.04)	(−2.30)
Exclude Japan					
ESG measure	−0.0621***	−0.0265**	−0.0997***	−0.0181**	−0.0485***
	(−3.78)	(−2.15)	(−6.25)	(−2.57)	(−3.98)
Exclude U.S.					
ESG measure	−0.0542***	−0.0494***	−0.1044***	−0.0030	−0.0408**
	(−2.76)	(−3.56)	(−5.61)	(−0.32)	(−2.51)
Exclude China, Japan, & U.S.					
ESG measure	−0.0310*	−0.0192	−0.0327**	−0.0159*	−0.0339**
	(−1.87)	(−1.40)	(−2.03)	(−1.72)	(−2.28)

This table reports the results of HLM regressions that examine the relation between country-level ESG ratings and IPO underpricing. The dependent variable is the IPO underpricing, which is calculated as the difference between the first-day secondary market closing price and the IPO offer price, divided by the IPO offer price. The first three rows report the results excluding IPOs listed in China, Japan, and the U.S., respectively. The last row reports the results excluding IPOs listed in all three countries. The coefficients on the control variables are suppressed for brevity. Regressions include unreported industry controls based on Dyck and Zingales (2004) and issue year fixed effects. The numbers between parentheses below each coefficient are the *z*-statistics. *Var(c.country)* is the variance between countries, and *var(e.ir)* is the variance between individual IPOs. Respectively, ***, **, and * denote significance of the coefficient at the 1, 5, and 10% level.

between ESG and underpricing. We suppress the control variables for brevity but find that they are consistent with our full sample results.

5. Conclusion

Interest in the environmental, social, and governance (ESG) risks that firms face and their strategies for managing such risks has amplified in recent years. This interest has many seeking greater ESG disclosure, which has the potential to lower information asymmetry (e.g., El Ghoul et al., 2011; Lopez-de-Silanes et al., 2019). In addition, ESG has captured the attention of investors, resulting in trillions of dollars in ESG-focused investment strategies (US SIF Foundation, 2018).

We posit a relation between MSCI's ESG Government Ratings and IPO underpricing. However, the direction of the relation is uncertain. If ESG ratings are associated with lower information asymmetry (El Ghoul et al., 2011; Lopez-de-Silanes et al., 2019), IPO underpricing should be lower for firms listed in countries with higher ESG ratings. On the other hand, if higher ESG ratings attract investor attention, underpricing should be greater for IPOs in countries with higher ESG ratings (Da et al., 2011; Liu et al., 2014). We test these hypotheses using a sample of 7446 IPOs issued in 36 countries from 2008 to 2018. Consistent with the notion that higher ESG ratings are associated with lower information asymmetry, we report a negative relation between the ESG Government Rating and IPO underpricing. The negative relation is also evident for the environmental, social, and governance pillars of the ESG Government Rating. Instrumental variable analysis and Impact Threshold for a Confounding Variable analysis provide additional support for the notion that ESG ratings are related to firm-level IPO underpricing. We also find that the relation between ESG ratings and underpricing is magnified by transparent financial disclosures, high liability standards, and strong shareholder protections.

Our findings have important policy implications. In 2005, the United Nations invited experts from the investment industry, intergovernmental organizations, and civil society to develop the Principles of Responsible Investment, which defines responsible investment as strategies and practices that incorporate ESG risk factors in investment decisions and active ownership.[16] Our study joins a growing body of literature that highlights the importance of this initiative to the sustainable growth of capital markets and value creation for companies and investors. We show that by effectively managing its ESG resources, a country not only serves a social purpose but also reduces the information asymmetry and uncertainty associated with its capital markets.

Acknowledgments

Research funding was provided by the Lindmor Professorship (Boulton). We acknowledge financial support for this paper from Mesirow Financial Corporation. All errors are our own. This is for educational use only and is not a recommendation. The ESG data contained herein is the property of MSCI ESG Research LLC (ESG). ESG, its affiliates and information providers make no warranties with respect to any such data. The ESG data contained herein is used under license and may not be further used, distributed or disseminated without the express written consent of MSCI. The world map was created using mapchart.net.

[16] https://www.unpri.org/pri/about-the-pri

Fig. A.1
MSCI Government Risk and Sub-Risk Factors.

Pillar	Risk factor	Risk exposure sub-factor	Risk management sub-factor
Environmental (25%)	Natural Resource (18%)	Energy Security (6%)	Energy Resource Management (6%)
		Productive Land and Mineral Resources (6%)	Resource Conservation (6%)
		Water Resources (6%)	Water Resource Management (6%)
	Environmental Externalities and Vulnerability (7%)	Vulnerability to Environmental Events (3%)	Environmental Performance (3%)
		Environmental Externalities (4%)	Management of Environmental Externalities (4%)
Social (25%)	Human Capital (15%)	Basic Human Capital (5%)	Basic Needs (5%)
		Higher Education and Technological Readiness (6%)	Human Capital Performance (3%)
			Human Capital Infrastructure (3%)
		Knowledge Capital (4%)	Knowledge Capital Management (4%)
	Economic Environment (10%)	Economic Environment (10%)	Wellness (10%)
Governance (50%)	Financial Governance (20%)	Financial Capital and Trade Vulnerability (20%)	Financial Management (20%)
	Political Governance (30%)	Institutions (10%)	Political Rights and Civil Liberties (10%)
		Judicial and Penal System (10%)	Stability and Peace (10%)
		Governance Effectiveness (10%)	Corruption Control (10%)

This figure presents between parentheses the weights of the MSCI ESG Government Ratings' pillars, risk factors, and sub-factors. Source: MSCI ESG Government Ratings Methodology (February 2019).

Appendix A. MSCI's country-level ESG measures

MSCI ESG Research ("MSCI") uses an intense process in the construction of its ESG Government Ratings.[17] MSCI starts by defining environmental, social, and governance issues as the underlying pillars for its ratings, which are intended to be global benchmarks for a country's attractiveness as an investment destination. For each of these pillars, MSCI defines two risk factors that impact the long-term competitiveness and sustainability of that country's economy. These risk factors are natural resource and environmental externalities and vulnerability for the environmental pillar, human capital and economic environment for the social pillar, and financial governance and political governance for the governance pillar.

As Fig. A.1 shows, MSCI defines two different groups with a total of 27 sub-factors for these six risk factors. One group measures the country's natural, human resources, and financial / political exposures, and the other group measures how efficiently and effectively a country manages these exposures. We find energy security as a sub-factor in the exposure group and resource conservation as a sub-factor in the management group associated with the natural resource risk factor, for example. Vulnerability to environmental events is a sub-factor in the exposure group, and environmental performance is a sub-factor in the management group associated with environmental externalities and vulnerability. Basic human capital is in the exposure group, and basic needs are in the management group associated with human capital. Economic environment is in the exposure group, and wellness is in the management group associated with economic environment. Financial capital is in the exposure group, and financial management is in the management group associated with financial governance. And judicial and penal system is in the exposure group, and corruption control is in the management group associated with political governance. To calculate the 27 sub-factor scores, MSCI uses 99 different data points (i.e., indicators) for each country. For example, MSCI uses data on fossil- and nuclear-fuel reserves and energy imports to calculate the energy security score. Particulate matter concentrations, adult literacy, ease of doing business, rule of law, ability to enforce contracts, corruption, current account balance, property rights, civil liberties, and youth unemployment are other examples of indicators used to measure the other sub-factors.

MSCI assigns a weight of 50% to the governance pillar because countries with more robust financial and political governances can invest more and better in programs intended to manage environmental and social risks. However, the governance pillar does not entirely account for the ESG factors that affect a country's long-term sustainability goals. Therefore, MSCI assigns weights of 25% to the environmental and social pillars. Factor and sub-factor weights are determined after assessing their impact on competitiveness and sustainability. Factors that have a more significant impact are given a higher weight. In Fig. A.1, we report the weights assigned to each factor and sub-factor. For example, MSCI assigns a weight of 18% to natural resource risk and 6% to each of its three risk sub-factors. Most risk exposure sub-factors have a corresponding risk management sub-factor with the same weight. But the 6% weight assigned to the higher education and technological readiness exposure sub-factor is associated with a 3% weight assigned to the management of human capital performance and a 3% weight assigned to the management of human capital infrastructure.

To determine its ESG Government Ratings, MSCI first converts each of the 99 data point values into country-level scores between 0 and 10. For risk exposure data points, a score of 0 corresponds to the lowest risk exposure, whereas a score of 10 corresponds to the highest risk exposure. For risk management data points, a score of 0 corresponds to the worst risk management, whereas a score of 10 corresponds to the best risk management. Second, the arithmetic average of the data point scores is calculated to determine each sub-factor score. Third, each risk factor management or exposure score is calculated as the weighted average of the respective sub-factor scores. Fourth, each pillar management or exposure score is calculated as the weighted average of the respective risk factor scores.

[17] For a complete explanation, please see the MSCI ESG Government Ratings Methodology (February 2019).

Fifth, the weighted averages of the environmental, social, and governance scores are calculated to determine the ESG risk management and the ESG risk exposure scores separately. Finally, the overall ESG Government Score of country j in year t is constrained as described below since a country with poor risk management cannot effectively make use of its resources even when those resources are abundant:

$$ESG\ Government\ Score_{jt} = Min\left\{\begin{array}{c}\left(ESG\ Risk\ Management\ Score_{jt}+1\right),\\ Average\left(10-ESG\ Risk\ Exposure\ Score_{jt}, ESG\ Risk\ Management\ Score_{jt}\right)\end{array}\right\} \quad (4)$$

To determine the ESG Government Rating thresholds, MSCI calculates the arithmetic average and the standard deviation of each year's country-level scores. The lowest AAA rating's score is set as the average score for the year plus two standard deviations. The highest CCC rating's score is set as the average score for the year minus two standard deviations. The thresholds for AA, A, BBB, BB, and B ratings are determined by linear interpolation.

While there is a considerable number of firm-level ESG ratings, the number of comparable country-level ratings is significantly smaller. MSCI is a leading agency in that field, having annually assessed the long-term sustainability of 198 countries since 2008. Its analysis includes many of the risk factors commonly examined by other agencies such as natural resources, human capital, and political governance. However, we find important differences among the rating agencies' methodologies and coverages. For example, RobecoSAM analyzes 40 indicators before aggregating them into 15 categories that lead to ESG scores for 150 countries. While the weights used in this process (20% to environmental, 30% to social, and 50% to governance risk factors) are similar to those used by MSCI, the number of indicators is clearly more limited.[18] Sustainalytics provides risk ratings for 170 countries that incorporate more than 30 indicators into a national wealth component and a management component, resulting in five hierarchical categories that classify ESG risks from negligible to severe.[19] Institutional Shareholder Services (ISS) analyzes more than 100 indicators that include relatively unique topics such as euthanasia and whaling. Still, its twelve-point rating system (from poor (D-) to excellent (A+)) covers only 120 countries.[20]

Appendix B. Variable names and definitions

Dependent variable	
Underpricing	Difference between the first-day secondary market closing price (Datastream) and the IPO offer price, divided by the IPO offer price (SDC).
Main independent variables	
ESG Government Rating	Rating of a country's exposure to and management of environmental, social, and governance risk factors (MSCI).
Environmental RM	Rating of a country's management of environmental risk factors (MSCI).
Social RM	Rating of a country's management of social risk factors (MSCI).
Governance RM	Rating of a country's management of governance risk factors (MSCI).
Total RM	Rating of a country's management of environmental, social, and governance risk factors (MSCI).
Control variables	
Country-level institutional quality	The first principal component of the following country-level measures: anti-director rights (Djankov et al., 2008), creditor rights (La Porta et al., 1998; Allen et al., 2005), rule of law (Boulton et al., 2010), and indicator variables for English speaking countries (Stulz and Williamson, 2003) and countries with a common law legal origin (La Porta et al., 2008).
Market integration	The Economic Globalization Index reported by the KOF Swiss Economic Institute.
Price stabilization	Difference in the number of IPOs with initial returns between zero and 1% and the number of IPOs with initial returns between zero and negative 1%, divided by the total number of IPOs in each country.
IPO activity	Ratio of the total number of IPOs in the issue year divided by the number of publicly listed firms for the country and year of listing, as reported by the World Bank.
Market return	Return on the Datastream index for the country of listing over the three months preceding the offering.
Stock market turnover	Ratio of the total value of shares traded to aggregate market capitalization as reported annually by the World Bank.
Offer size	Inflation-adjusted offer value in millions of U.S. dollars. The log transformation of this measure is used in the multivariate analysis to alleviate skewness.
Underwriter rank	Average decile-reputation rank based on each IPO underwriter's market share during our sample period.
VC backed	Indicator variable set equal to one for IPOs that received venture capital funding, and zero otherwise.
Lockup length	Number of days between the IPO issue date and the first lockup expiration date. The log transformation of this measure is used in the multivariate analysis to alleviate skewness.
Bookbuilt	Indicator variable set equal to one for bookbuilt deals, and zero otherwise.
Firm commitment	Indicator variable set equal to one for firm commitment deals, and zero otherwise.
Equity carveout	Indicator variable set equal to one for equity carveout deals, and zero otherwise.
High-tech firm	Indicator variable set equal to one for firms in one of the high-tech industries identified by Ljungqvist and Wilhelm (2003), and zero otherwise.
Transparent financial disclosure	Indicator variable set equal to one for IPOs issued in a country with an aggregate earnings management score in the bottom quartile within our sample, and zero otherwise (Leuz et al., 2003).
High liability standards	Indicator variable set equal to one for IPOs issued in a country with a liability standard index in the top quartile within our sample, and zero otherwise (La Porta et al., 2006).

(*continued on next page*)

[18] https://www.robeco.com/uk/key-strengths/sustainable-investing/country-ranking/.
[19] https://www.sustainalytics.com/country-risk-rating/.
[20] https://www.issgovernance.com/esg/ratings/country-rating/.

(*continued*)

Strong shareholder rights	Indicator variable set equal to one for IPOs issued in a country with an anti-director rights index in the top quartile within our sample, and zero otherwise (Djankov et al., 2008).

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