Does Foreign Institutional Capital Promote Green Growth for Emerging Market Firms?*

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Abstract

We examine how foreign institutional capital affects carbon emissions in emerging-market firms. As shocks to foreign institutional capital, we consider firm-level inclusion in the MSCI Index as well as market-level inclusion of China A-Shares. After index inclusion, emissions grow at a faster rate than outputs, such that emission intensities increase at the expense of lower abatement expenditures. Emission intensities increase greater in countries with weaker environmental policies and with more foreign capital from green investors. In contrast, emission intensities tend not to increase in developed-market firms after index inclusion. Overall, results suggest that environmental considerations are assigned lower priority when emerging-market firms utilize foreign capital to boost growth.

JEL Classification: G15, G23, Q54

Keywords: Carbon emissions, climate risk, corporate social responsibility, ESG, international institutional investors, emerging markets, MSCI

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1. Introduction

Achieving net-zero carbon emissions has become a primary goal among global asset managers. Despite the sustained efforts of developed economies, net-zero would be extremely difficult to achieve without accompanying greenhouse gas (GHG) reductions in emerging economies, as emissions in emerging economies have exceeded those of developed economies.[1] Nevertheless, reliance on fossil fuels is viewed by many as an unavoidable cost to be paid to drive growth in emerging economies. In this paper, we examine whether global asset managers, most of whom are based in developed markets (DMs), help to reduce GHG emissions in emerging market (EM) firms while also facilitating their growth—that is, green growth for these EM companies.

Carbon emissions are a joint product of output, so firms are expected to produce emission when they grow—but then, by how much? We provide a simple conceptual framework in which to develop intuitions to answer this question. Within this framework, *emission intensity* (i.e., emissions per output) *should drop* as firms' outputs grow with foreign capital, given the same level of environmental awareness among investors. The intuition is that an influx of foreign investors cheapens the cost of capital, which in turn should make pollution relatively more expensive, so firms will actively undertake more extensive emission-abatement efforts. Instead, our empirical results show that emissions intensities increase with foreign capital, which strongly suggests that EM firms have reduced their emissions-abatement efforts.

Our results seem to run counter to the argument that foreign institutional investors should extend effective environmental, social, and governance (ESG) practices to international firms.[2]

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[1] As of 2019, China's GHG emissions alone, at 14 gigatons per year, surpassed the emissions of all developed countries combined (https://rhg.com/research/chinas-emissions-surpass-developed-countries/).
[2] Aggarwal et al. (2011), e.g., show that foreign institutional investors spread shareholder-centric governance practices to international firms. Dyck et al. (2019) document that institutional investors drive better environmental and social (ES) performance worldwide, without distinguishing ES performance in EM firms from that in DM firms. In their survey, Stroebel and Wurgler (2021) find that researchers and practitioners view pressure from institutional investors as the most powerful force for change in addressing climate change.

Nevertheless, foreign investors might not necessarily stimulate carbon emissions reduction in EM firms. First, foreign investors do not fully bear the local environmental externalities and thus are not incentivized to pressure management in local countries to invest in green corporate policies. Second, environmental regulations and social pressure may be weaker in EMs.[3] If the pressure on foreign investors to encourage "greenness" differs between EMs and DMs, their incentives to improve environmental performance in their portfolios may diverge in EMs. Third, foreign investors may choose to focus on financial performance in EMs, while compromising environmental performance, as EM stock returns can be higher. As shown in prior studies, ESG-friendly assets can underperform (e.g., Hong and Kacperczyk, 2009; Chava, 2014; Barber, Morse, and Yasuda, 2021; Liang, Sun, and Teo, 2022), an equilibrium outcome that reflects varying tastes for ESG investing (Pástor, Stambaugh, and Taylor, 2021). Institutional investors may opt to compensate for such compromised financial performance in DM investments with high-return EM investments. Thus, to the extent that foreign investors have diverging incentives to invest in DM and EM firms, the relationship between foreign investment and carbon emissions in DM firms does not necessarily extend to EM firms.

To examine whether foreign investors drive green growth (or the lack thereof), we focus on index inclusions in the Morgan Stanley Capital International (MSCI) Emerging Markets (EM) Index as an exogenous driver of foreign capital. Our first identification setting uses firm-level inclusion in the MSCI EM Index, in line with an approach adopted in previous studies (Aggarwal, Erel, Ferreira, and Matos, 2011; Bena, Ferreira, Matos, and Pires, 2017; Dyck, Lins, Roth, and Wagner, 2019; Kacperczyk, Sundaresan, and Wang, 2021). We corroborate the first identification setting and address firm-level omitted variable issues with a second setting that exploits market-level inclusions of China A shares in the MSCI EM Index. In 2018 and 2019, for the first time, Chinese large- and mid-cap A

[3] As Matos (2020) notes, "[d]ifferent regions around the world are proceeding at different speeds on ESG regulation (p. 11)," with the European Union setting a particularly aggressive agenda compared with the rest of the world.

shares were added *en masse* to the index. This event was not driven by unobservable factors involving any individual firm, enabling us to examine the impact of an exogenous influx of foreign capital on carbon emissions.

These MSCI index inclusions provide us with a nice laboratory in which to study green growth. Given the sheer volume of investor money that follows the MSCI EM Index (equivalent to US$1.6 trillion as of 2017), the influx of foreign capital into an EM would provide newly indexed firms with expansion opportunities by reducing the cost of capital. At the same time, many global asset managers are subject to investor scrutiny and proactively assess climate risks in their portfolios (e.g., Krueger, Sautner, and Starks, 2020 and Atta-Darkua, Glossner, Krueger, and Matos, 2023). Thus, an influx of foreign capital into EM firms may not only reduce the cost of capital for portfolio firms but also reshape their ESG practices.

Using MSCI inclusions for the period running from 2003 through 2020, we first examine the extent to which foreign capital entry increases output and emissions in EM firms. We employ portfolio holdings data for global equity mutual funds provided by Morningstar and firm-level GHG emission data from Trucost.[4, 5] We confirm that emerging market firms' inclusion in the MSCI Index leads to a substantial immediate increase of 2.3 percentage points in foreign mutual fund shareholdings, which should provide these firms with expansion opportunities, with significant increases in assets and sales. We further document a corresponding increase in these firms' GHG emission levels, across both direct (Scope 1) and indirect (Scopes 2 and 3) measures, as production capacity expands.

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[4] In particular, by focusing on an objective, output-based measure of carbon emissions rather than a potentially subjective assessment of a firm's general environmentally relevant activities, we abstract from the ongoing debate over whether conventional ESG scores truly capture a firm's environmental performance in light of huge discrepancies in ESG scores computed by different rating agencies (e.g., Gibson, Krueger, and Schmidt, 2021; Avramov, Cheng, Lioui, and Tarelli, 2022; Berg, Kölbel, and Rigobon, 2022; Gibson, Glossner, Krueger, Matos, and Steffen, 2022; Kim and Yoon, 2022).

[5] Trucost is a widely accepted source of carbon emissions data used by both MSCI and Standard and Poor's (S&P) in their ESG index evaluation (Azar, Duro, Kadach, and Ormazabal, 2021).

As emissions can be viewed as a joint product of output, it might not be particularly surprising to find that emissions increase with output growth. We thus turn to our study's central question, guided by our conceptual framework: How does GHG emission intensity in EM firms change following MSCI index inclusion? We find that firms significantly increase their emission intensity, both directly and indirectly, with indirect measures of GHG emission intensity exhibiting particularly strong statistical significance. This result, according to the predictions of our framework, indicates that firms relax their abatement efforts, perhaps as a result of weaker pressure from shareholders to adopt greener business practices. This result also contrasts with the idea that foreign investors spread more effective environmental practices and thereby promote green growth.

These increases in emission intensity are particularly evident in manufacturing-heavy regions such as China and South and Southeast Asia when compared with other regions, including Europe, the Americas, and East Asia. In contrast to these results for EM firms, we find little evidence of increases in GHG emissions in DM firms following inclusion in the MSCI DM Index, except for some limited evidence of increases in indirect GHG emission intensity.[6] As further corroborating evidence for weaker abatement efforts in EM firms following MSCI Index inclusion, we find that such firms set less aggressive carbon emissions reduction targets and cut back on environmental expenditures. This result also suggests that rises in emission intensity reflect rollbacks in abatement efforts in response to reduced pressure from shareholders.

This drop in abatement efforts may stem from two sources. The first source is rather benign—foreign investors do not fully bear the local environmental costs of pollution and thus are not incentivized to pressure management to invest in green corporate policies. The second source involves the active "relocation of pollution" within their portfolios, from countries that apply stringent

[6] Throughout this paper, we refer to the MSCI World Index, which consists of DM markets only, to avoid confusion with the MSCI All-Country Weighted Index (ACWI), which includes both DM and EM markets.

environmental standards to those that apply weaker standards, which is essentially the "pollution-haven" hypothesis. If those foreign investors also try to maintain the outward appearance of environmental friendliness in their home countries, then shifting investments to pollution havens also amounts to "greenwashing." We find evidence supporting the occurrence of pollution relocation and greenwashing. Increases in emission intensity in index-included firms are more pronounced with environmentally friendly ("green") foreign funds that score highly on carbon-risk or portfolio environmental scores and with funds that originate from countries that apply stringent environmental policy standards. Correspondingly, increases in emission intensity are also most pronounced in EM firms operating in countries that feature weak environmental policy standards and high levels of GHG emissions per capita, in clear support of the pollution-haven hypothesis (Brunnermeier and Levinson, 2004; Copeland and Taylor, 2004; Gibson, 2019).

Such an incentive-driven pollution story raises a natural question: What would persuade these green funds to allow their EM portfolio firms to cut back on abatement, knowing that such cutbacks would cause the carbon and environmental scores of their portfolios to fall? Our analysis of MSCI-included firms reveals that EM firms' post-inclusion stock returns are substantially higher than those on DM firms. Thus, those green funds may be willing to sacrifice their portfolios' environmental performance to some degree to generate higher returns for their investors. As further evidence that our treated EM firms assign lower priority to environmental performance, we collect firm-level environmental violation news events from RepRisk and document significant increases in such events among our EM firms following index inclusion. In contrast, we find no increases in adverse environmental events among DM firms after MSCI inclusion.

Literature Review. We contribute to the literature in the following ways. First, we contribute to the rich literature that examines the relationship between financial development and economic growth (King and Levine, 1993; Jayaratne and Strahan, 1996; Demirgüç-Kunt, and Maksimovic, 1998;

Rajan and Zingales, 1998). Our contribution to this strand of the literature lies in documenting whether access to foreign investor financing acts as a catalyst not only for expansion but also for better corporate environmental performance. Our evidence suggests that, while there is significant growth in sales and profit margins, such expansion occurs at the expense of significantly higher direct and indirect GHG emission intensity, suggesting that the increased presence of foreign mutual fund investors is insufficient to promote green growth in EM firms.

Second, we contribute to the literature that studies the impact of institutional investor engagement on portfolio firms, particularly regarding ESG issues (e.g., Dimson, Karakaş, and Li, 2015; Iliev and Lowry, 2015; McCahery, Sautner, and Starks, 2016; Dyck, Lins, Roth, and Wagner, 2019; Kim, Wan, Wang, and Yang, 2019; Krueger, Sautner, and Starks, 2020; Azar, Duro, Kadach, and Ormazabal, 2021; Dimson, Karakaş, and Li, 2021; He, Kahraman, and Lowry, 2022; Atta-Darkua, Glossner, Krueger, and Matos, 2023). Our contribution to this line of the literature lies in revealing that institutional investors' presence may have a differential impact on their portfolio firms' environmental performance in EMs and DMs. By employing a plausibly exogenous shock to foreign investor holdings—the inclusion of China A-Shares in the MSCI EM Index—we reveal a causal link between higher shareholding by foreign institutional investors and their portfolio firms' carbon emissions in EMs. In so doing, we also contribute to the broader, blossoming literature on climate change and pollution risk (e.g., Andersson, Bolton, and Samama, 2016; Bansal, Ochoa, and Kiku, 2021; Bolton and Kacperczyk, 2021a; 2021b; Hsu, Li, and Tsou, 2022) by revealing that the role of institutional investors in reducing climate risk in portfolio firms may not be homogeneous across the world and that, in EMs, they may actually exacerbate these risks.

Finally, our paper is also related to the literature on investors' ESG preferences. While some studies find that investors do respond to sustainability profiles when they consider mutual funds (e.g., Hartzmark and Sussman, 2019), other studies reveal some noticeable differences in the degree to which investors prefer assets that exhibit strong ESG characteristics. Indeed, a number of recent papers theoretically explore the asset-pricing implications of ESG investors on the premise that heterogeneity in ESG preferences exists (e.g., Pástor, Stambaugh, and Taylor, 2021; Pedersen, Fitzgibbons, and Pomorski, 2021; Goldstein, Kopytov, Shen, and Xiang, 2022). Our empirical results reveal the possibility of "greenwashing" (e.g., Kim and Yoon, 2022), whereby the increased presence of investors with stronger ESG preferences ironically worsens GHG emission intensity among firms that operate in countries that feature poor environmental regulatory standards. In fact, our evidence appears largely consistent with the "outsourcing" of pollution standards, whereby investors from stringent regulatory environments accept higher GHG emissions by their portfolio firms in less stringent environments (e.g., Dai, Duan, Liang, and Ng, 2022). Thus, we find that investors' ESG preferences may not yield identical corporate GHG emissions outcomes across firms operating in dissimilar regulatory environments.

2. Conceptual Framework: Would Emissions Increase or Decrease as Firms Grow?

In this section, we provide a simple conceptual framework that we use to better understand the relationship between output growth and emissions. This framework formalizes the following arguments:

a. With a lower cost of capital, outputs will grow. However, emission intensity, calculated as emissions per output, should fall with the lower cost of capital, holding the level of environmental awareness (or the cost of pollution) constant.
b. Emission intensity is a decreasing function of abatement efforts. Thus, if emissions intensities increase, firms must have relaxed their abatement efforts.

c. There is no clear prediction regarding the volume of emissions. Emissions can either increase or decrease.

Emissions represent a joint output of production. The first step in our analysis is to illustrate how emissions can also be interpreted as a factor input instead of an output. Let us consider a firm that produces output using capital as the sole factor. That is, the production function is given by $F(K)$, where F satisfies decreasing returns to scale and is increasing with capital K. For illustrative purposes, we treat capital as the only factor but this setting could be easily extended to a multifactor case.

Production also generates GHG emissions. As emissions are undesirable, a firm can choose to exert effort to achieve abatement, which we refer to as θ. Abatement is costly and reduces production by $(1-\theta)$. Thus, the firm's final output is given as

$$X = (1-\theta)F(K). \tag{1}$$

The volume of emissions depends on the firm's abatement efforts. Specifically, the volume of emissions, z, is determined as follows:

$$z = \phi(\theta)F(K), \tag{2}$$

where ϕ is the technology function that transforms the firm's abatement efforts into emissions. We assume that $\phi(\theta)$ is decreasing with θ, with $\phi(0) = 1$, $\phi(1) = 0$, and $\phi''(\theta) > 0$ for all $\theta \in [0,1]$. One may interpret this outcome in the following way: The firm chooses "intermediate" output $F(K)$, a θ fraction of which is then used as input for abatement activities, with the remaining $1-\theta$ fraction becoming the final output.

Let us define emission intensity in this scenario as $e \equiv \frac{z}{X} = \frac{\phi(\theta)}{1-\theta}$. We first show that intensity monotonically decrease with the firm's abatement efforts:

Proposition 1. Emission intensity (e) decreases with the firm's abatement efforts (θ).

Proof. See the Appendix.

Now, let us show that emissions can be interpreted as a production factor instead of a joint output. From Eqs. (1) and (2), we can derive the following:

$$X = \left(1 - \phi^{-1}\left(\frac{z}{F(K)}\right)\right) F(K) \equiv g(z, F). \tag{3}$$

The firm's problem is now transformed into a conventional two-factor production problem with a constant return-to-scale production function. That is, even though GHG emissions are a by-product of production, Eq. (3) allows us to treat those emissions as though they constitute an input factor. This representation of production is handy as we can use the usual tools to solve the firm's cost-minimization problem, for example by using the isoquants and iso-cost lines.

We now show that the emissions-to-output ratio, $\frac{z}{F(K)}$, as well as emission intensity, $\frac{z}{X}$, increase with a lower cost of capital, which represents an exogenous influx of foreign capital. We then need to introduce the costs associated with both production factors. Let us denote r as the cost of capital (K) and τ as the dollar cost per unit volume of pollution (z). The latter may capture explicit emissions costs such as pollution taxes as well as implicit emissions costs associated with shareholder or external social pressure (Shapira and Zingales, 2017; Ramelli, Wagner, Zeckhauser, and Ziegler, 2021; Xu, 2022). The firm's optimization problem then becomes:

$$\max X - (\tau z + rK) \ \text{ s.t. } \ \tau z + rK = E, \tag{4}$$

where E is the firm's cost budget. As an interim step, we first prove that the marginal rate of technical substitution is a positive number:

Proposition 2. Whenever $\theta < 1$, the marginal rate of technical substitution $\frac{\partial X}{\partial K} \big/ \frac{\partial X}{\partial z} > 0$.

Proof. See the Appendix.

The optimality condition requires this marginal rate of technical substitution to equal the factor–price ratio:

$$\frac{\partial X}{\partial K}\Big/\frac{\partial X}{\partial z} = \frac{\phi(\theta)-(1-\theta)\phi\prime(\theta)}{F}\frac{dF}{dK} = \frac{r}{\tau}. \tag{5}$$

If we express this in the pollution-potential output (i.e., z-F) space, we have:

$$\frac{\partial X}{\partial F}\Big/\frac{\partial X}{\partial z} = \frac{\phi(\theta)-(1-\theta)\phi\prime(\theta)}{F} = \frac{r}{\tau}\left(\frac{dF}{dK}\right)^{-1}. \tag{6}$$

We now demonstrate the impact of a drop in the cost of capital (r). As is evident from Figure 1, this drives the optimal "input mix", $\frac{z}{F} = \phi(\theta)$, lower. This can occur only if the optimal abatement effort, θ, increases (as ϕ is decreasing with θ). In other words, when the firm's access to capital becomes cheaper, the firm will engage more proactively in abatement activities because emissions are now relatively more expensive than capital. Emission intensity, e, will also fall as a result because it is a decreasing function of θ. Note, however, that the level of emissions itself, i.e., z, can either increase or decrease, depending on the shape of the isoquant.

FIGURE 1 HERE

Emission intensity can increase within this framework only if the cost of pollution falls along with the cost of capital. This case is presented in Figure 2. If the influx of foreign institutional capital drives both the cost of pollution and the cost of capital down, it is then possible for emission intensity, e, to subsequently rise. This circumstance arises only when the firm optimally cuts back on its abatement effort, θ.

FIGURE 2 HERE

3. Data

In this section, we outline the data used in our empirical analysis. We begin with the data on MSCI global index constituents. We combine these data with data on GHG emissions from S&P

Global Trucost Environmental, global fund-holdings data from Morningstar, and international financial-statement data from Datastream Worldscope. In addition to the GHG emissions data, we collect data on adverse ESG-related events from RepRisk and shareholder voting agendas and mutual fund voting records from ISS Voting Analytics.

3.1. MSCI equity indices

MSCI's international equity indices are widely used by institutional investors, with assets under management by exchange-traded funds (ETFs) following MSCI's All-Country Weighted Index (ACWI), World, and Emerging Markets indices exceeding $170 billion dollars. MSCI classifies global stock markets into World (developed) Markets, Emerging Markets, and Frontier Markets, with countries not included in any of these indices comprising the Standalone Market. MSCI first defines its equity universe by identifying eligible securities listed on each country's stock market. Inclusion depends on a mechanical set of criteria, the details of which are illustrated in the Appendix. We classify firms as operating in DMs if they operate in countries constituting the MSCI World Index and in EMs if the countries are included in the MSCI EM Index.

3.2. GHG Emissions

Our data on GHG emissions are taken from S&P Global Trucost Environmental. The dataset measures the environmental impact of more than 15,000 firms globally, beginning in 2002. Trucost provides raw values of emissions or resources at the company level, using various definitions of firm-level impact. This has in recent years become a widely accepted source of a firm's GHG emissions, with both MSCI and S&P using these emissions data as inputs in their ESG score calculations.

The main variable used in this study is GHG emissions in metric tons of CO_2 equivalents, which is divided into three "scopes." Scope 1 measures GHG emissions from resources owned directly by emitting companies. Scope 2 measures emissions from resources that are owned by other companies but produced specifically for a focal company, mostly emissions released by energy providers to create electricity consumed by the company in its production process. Scope 3 includes all indirect activities to create products along the supply chain, including business travel by suppliers and product disposals. Using these three scopes, Trucost also calculates a firm's "direct" and "indirect" GHG emissions, in terms of both CO_2 emissions and in dollar terms representing the externality costs associated with the emissions. Thus, one major advantage of this dataset is that we can measure the full extent of the environmental impact of a firm's production process, not only of its own output but of outputs along the entire supply chain, allowing us to better discern the firm's role in the global effort to achieve net-zero carbon emissions.

3.3. Fund characteristics and holdings

We obtain data on holdings of open-end mutual funds and ETFs across the world from Morningstar. The dataset includes holdings information for over 93,000 funds domiciled in 73 countries between 2002 and 2020. In the dominant majority of cases, the number of shares of each security held by a fund is reported at either quarterly or monthly frequency, and we use the latest available (i.e., of the highest frequency) holdings information for each fund at every month-end, following Elton, Gruber, and Blake (2011).

We then supplement this information with information indicating fund characteristics from Morningstar Direct, including data on monthly returns and flows, assets under management, expenses, Morningstar category and ratings (in terms of both financial and sustainability performance), funds' sales region, passive fund indicator, and the sustainability characteristics of funds' portfolios. We exclude preferred and other non-common shares. We convert assets under management into U.S. dollars using month-end exchange rates reported in Datastream Worldscope. CINS (the CUSIP International Numbering System)–ISIN (International Securities Identification Numbers) matching data is from Bloomberg.

By summing the number of shares held at each month-end and by dividing this figure with the total number of shares outstanding of each security as reported in Datastream, we calculate the percentage of a firm's shares held by all mutual funds as well as shares held by funds that satisfy particular fund-characteristic criteria. For the purpose of classifying mutual funds into "foreign" and "domestic," we consider a fund's sales region as reported in Morningstar Direct. This is important, as many of the funds held in the European Union, for example, tend to be domiciled in Luxembourg to take advantage of "passporting" rights and are marketed across other countries in the European Union.

3.4. Firm-level information

Data on financial accounting and stock security information are collected from Datastream Worldscope. Following standard definitions in the literature, we use these data to compute financial variables such as market-to-book ratios. We collect data expressed in local currencies first and calculate percentage and percentage-growth variables to exclude any changes induced by changes in exchange rates. We then convert assets and sales figure into U.S. dollars to ensure full comparability between countries. We match this financial and stock information with S&P Trucost data, enabling us to examine the effects of foreign investor holdings on GHG emissions while controlling for an array of firm-level financial characteristics.

3.5. Information on negative ESG events

We obtain data on ESG risk incidents from RepRisk. The RepRisk dataset covers more than 210,000 firms beginning in January 2007. Every day, RepRisk screens more than 100,000 public sources in 23 languages for incidents that can involve reputational, compliance, or financial risk, using artificial intelligence (AI) and machine-learning techniques. This dataset allows us to examine the number of negative ESG incidents. We select firms that were included in the MSCI ACWI and control firms based on our matching process and map the risk-incident data with our main dataset.

3.6. Summary statistics

TABLE 1 HERE

We report summary statistics for EM firms in Table 1 and for DM firms in Table A.1. While most of the firm-level financial variables are similar across developed and emerging markets, we note a large discrepancy in the average level of GHG emissions between DM and EM firms.[7] For example, the mean value of direct GHG emissions among EM firms is 2.7 million tons of CO_2 equivalents, while the comparable figure for DM firms stands at 1.7 million tons, which is around 60% of EM firms' emissions. Both the EM and DM firms' average indirect GHG emissions are similar at around 0.8 to 0.9 million tons of CO_2 equivalents, respectively. Given that average corporate GHG emissions are substantially higher among EM firms, understanding the factors that drive overall GHG emissions in these firms is integral to global efforts to reduce climate risk.

FIGURE 3 HERE

Prior to examining the relationship between foreign institutional ownership and corporate GHG emissions in greater detail, we graphically illustrate their *prima facie* association in Figure 3. Specifically, we average firm-level foreign institutional ownership (using holdings information from the FactSet/Lionshare database) and direct GHG emissions for each country over our sample period. Panel A presents results that reveal the relationship in EMs, while Panel B results do so for DMs. Whereas there is little association between the two in DMs, with the fitted slope trending marginally downward, as illustrated in Panel B, we observe a more noticeable positive relationship between the two variables in EM countries in the results reported in Panel A. The graphical evidence presented in Figure 3 suggests that more robust foreign ownership may not have a homogeneous impact on the

[7] To capture the meaningful effects of index inclusion on GHG emissions, we take the contemporaneous datapoint if a firm was included in the index on or before June of a given year and the one-year-ahead datapoint if a firm was included on or after July of a given year.

environmental profiles of foreign owners' portfolio firms depending on the level of financial development where the firm operates.

4. Foreign Capital and GHG Emissions

In this section, we first outline our empirical strategy for MSCI Index inclusion as a plausibly exogenous driver of foreign investor capital influx. This influx of capital leads to sizable corporate expansion as well as corresponding increases in GHG emissions levels. We then pose the central research question of this paper, namely whether the emissions intensities of EM firms rise following index inclusion. We also provide results suggesting that such increases in emissions intensities are consistent with weaker abatement efforts on the part of EM firms.

4.1. Empirical strategy

Our key empirical analysis requires instances whereby an exogenous influx of foreign investors provides expansion opportunities for EM firms. We employ two types of MSCI index inclusions as such instances: inclusions of individual firms in the MSCI EM Index and market-wide inclusions of China-A shares in the Index.

Our first setting enables us to exploit inclusions of individual firms in the MSCI Index as a shock to foreign investor capital as in, for example, Aggarwal, Erel, Ferreira, and Matos (2011), Bena, Ferreira, Matos, and Pires (2017), and Dyck, Lins, Roth, and Wagner (2019). The Index is tracked by mutual funds around the world with total capital of approximately $170 billion dollars, and thus inclusion in this index will increase the presence of foreign investors that follow MSCI indices as their benchmark, thus enabling us to use these inclusions as exogenous shocks to influxes of foreign investor capital.

We corroborate our first identification setting with the second setting, which focuses on market-level inclusion, specifically inclusion of China A shares in the EM Index between May 2018 and November 2019, to further sharpen our identification strategy. The advantage of using market-level inclusions is that they are not likely to be driven by any unobservable firm-level characteristics. While firm-level stock inclusions have been widely used in the existing literature, these inclusions can be associated with time-varying firm-level omitted variables that might also drive firms' emissions choices.

China A-Share inclusions provide a nice laboratory in which to avoid this omitted-variable issue. MSCI first included 222 large-cap China A shares in the EM Index in May 2018 after concluding that China A-shares, which had been designed originally for domestic investors,[8] had become sufficiently accessible to global investors (most notably with the launch of the Stock Connect program in 2014). In particular, these stocks were included in the EM Index over five stages, from May 2018 to November 2019, and this was based on market-wide considerations, not on firm-by-firm characteristics. Large- and mid-cap China A-Shares were gradually assigned larger weights within the EM Index, with their combined weight in the index rising from 0.0% to 5.1% by August 2020. When China A Shares were initially included in May 2018, the MSCI essentially used almost all the large-cap A-Share stocks that were accessible through Stock Connect and had already been included in the MSCI China Index (but not necessarily in the EM Index) at least a year earlier.[9] Thus, China A-share inclusions offer distinct advantages for identification because they are not driven by factors associated with unobservable time-varying firm-level variables. We further rule out the effects of any industry-

[8] Stocks are listed on one or the other of the two mainland Chinese exchanges, namely the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE), are quoted in RMB. These were completely unavailable for foreign purchase until 2002. Given their lack of investability from foreign institutional investors' perspective, they were initially not included in the EM Index.

[9] On June 20 of 2017, MSCI announced that it would include 222 China A Large Cap stocks in the EM Index, after excluding 195 mid-cap stocks and 42 large cap stocks in the MSCI China A Share Index that are not accessible or suspended through the Stock Connect Program (See, "*Adding A Shares into Emerging Markets—Are You Ready*," *MSCI, June 2017*.)

specific factors that may have changed around the time of A-share index inclusion at the industry level by including industry-by-time fixed effects, which enables us to compare environmental performance in firms operating within the same industry in China at a given point in time.

Once we identify our treated firms based on either firm-level inclusions or China A-Share inclusions, we construct a set of control firms after matching to address any concerns that the treated firms may differ systematically from control firms. Specifically, we match the treated firms with control firms in the same year and market, based on log total assets, log sales, log market capitalization, log physical assets (property, plant, and equipment), log capital expenditures, market-to-book ratios, and profitability using one-to-three nearest-neighbor matching. We check matching quality by examining differences in firm characteristics between treated and matched control firms. The difference statistics reported in Table A.2 in the Appendix show that our matching is quite successful and there are no meaningful differences in firm characteristics between the two groups of firms except for profitability. Our main empirical specifications are based on difference-in-differences (DiD) regressions, using these treated and matched control firms. We use this DiD setup to examine the effects of MSCI index inclusion on firms' expansion and carbon emissions and foreign mutual fund holdings in the firms.

MSCI inclusion and foreign mutual fund ownership. Using DiD regressions, we document that foreign mutual funds increase holdings in stocks that are newly included in the MSCI Index. The results are reported in Table A.3 for inclusions in both the EM and DM indexes. In summary, we observe an immediate increase in foreign fund shareholdings in EM-included firms relative to shareholdings in matched control firms by 0.9 percentage points (column (2)), which remains highly significant for the months following inclusion. An increase in foreign mutual fund holdings is accompanied by an immediate increase in total mutual fund holdings of 1.2 percentage points (column (1)). We also find that increases in fund holdings following DM Index inclusion are also sizable, with total fund shareholdings increasing significantly, by almost 1.7 percentage points (column (5)) over shareholdings in matched control firms immediately following index inclusion. In Figure 4, we graphically illustrate these increases in foreign mutual fund shareholdings between MSCI EM-included and matched control firms. As is evident from Figure 4, we observe a noticeable upward spike in shareholdings in inclusion months in both total (Panel A) and foreign (Panel B) mutual fund holdings, with mutual fund shareholdings remaining higher in the ensuing months.

FIGURE 4 HERE

We further note that this increase in foreign mutual fund holdings needs not consist entirely of passive funds. The reason for this is that the MSCI indices form an integral part of the investment mandate of many active funds. Thus, following a firm's inclusion into the MSCI index, influx of both active and passive funds are likely. To illustrate this, we examine the prospectuses of U.S. international equity funds filed in the EDGAR database between 2010Q1 and 2020Q4. This allows us to identify "MSCI mandate" funds, i.e., those that refer to an MSCI index in the "Principal Investment Strategies" section of fund prospectus (e.g., Abis, Buffa, Javadekar, and Lines, 2022), whose numbers and AUMs we report in Table A.4 in the Internet Appendix. We find that there are twice as many active MSCI mandate funds as their passive counterparts, with slightly higher aggregate AUMs as of 2020 year-end ($430 billion vs. $370 billion).

4.2. Expansion and GHG emissions

Within our conceptual framework, lower capital costs associated with an influx of foreign capital should result in higher output and, depending on the shape of the pollution-production isoquant, the *level* of GHG emissions may also increase with higher output. We thus examine the extent to which MSCI index inclusions lead EM firms to expand, raising GHG emissions. Specifically, we run DiD regressions of our treated and matched control firms in EMs for a window of [-3, 2] years around inclusion years. The treated firms include those based on both firm-level index inclusion and China A Share inclusion. In the first set of regressions, in which we examine firm expansion, the dependent variables are log sales, log total assets, log total number of employees, and profitability. In the second set of regressions, in which we examine GHG emissions, the dependent variables are log GHG Scope 1, Scope 2, and Scope 3 emissions. The regressions include firm, country-by-year, and industry-by-year fixed effects and standard errors are two-way clustered by firm and year. To avoid problems with bad controls, we omit other control variables. Table 2 presents the results.

TABLE 2 HERE

In Table 2 Panel A we report DiD regression results showing that EM firms grow more substantially than matched control peers after MSCI inclusion. As is evident in columns (1) and (2), for example, the coefficient estimates on interactions between the indicator variable for treated firms ("*Included*") and the post-inclusion indicator ("*Post*") are positive and highly statistically significant. Inclusion in the MSCI EM index of a sample firm with average log total sales of 14.48 results in an increase in sales of (exp(0.148+14.48) – exp(14.48))/exp(14.48)=16.0%. Using a similar calculation, we document a 14.8% increase in total assets. The results reported in columns (3) and (4) further show that our treated firms hire more employees and are more profitable following inclusion in the MSCI EM Index. These results are consistent with our conceptual framework, whereby a lower cost of capital results unambiguously in expansion and higher output.

Do GHG emissions also increase with MSCI inclusion? The results reported in Table 2 Panel B show that they do. Across all the emissions-scope measures as well as direct and indirect measures, the coefficient estimates on the interaction terms are all positive and highly statistically significant. The economic magnitudes of the coefficient estimates are also sizable. In column (1), for example, the coefficient estimate of 0.205 indicates that a treated firm with average Scope 1 GHG emissions of 2.629 million tons increases its emissions by (exp(0.205+log(2.629)) – 2.629)/2.629 = 22.8% more than their matched control firms. GHG emissions from energy use, as measured in Scope 2, as well as those from supply chain carbon footprints measured in Scope 3, increase significantly, with t-statistics above 3. Therefore, corporate expansion after an influx of foreign capital is accompanied by corresponding increases in GHG emissions.

4.3. MSCI inclusion and GHG emission intensity

Our conceptual framework predicts that, while emissions levels can rise when the cost of capital falls, emissions intensities—GHG emissions per unit of output produced—should fall unless the (implicit) cost of pollution also falls with the lower cost of capital. If the cost of pollution also falls, however, firms will optimally adjust their abatement efforts downward, resulting in higher emission intensity. On the one hand, the implicit cost of pollution will increase when foreign investors are involved if those investors export higher pollution standards from more developed countries to EM firms. On the other hand, the cost of pollution can fall with more foreign investors if they are less concerned about environmental issues in host countries than host-country investors are. Even if foreign investors originate from countries that maintain high environmental standards, they might care less about the environment in host countries than host-country investors who would bear the environmental consequences. Moreover, these foreign investors can be incentivized to care less about polluting in countries that are subject to less strict environmental regulations, thus using EM countries as pollution havens.

For Table 3, we repeat the DiD regressions as in the previous subsection, but with log emission intensity (i.e., GHG emissions divided by sales) as the dependent variable. All fixed-effect and standard-error specifications remain unchanged.

TABLE 3 HERE

The results we report in Table 3 show that emissions intensities in treated EM firms are higher than those in matched control peers following inclusion in the MSCI EM Index. As seen in column

(1), for example, the coefficient estimate on the interaction term (*"Included times Post")* is 0.123,[10] indicating that emission intensity (i.e., from direct operations) increases, with statistical significance at the 1% level, a finding echoed in our results reported in column (4) for direct emission intensity. Regarding results obtained with Scopes 2 and 3 emission intensity and reported in columns (2) and (3), we also find all the coefficient estimates to be positive (0.108 and 0.080, respectively) with statistical significance at the 1% level. The economic magnitudes of the coefficients are also sizable. For example, a treated firm's Scope 2 emission intensity with average intensity of 0.208 increases by (exp(0.108+log(0.208))-0.208)/0.208 = 11.4%. Therefore, in terms of both direct operations and through energy use and supply chains, we observe sizable drops in emissions intensities.

The results suggest overall that an influx of foreign capital leads to a fall in the cost of pollution, disincentivizing firms from engaging in robust abatement efforts. Given that emission intensity falls with firms' abatement efforts according to our conceptual framework, our results based on emission intensity strongly indicate that firms exert less effort to manage GHG emissions in response to the increased presence of foreign investors.

Figure 5 Panel A graphically illustrates increases in log Scope 1 GHG emission intensity. Although there is no noticeable trend in GHG emission intensity between treated and matched control firms prior to inclusion, we observe an immediate increase in GHG emission intensity beginning in the year of MSCI inclusion, with the difference remaining elevated for the following two years.

FIGURE 5 HERE

4.4. China A Share inclusion and emission intensity

[10] In Table A.5, we run full-sample pooled OLS regressions of EM firms' emission intensity on foreign fund shareholdings (as well as total and domestic fund shareholdings) for comparison with our DiD regression estimates. We find a similarly positive relationship between log Scope 1 emission intensity and foreign fund shareholding, with the coefficient of 0.128 and statistical significance at the 5% level.

Our earlier set of regressions reveal substantial increases in GHG emission intensity following inclusion in the MSCI EM Index, indicating reduction in abatement efforts. To address a concern that firm-level factors not reflected in the matching process may be driving index inclusion and GHG emissions simultaneously, we focus our attention on the market-wide inclusion of China A Shares in the MSCI EM Index to further sharpen our identification. To examine how emissions intensities change after China A Share inclusions, we run DiD regressions as in the previous subsection, but with a sample of treated and matched control firms around China A share inclusion in 2018 and 2019.[11]

TABLE 4 HERE

In Table 4 column (1) we report the results using log Scope 1 emission intensity as the dependent variable. The point estimate of the interaction term ("*Included times Post*") is positive (0.174) and sizable, with a *t*-statistic of 2.61. We find a similar result for direct emission intensity, as reported in column (4). For emissions from energy use (Scope 2) as reported in column (2) or from the supply chain (Scope 3) as reported in column (3), we find that the coefficient estimates of the interaction term are both positive and statistically significant at conventional levels, consistent with our earlier results obtained while utilizing the entire sample of firm-level MSCI index inclusions. It is also interesting to find a particularly strong rise in Scope 3 emission intensity in terms of statistical significance, suggesting that weaker abatement effort is evident along the supply chain, which suggests that these large-cap, newly included firms may be "outsourcing pollution" down to their suppliers. In Figure 5 Panel B, we observe a pattern of the gradual increase in emission intensity when we focus on market-wide inclusion of China A share firms in the MSCI EM Index consistent with the results using firm-level MSCI index inclusions in Panel A.

[11] In Table A.6, we observe firm expansion and the increase in GHG emission levels around China A-share MSCI EM index inclusions consistent with the results in Table 2.

In Table A.7 in the Internet Appendix, we check whether firms' inclusion into the local stock market index has a similar effect. Specifically, we run similar DiD regressions using treated and matched control firms around Chinese firms' inclusion in the CSI 300 index, a "blue chip" index consisting of top 300 firms in the Shanghai and Shenzhen stock exchanges that serve as one of the most widely used benchmarks among Chinese equity mutual funds. While we document a significant increase in log total assets following the index inclusion, we do not find this expansion to be accompanied by a significant increase in emission level or intensity, suggesting that the influx of foreign capital is the key driver of increased emission intensity among Chinese firms around index inclusions.

We further check whether this increase in emission intensity is a mere by-product of the increased disclosure quality following the influx of foreign institutional investors (Cohen, Kadach, and Ormazabal, 2022). Indeed, in Table A.8, we also find that the EM firms' carbon disclosure quality increases after the MSCI index inclusion. However, if we observe an increase in the emission intensity simply because there is more, better-quality disclosure, the increase in intensity should not be observed in the sample where there is no change in disclosure quality. Among 1,220 unique firms who were newly included in MSCI EM index from 2003 to 2020, 951 of them did not change the disclosure quality. In columns (3) and (4) of Table A.8, we restrict our DiD sample to be those without a change in disclosure quality before and after MSCI index inclusion, for the entire index inclusion cases and for China A-share inclusions, respectively. We continue to observe a strong increase in Scope 1 GHG emission intensity among index-included firms relative to their peers, which suggests that this increase in GHG emission intensity is not driven by increased disclosure quality.

4.5. *Emission intensity across regions*

We explore changes in GHG emission intensity in response to MSCI EM Index inclusion across different regions using DiD regressions. Specifically, we divide our EM firms into the following five geographic regions: South and Southeast Asia, China, East Asia, EMEA (Europe, Middle East, and Africa), and Latin America. Table 5 presents our results.

TABLE 5 HERE

Table 5 presents the results for each of the geographic regions using log Scope 1 GHG emission intensity as the dependent variable. We find that the coefficients on the DiD interaction term are positive and statistically significant at the 5% level in South and Southeast Asia as well as in China.[12] For the other three regions, the coefficient estimates are either close to zero or even negative, with no statistical significance. These results suggest that GHG emissions tend to be concentrated in manufacturing- and export-oriented countries, such as China, India, Malaysia, and Indonesia.

4.6. Emission intensity in DM firms after MSCI Index inclusion

Our results reported thus far indicate that, following an influx of foreign capital, treated firms that are newly included in the EM Index increase emissions intensities substantially more than their matched control peers. Would foreign capital also lead to higher emissions intensities in DM firms? If foreign capital also tends to reduce the cost of pollution for DM firms, we expect to find higher emissions intensities, as in EM firms. This is likely the case if foreign investors in general care less about the environment in host countries than host-country investors themselves do. If, in contrast, foreign capital does not reduce the cost of pollution for DM firms, emissions intensities will not increase. We thus examine how emissions intensities change after DM firms are included in the index.

Table 6 column (1) presents the DiD regression results using log Scope 1 GHG emission intensity as the dependent variable. In contrast with the results obtained based on MSCI inclusion of EM firms, our results for DM firms do not reveal any statistically significant increases in emission

[12] These Chinese treated firms include both firm-level and market-level MSCI inclusion cases.

intensity.[13] If anything, point estimates of the interaction terms in the DiD regressions are negative. Results reported in column (2) similarly indicate that Scope 2 intensities in DM firms do not tend to rise significantly after index inclusion. Interestingly, however, we find that the coefficient estimates of the interaction terms for Scope 3 and indirect emissions intensities, reported in columns (3) and (5), respectively, are positive and statistically significant at the 10% and 5% levels, respectively. These results for indirect emissions indicate that DM firms tend to outsource GHG emissions along their supply chains. Given that some of these firms' suppliers may reside in EM countries, the statistically significant increase in Scope 3 GHG emission intensity may in part reflect some of our earlier findings for EM firms.

TABLE 6 HERE

4.7. MSCI inclusion and abatement efforts

The key prediction of our conceptual framework is that emission intensity is a decreasing function of firms' unobserved abatement efforts. A natural question then arises: Do EM firms' abatement targets and activities actually weaken following inclusion in the MSCI Index? To answer this question, we employ stated emissions-reduction targets as reported in the ASSET4 database and examine how they change in DiD regressions. Emission reduction target indicates how much percentage a firm is aiming to reduce its GHG emission. We emphasize that the results should be treated with caution given that abatement targets are self-reported, i.e., "espoused," measures and may not fully reflect actual abatement efforts. Coverage of this data item in the database is rather sparse, leading to a substantially smaller sample, particularly after including an extensive set of fixed effects,

[13] The fact that emissions intensity does not rise does not reflect a lack of growth in DM firms. We confirm that, as in EM markets, inclusion in the MSCI DM Index leads firm to expand, thereby increasing total GHG emissions, as shown in Table A.9 in the Appendix.

as in the previous specifications. As an alternative, we also consider a smaller set of fixed effects, namely firm and year fixed effects.

TABLE 7 HERE

Panel A of Table 7 columns (1) and (2) present the results showing that EM firms tend to reduce emissions-reduction targets following MSCI Index inclusion. As can be seen in column (1), for which we include firm and year fixed effects, we find that treated firms reduce their percentage emissions-reduction targets 2.66 percentage points lower than matched control peers following index inclusion. As can be seen in column (2), we find that the coefficient estimate of the interaction term (*Included times Post*) is positive but lacks statistical significance once we replace year fixed effects with a strict set of country-by-year and industry-by-year fixed effects. Given that the sample for this regression is less than half the size of that used in the emission intensity analysis, however, the inclusion of so many fixed effects for column (2) may have resulted in insufficient variation in the dependent variable. For columns (3) and (4) we repeat the analysis for DM firms. As shown by the coefficient estimates, we find that treated DM firms raise their emissions-reduction targets around 0.4 percentage points higher than their control peers, in contrast to the behavior observed among EM firms, further highlighting the differential effects of an influx of foreign capital on EM and DM firms.

As an additional measure of abatement efforts, we also collect environmental expenditures reported in the same database. In Table 7 Panel B, the results reported in first two columns reveal, with or without controlling for country-by-year and industry-by-year fixed effects, that EM firms tend to reduce environmental expenditures after MSCI Index inclusion. On the other hand, as seen in columns (3) and (4), we find that treated DM firms increase environmental expenditures to a greater extent than their control peers. These results should be interpreted with caution, though, given the small number of available observations of environmental expenditures.

5. Evidence of Pollution Migration and Greenwashing

In the previous section our reported results suggest that, following an index-inclusion-driven influx of foreign capital, EM firms' abatement efforts weaken significantly, as evidenced by sizable increases in emission intensity across all emissions-measure scopes. Weaker abatement efforts may materialize through one of the following two channels. First, foreign investors are unlikely to fully bear the environmental consequences that host countries (i.e., EM countries) experience,[14] suggesting that a change in the composition of a firm's shareholder base with a greater presence of foreign investors would, by itself, weaken abatement efforts in EM firms. Second, foreign investors may *actively* reallocate GHG emissions within their portfolio firms, for example from a firm that operates in a country that features stringent environmental regulations to a firm that operates in a country that features lax regulations, known as the pollution-haven hypothesis. Such migration to pollution havens can also amount to "greenwashing" on the part of foreign investors if they appear to be green investors in their home countries while investing in "brown" companies in EM countries. In this section, we provide empirical evidence consistent with the second channel.

5.1. Do fund-level characteristics matter?

Low vs. High turnover funds. We first examine how EM firms' emissions intensities respond to index inclusions depending on fund turnover. On the one hand, these high turnover, short-horizon funds might help reduce emission intensity if they exert pressure on firms to be greener with their voice as well as their feet, by actively engaging in as well as trading out of dirtier firms. On the other hand, such funds could instead focus on short-term profits and expansion by cutting expensive greener capital expenditures, thus increasing emissions intensities. To shed light on this issue, we

[14] Groen-Xu and Zeume (2021), for example, document that local investors respond less to foreign ESG violation events, suggesting home bias in investors' ESG concerns.

estimate DiD regressions using an indicator variable that takes the value of one if and only if low turnover fund holdings in treated firms increase more than high turnover fund holdings from one month before to one month after MSCI index inclusion. We interact this variable with the post-event indicator variable, enabling us to isolate firms that low turnover funds "overweight" relative to high turnover funds around MSCI inclusion events. We report the results for all MSCI inclusions in Panel A, while we restrict our attention to China A-Share inclusions in Panel B.

TABLE 8 HERE

In column (1) of Table 8 Panel A we present results showing that Scope 1 GHG emissions intensities increase to a greater extent for treated firms that experience more pronounced changes in low turnover fund shareholding relative to high turnover fund shareholding. That is, when foreign mutual funds with longer investment horizon overweight our sample of EM firms around MSCI inclusion relative to the short-horizon high turnover funds, we obtain a more pronounced increase in GHG emission intensity. It thus appears that the increased emission intensity of portfolio firms is primarily observed among foreign mutual fund investors that trade relatively infrequently. We confirm that a qualitatively similar result is obtained when we focus on China A-Share inclusions in Panel B column (1).

Big 3 vs. Other Passive Funds. We then examine whether the increased presence of passive funds belonging to the Big 3 firms, i.e., BlackRock, State Street, or Vanguard, is associated with greater GHG emission intensity. These three firms, whose combined assets ($22 trillion) are more than half the entire market capitalization of S&P 500 companies,[15] have strong market power to engage with their portfolio firms. Whether they are contributing toward better ESG profiles of their portfolio firms, however, has been the subject of recent debate, with some arguing these firms to be "treading the

[15] For more detail, see "What BlackRock, Vanguard and State Street Are Doing to the Economy" (New York Times, May 12, 2022).

water" and not doing enough on environmental issues while others claiming they are driving the ESG agenda too hard.[16] We thus isolate firms that experience a large influx of Big 3 passive fund presence compared to other passive funds and run the identical DiD specification.

We report the results in column (2) of Table 8 Panel A. We find that the greater presence of Big 3 passive funds relative to other passive funds is associated with a more pronounced increase in GHG emission intensity, with Panel B column (2) confirming the result for the identification setting of China A-Share inclusions. Our evidence suggests that these firms appear not to be engaging sufficiently with their constituent EM portfolio firms toward green growth.

Poor vs. Well-Performing Funds. We then turn to the role of fund performance. Funds with poor year-to-date return relative to their peers, the most visible fund performance metric, would likely be under greater pressure to generate financial performance for their investors. In the process, it is likely that environmental considerations are given a lower priority. To examine the role of fund performance on the emission intensity of their portfolio firms, we create an indicator variable that takes the value of one if the holdings of below-peer year-to-date return funds in treated firms increase by a greater extent than those of above-peer year-to-date return funds between one month before and one month after the MSCI inclusion events. We then utilize a similar DiD specification as before.

We report the results of our DiD regressions in column (3) of both panels in Tables 8. As expected, we find the increase in emission intensity to be more prominent among treated firms that experience a larger increase in poorly performing funds compared to those that are overperforming their peers. Put differently, we find a deterioration in emission intensity when the influx of capital emanates from funds with greater pressure to generate returns for their investors.

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[16] For example, see "BlackRock, Vanguard Among Firms Blocking Key ESG Votes: Study" (Bloomberg, May 24, 2023) or "BlackRock Facing More Blowback Over ESG as GOP Pressure Mounts" (Bloomberg, Dec. 11, 2022).

Green vs. Non-green funds. We then examine how emission intensity responds to foreign funds' ESG portfolio scores in a similar DiD specification. The results of this analysis indicate the extent of greenwashing by foreign mutual funds that hold shares in emerging market firms. The DiD regression employs an indicator variable that takes the value of one if green funds' holdings in treated firms increase to a greater extent than non-green funds' holdings between one month before and one month after MSCI inclusion. We designate funds as green if their fossil fuel exposure as reported in Morningstar are lower than the latest quarterly sample median fossil fuel exposure. Similarly, the DiD regression employs another indicator variable based on Sustainalytics' portfolio environmental scores as an alternative designation of green funds.

We report the results in columns (4) and (5) of Table 8 Panels A and B, indicating greenwashing on the part of foreign mutual funds. The coefficient estimates reported in columns (4) and (4) are both positive and statistically significant at the 1% level. Thus, the increased presence of "green" funds around MSCI inclusion is associated with a significantly higher increase in emission intensity in their portfolio firms. Ironically, funds with strong ESG portfolio performance appear to drive the increase in GHG emission intensity in EM firms, which strongly suggests the possibility of greenwashing. These funds might sacrifice environmental performance in their EM portfolio firms, perhaps because financial performance can be much higher with these stocks. We investigate this issue further in Section 5.3.

Stringent vs. Less-stringent environmental policy. Finally, we examine how the GHG emission intensity response depends on environmental policy stringency (EPS) in the home countries of foreign mutual funds. The EPS measure is obtained from the OECD database, and we create an analogous indicator variable that takes the value of one if and only if funds originating in high-EPS countries increase shareholdings to a greater extent than funds originating in low-EPS countries. We then interact this indicator variable with the post-MSCI inclusion indicator in the DiD regression.

The results reported in column (6) of Table 8 Panels A and B reveal that, following MSCI Index inclusion, EM firms' emissions intensities increase to a greater extent in firms where shareholding by funds arriving from countries with strong EPS standards is higher. The coefficient estimate reported in Panel A column (6) is positive, with a *t*-statistic of 2.62, which is consistent with the idea of pollution migration. The results reported in Table 8 suggest overall that increases in emission intensity that we document for EM firms are driven by pollution migration and greenwashing incentives.

5.2. Environment policy stringency in EM countries

To examine pollution migration further, we now focus on environmental stringency in EM countries. In particular, we examine whether emissions intensities increase to a greater extent in EM countries that feature less stringent environmental policies, which is likely to occur if foreign investors are more profit-driven than environmentally conscious. We create subsamples of our EM firms based on the underlying components of EPS as categorized by the OECD, namely (i) economic policy stringency, (ii) market-based policy stringency, and (iii) R&D subsidies for environmental projects, with the latest annual sample median as the cutoff for low- and high-EPS countries. In addition to these measures of EPS components, we consider (iv) carbon emissions per capita in EM countries and (v) the capital intensity of industries in which EM firms operate. These two latter measures will be informative about whether emissions intensities increase to a greater extent in countries and industries where pollution is worse. We then run our earlier DiD regressions with log Scope 1 GHG emission intensity as the dependent variable. We report the results in Table 9.

TABLE 9 HERE

As the results reported in rows (1) through (3) of Table 9 indicate, we find that increases in emission intensity in treated firms are more pronounced in EM countries where EPS is relatively weak.

In all instances, the coefficient estimates for weak EPS countries are both positive and statistically significant at conventional levels.

The results reported in rows 4 and 5 for per capita emissions and capital intensity, respectively, show that EM emissions intensities are higher in countries where pollution is relatively worse and for firms that operate in capital-intensive industries. Overall, the results we report in Table 9, along with our earlier results reported in Table 8, support the pollution-haven hypothesis, whereby increases in emission intensity are most evident among EM firms that operate in weaker regulatory environments but with more foreign capital flows coming from stricter regulatory environments.

In Table A.10, we find further corroborating evidence in favor of the migration of pollution hypothesis. Specifically, in addition to the GHG emission intensity, we check whether the emission intensity of other forms of air and waste pollution respond. In contrast to GHG, which has the potential to adversely affect the livelihoods of all investors on a global scale, air pollution and waste tend to lead to a deterioration in environmental standards on a narrower, more local scale. If the foreign investors do not take these negative externalities fully into consideration, the incentive to increase local air and waste pollution should, if anything, be even more heightened. We indeed find that landfill and incineration waste generation intensity as well as air pollution intensity of our treated firms increase substantially relative to their matched control peers around MSCI inclusion, regardless of whether we focus on all EM inclusion events or restrict our attention to China A-Share inclusions.

6. Further Evidence on Fund Incentives and Behavior

6.1. MSCI inclusion and stock returns: EM vs. DM firms

The results reported thus far indicate that green funds whose portfolios achieve strong environmental performance tend to sacrifice environmental performance in their EM portfolio firms. At first sight, these results can look puzzling. If these funds are conscious of their portfolio environmental scores, as shown by Atta-Darkua, Glossner, Krueger, and Matos (2023), why do they allow these EM firms to weaken their abatement efforts and correspondingly increase emission intensity? Perhaps, in addition to maintaining the environmental performance of their portfolios, these funds also need to generate financial performance for their investors. Thus, funds face a tradeoff between environmental and financial performance. Some sacrifice in environmental performance is acceptable if those EM stocks can generate higher returns. To investigate this possibility, we compare stock returns on our EM and DM firms that are included in the MSCI indices for each of the three years following MSCI inclusion. We also run regressions of stock returns over the one- through three-year horizons following MSCI inclusion on the EM indicator as the main independent variable, with log market capitalization, market-to-book ratios, profitability, investment, and year fixed effects as controls. We report the estimation results in Table 10.

TABLE 10 HERE

In Table 10, we report the estimation results of the regressions of MSCI-included firms' stock returns on the EM indicator and control variables. In these regression results, reported in columns 1 through 3, we also find that EM treated firms' stock returns are significantly higher than those of their DM counterparts across all three time horizons; when we add the first three years' returns, for example, EM firms' returns are higher than DM firms' returns by around 1.1%. These results suggest that funds that invest in EM stocks are compensated with stronger financial performance while experiencing worse environmental performance. Funds that build strong records of ESG performance may optimally decide to allow their EM portfolio firms to cut back on their abatement efforts if they are rewarded with higher stock returns, strengthening the incentive for greenwashing.

6.2. *What happens to fund-level GHG emission intensity?*

Our earlier analysis reveals that the increased presence of green funds is more prominently associated with an increase in the GHG emission intensity of their EM portfolio firms following MSCI index inclusion. It is therefore important to examine how the portfolio-level GHG emission intensity of funds holding the treated firms changes relative to funds holing the control firms. We thus compute for each fund-year pair holding-weighted-average log GHG emission intensity at the portfolio level. We then define "treated funds" as those that hold positive amounts of MSCI-included firms at the year of inclusion[17] without any holding in matched control firms. Analogously, we define "control funds" as those that hold positive amounts of control firms without any holding in MSCI-included firms. Table 11 reports the differences in average log GHG emission intensity change between treated and control funds, with Table A.11 reporting the average values separately for treated and control funds. Panel A report the changes in portfolio-level emission intensity around EM inclusions, while DM inclusion results are reported in Panel B.

TABLE 11 HERE

As reported in Table A.11 Panel A, we find that the changes in average GHG emission intensity of both treated and control funds are negative on average, possibly reflecting the increased awareness and the ensuing global drive toward achieving net zero. Interestingly, Table 11 Panel A further reveal that, on aggregate, treated funds cut GHG emission intensity of their portfolio firms more aggressively than their control fund peers, which is particularly evident for Scope 1 and direct measures of GHG emission intensity. The observed patterns suggest that, while funds holding our sample of EM treated firms are more aggressive in reducing GHG emission intensity on the whole, they accept some sacrifice in environmental performance in these treated firms, possibly due to their desire to retain financial performance while being seen as aggressive on cutting carbon emission.

In contrast, we do not observe a similar pattern among treated and control funds around DM index inclusions, as shown in Panel B. Overall, we do not observe a significant difference in GHG

[17] The results are qualitatively the same if we allow funds to hold MSCI-included EM (or DM) firms that have been included within the past three years, as revealed in Table A.12.

emission intensity change between treated and control funds, with some significantly positive difference in treated and control funds for Scope 3 and indirect measures depending on the fixed effect specification, similar to the patterns found in Table 6.

6.3. *Fund voting behavior and ESG violations*

Our evidence indicates that funds increase the emission intensity of their EM portfolio firms following their index inclusion in order to enhance their financial performance while accepting some deterioration in environmental performance. If so, we may expect these funds to exert their "voice" in a manner that prioritizes financial performance over environmental performance, calling for these firms to be managed in a more profit-driven manner. We thus examine the voting behavior of mutual funds. Using the ISS Voting Analytics database, we classify a shareholder proposal as "profit-driven" if it concerns, for example, on sale of assets, share repurchases, or payout policies. We classify a proposal as "environmentally-oriented" if the proposal is on, for example, environmental policies, climate change, sustainability, or energy policies of the firm. Then, out of all shareholder proposals that a fund votes in favor of, we calculate the proportion of profit-driven and environmental agenda that the fund votes for. Table A.13 in the Internet Appendix reveals that, following MSCI EM index inclusion, funds tend to vote for more profit-driven and fewer environmental agenda, as shown in columns (1) and (2) of Table A.13. In both instances, statistical significance is at the 1% and 5% levels, respectively. We do not observe a similar shift toward profit-driven agenda when a DM firm is included into the MSCI index, with the DiD term lacking statistical significance in both columns (3) and (4). This is further corroborating evidence of funds prioritizing financial performance ahead of environmental performance in EM firms following the MSCI index inclusion.

If this shift toward financial performance lowers the implicit cost of pollution, incentivizing firms to cut back on their abatement efforts and increase their emission intensity, we would expect to observe an increase in the number of environmental ESG violations for these firms. To this end, in our final set of analyses, we count the number of negative ESG incidents reported in RepRisk, which collects information on ESG violations reported by various sources, including regulators, print media, newsletters, non-profits, and social media. In particular, we focus on issues pertaining to the environment, climate-related pollution, local pollution, and waste. We present the results for the EM sample in Table A.14 Panel A, and for comparison purposes, DM results are presented in Panel B. As can be seen in Panel A of Table A.14, we find, across all issue categories, a significantly greater increase in the number of environmental-related negative ESG incidents in MSCI-included firms than in their matched control peers, with the DiD term significant at the 5% level in all instances and at the 1% level when we consider all environmental issues for column (1). In contrast, we do not observe a similar increase in the number of negative ESG incidents in DM countries around MSCI Index inclusion, as shown in Panel B.

7. Conclusion

Whether EM countries can achieve growth without compromising the planet's environmental sustainability in light of the role the financial sector plays on this road to economic growth is a question of crucial importance in global efforts to achieve net-zero carbon emissions by 2050. In this paper, we examine whether an influx of foreign mutual funds into EM countries following MSCI Index inclusion can promote growth and enhance abatement efforts at the same time. We find evidence to the contrary. Whereas MSCI-included firms utilize the greater availability of foreign external financing to engage in significant asset and sales growth, we document that such expansion increases not only GHG emissions but also *per-revenue* GHG emission intensity, in terms of direct emissions as well as indirectly through energy use and along the supply chain. We confirm the causal direction of foreign investor entry and GHG emissions through an arguably cleaner setting featuring country-level inclusion of China A-Shares in the MSCI EM Index. This finding contrasts with what occurs in DM countries, where we do not observe any significant deterioration in the direct intensity of GHG emissions. We find supporting evidence of less aggressive emissions-reduction targets in newly included EM firms than in their peers.

We further document evidence consistent with greenwashing, with higher GHG emissions particularly noticeable in portfolio firms of mutual funds that tout their environmentally friendly reputations. We also document a "migration of pollution standards," whereby higher GHG emissions are evident among mutual fund investors from countries where environmental regulatory standards are stringent that invest in countries with relatively lax regulatory standards. These ESG-friendly funds seem willing to partially sacrifice environmental performance in their portfolios to generate higher returns for investors, with our EM treated firms' post-inclusion stock returns substantially higher than those of their DM counterparts. These foreign mutual funds thus appear to assign lower priority to their EM portfolio firms' environmental performance. Consequently, we document that our sample MSCI-included EM firms are more likely to be embroiled in environmental ESG violations. We thus document the sheer difficulty involved in overcoming the challenges faced by the financial sector in its role in global efforts to address climate change and provide meaningful economic growth opportunities for EM countries at the same time.

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Appendix A.1. Proofs

Proof of Proposition 1. We want to show $e'(\theta) < 0$ for all $\theta \in [0, 1]$. Since:

$$e'(\theta) = \frac{(1-\theta)\phi'(\theta)\cdot + \phi}{(1-\theta)^2} \equiv \frac{h(\theta)}{(1-\theta)^2}. \tag{A.1}$$

We know that $h(1) = \phi(1) = 0$, so it suffices to show that $h'(\theta) > 0$ for all $\theta \in [0, 1]$. Given that this becomes:

$$h'(\theta) = (1-\theta)\phi''(\theta) - \phi'(\theta) + \phi'(\theta) = (1-\theta)\phi''(\theta) > 0, \tag{A.2}$$

this completes the proof. □

Proof of Proposition 2. We prove the proposition in steps. First, given that:

$$\frac{\partial X}{\partial K} = \frac{\partial X}{\partial F}\frac{\partial F}{\partial K}, \tag{A.3}$$

and that the production function is always increasing in K, it suffices to show that $\frac{\partial X}{\partial F} > 0$ to guarantee $\frac{\partial X}{\partial K} > 0$.

Taking the derivative of X with respect to F gives:

$$\frac{\partial X}{\partial F} = \left(1 - \phi^{-1}\left(\frac{z}{F}\right)\right) + F\left([\phi^{-1}]'\left(\frac{z}{F}\right)\cdot\left(-\frac{z}{F^2}\right)\right) = 1 - \phi^{-1}\left(\frac{z}{F}\right) - \frac{z}{F}[\phi^{-1}]'\left(\frac{z}{F}\right). \tag{A.4}$$

Using the inverse function's derivative rule, this becomes:

$$\frac{\partial X}{\partial F} = 1 - \phi^{-1}\left(\frac{z}{F}\right) - \frac{z}{F}\frac{1}{\phi'\left(\phi^{-1}\left(\frac{z}{F}\right)\right)}. \tag{A.5}$$

But knowing that $\frac{z}{F} = \phi(\theta)$, this becomes:

$$\frac{\partial X}{\partial F} = (1-\theta) - \frac{\phi(\theta)}{\phi'(\theta)} \tag{A.6}$$

For our interval of interest, as long as $\phi(\theta) > 0$, i.e., $\theta < 1$, the entire term is positive, knowing that $\phi'(\theta) < 0$, which in turn guarantees that $\frac{\partial X}{\partial K} > 0$.

As for $\frac{\partial X}{\partial z}$, we obtain:

$$\frac{\partial X}{\partial z} = -[\phi^{-1}]'\left(\frac{z}{F}\right) \cdot \frac{1}{F} = -\frac{1}{F}\frac{1}{\phi'\left(\phi^{-1}\left(\frac{z}{F}\right)\right)} = -\frac{1}{F\phi'(\theta)} > 0. \tag{A.7}$$

Excluding the uninteresting case of zero intensity, which can only occur in the case of zero final output, each factor's marginal product is positive, guaranteeing that their marginal rate of substitution, in turn, will also be positive. Specifically, the marginal rate of technical substitution is given by:

$$\frac{\partial X}{\partial K} \Big/ \frac{\partial X}{\partial z} = \frac{\phi(\theta) - (1-\theta)\phi'(\theta)}{F} \frac{dF}{dK}, \tag{A.8}$$

which is positive as long as $\theta < 1$. □

Appendix A.2. Variable Definition

In this section, we provide definitions of the variables used in our empirical analyses. We cite the data source in parentheses.

Capital investment (Worldscope): Capital expenditure scaled by total assets

Profitability (Worldscope): Earnings before interest, tax, depreciation, and amortization, divided by total assets on the firm's balance sheet.

Profit margin (Worldscope): Net income scaled by total sales

Tangibility (Worldscope): Property, plant, and equipment, divided by total assets on the firm's balance sheet.

Log total assets (Worldscope): the natural logarithm of total assets on the firm's balance sheet. Total assets are converted to U.S. dollars and presented in million U.S. dollar unit.

Leverage (Worldscope): Total debt divided by total assets on the firm's balance sheet.

Market-to-book (Worldscope): Market capitalization plus total debt divided by total assets on the firm's balance sheet.

Greenhouse Gases (Scope 1) (Trucost): Greenhouse gas emissions from sources that are owned or controlled by the company (categorized by the Greenhouse Gas Protocol) in million tCO_2e unit.

Greenhouse Gases (Scope 2) (Trucost): Greenhouse gas emissions from consumption of purchased electricity, heat or steam by the company (categorized by the Greenhouse Gas Protocol) in million tCO_2e unit.

Greenhouse Gases Scope 3 (Trucost): Greenhouse gas emissions from other upstream activities not covered in Scope 2 (categorized by the Greenhouse Gas Protocol) in million tCO_2e unit.

Direct greenhouse gas (Trucost): Greenhouse gas emissions generated from burning fossil fuels and production processes which are owned or controlled by the company in million tCO_2e unit.

Indirect greenhouse gas (Trucost): Greenhouse gas emissions generated from direct suppliers in million tCO_2e unit. The most significant sources are typically purchased electricity (Scope 2 of the GHG Protocol) and employee's business air travel.

Greenhouse Gases Scope 1 Cost (Trucost): External cost of greenhouse gas emissions from sources that are owned or controlled by the company in millions of U.S. dollars.

Direct greenhouse gas Cost (Trucost): External cost of greenhouse gas emissions generated from burning fossil fuels and production processes which are owned or controlled by the company in millions of U.S. dollars.

Total fund shareholdings (Morningstar): Proportion of mutual fund holdings divided by the latest number of shares outstanding. Mutual fund holdings are aggregated across all funds with the holdings data available in Morningstar.

Total passive fund shareholdings (Morningstar): Proportion of passive mutual fund holdings divided by the latest number of shares outstanding. Passive funds are defined as those are flagged by Morningstar as index funds or ETFs.

Total active fund shareholdings (Morningstar): Proportion of active mutual fund holdings divided by the latest number of shares outstanding. Active funds are funds that do not satisfy the criteria for passive funds as outlined above.

Foreign fund shareholdings (Morningstar): Proportion of foreign mutual fund holdings divided by the latest number of shares outstanding. We define a fund to be "foreign" if the sales region (as reported in Morningstar) of the fund's largest share class does not cover the firm's domicile country. When a fund's sales region is specified as "Nordic cross-border," we classify it as domestic in Scandinavian countries, while if it is specified as "European cross-border," it is treated as domestic in all countries that are part of the European union at the month-end in question.

Foreign passive fund shareholdings (Morningstar): Proportion of mutual fund holdings that satisfy the criteria above for passive and foreign funds, divided by the latest number of shares outstanding.

Low carbon designation (*Morningstar*): Designation assigned if portfolios that have low carbon-risk scores (Morningstar Portfolio Carbon Risk Score) and low levels of fossil-fuel exposure (Morningstar Portfolio Fossil Fuel Involvement).

Appendix A.3. A Primer on the MSCI Index Inclusion Criteria

Panel A. Firm-level criteria

For a security to be included in the index, it has to meet the following investability requirements.

- Equity Universe Minimum Size Requirement.
- Equity Universe Minimum Free Float-Adjusted Market Capitalization Requirement.
- DM and EM Minimum Liquidity Requirement.
- Global Minimum Foreign Inclusion Factor Requirement.
- Minimum Length of Trading Requirement.
- Minimum Foreign Room Requirement.
- Financial Reporting Requirement.

Panel B. Country-level criteria

In order to be classified in a given investment universe, a country must meet the requirements of all three criteria as described in the table below.

Criteria	Frontier	Emerging	Developed
A Economic Development			
A.1 Sustainability of economic development	No requirement	No requirement	Country GNI per capita 25% above the World Bank high income threshold* for 3 consecutive years
B Size and Liquidity Requirements			
B.1 Number of companies meeting the following Standard Index criteria	2	3	5
Company size (full market cap) **	USD 1,189 mm	USD 2,378 mm	USD 4,755 mm
Security size (float market cap) **	USD 101 mm	USD 1,189 mm	USD 2,378 mm
Security liquidity	2.5% ATVR	15% ATVR	20% ATVR
C Market Accessibility Criteria			
C.1 Openness to foreign ownership	At least some	Significant	Very high
C.2 Ease of capital inflows / outflows	At least partial	Significant	Very high
C.3 Efficiency of operational framework	Modest	Good and tested	Very high
C.4 Availability of Investment Instrument	High	High	Unrestricted
C.5 Stability of the institutional framework	Modest	Modest	Very high

* High income threshold: 2019 GNI per capita of USD 12,536 (World Bank, Atlas method)
** Minimum in use for the November 2021 Semi-Annual Index Review, updated on a semi-annual basis

Market Accessibility Criteria

	Definition
Openness to foreign ownership	
Investor qualification requirement	Existence of qualifying conditions for international investors. Existence of a level playing field for all international investors.
Foreign ownership limit (FOL) level	Proportion of the market being accessible to non-domestic investors.
Foreign room level	Proportion of shares still available for non-domestic investors. Existence of a foreign board where non-domestic investors could trade with each other.
Equal rights to foreign investors	Equal economic and voting rights as well as availability of information in English. Equal rights for minority shareholders.
Ease of capital inflows / outflows	
Capital flow restriction level	Existence of restriction on inflows and outflows of foreign capital to/from the local stock market (excluding foreign currency exchange restrictions).
Foreign exchange market liberalization level	Existence of a developed onshore and offshore foreign exchange market.
Efficiency of the operational framework	
Market entry	
Investor registration & account set up	Existence/level of complexity of registration requirements for international investors such as Tax IDs as well as ease/complexity for setting up local accounts (e.g., documents to be provided, approvals required). The time to complete the process includes the preparation of the documents.
Market organization	
Market regulations	Level of advancement of he legal and regulatory framework governing the financial market, the stock exchange and the various other entities involved in the financial markets, an important weight is assigned to: ease of access (including in English), lack of ambiguity and prompt enforcement of laws and regulations, as well as consistency over time.
Information flow	Timely disclosure of complete stock market information items (e.g., stock exchange alerts, corporate news, float information, dividend information) in English and under reasonable commercial terms, as well as the robustness and enforcement of accounting standards.
Market infrastructure	
Clearing and Settlement	Well functioning clearing and settlement system based on the broad framework published by the Bank for International Settlements including delivery versus payment (DVP), the absence of pre-funding requirements/practices and the possibility to use overdrafts. Availability of real omnibus structures.
Custody	Level of competition amongst local custodian banks as well as the presence of global custodian banks. Existence of an efficient mechanism that prevents brokers to have unlimited access to the investor's accounts and guarantees the safekeeping of its assets.
Registry / Depository	A well functioning central registry or independent registrars and a central depository.
Trading	Level of competition amongst brokers ensuring high quality services (e.g., cost efficient trading, ability to execute grouped trades at the same price for the various accounts of a fund manager).
Transferability	Possibility of off-exchange transactions and "in-kind" transfers.
Stock lending	Existence of a regulatory framework as well as an efficient mechanism allowing extensive use of stock lending.
Short selling	Existence of a regulatory and practical framework allowing short selling.
Availability of Investment Instruments	Existence of restrictions on access to derived stock exchange information, data and products that prevents the creation of investment instruments.
Stability of institutional framework	Basic institutional principles such as the rule of law and its enforcement as well as the stability of the "free-market" economic system. Track record of government intervention with regards to foreign investors.

Figure 1. The effect of a fall in the cost of capital ($r_1 \rightarrow r_2$)

This figure plots how a firm adjusts its optimal input mix in the emission-potential output (z-F) space following a decrease in the cost of capital from r_1 to r_2.

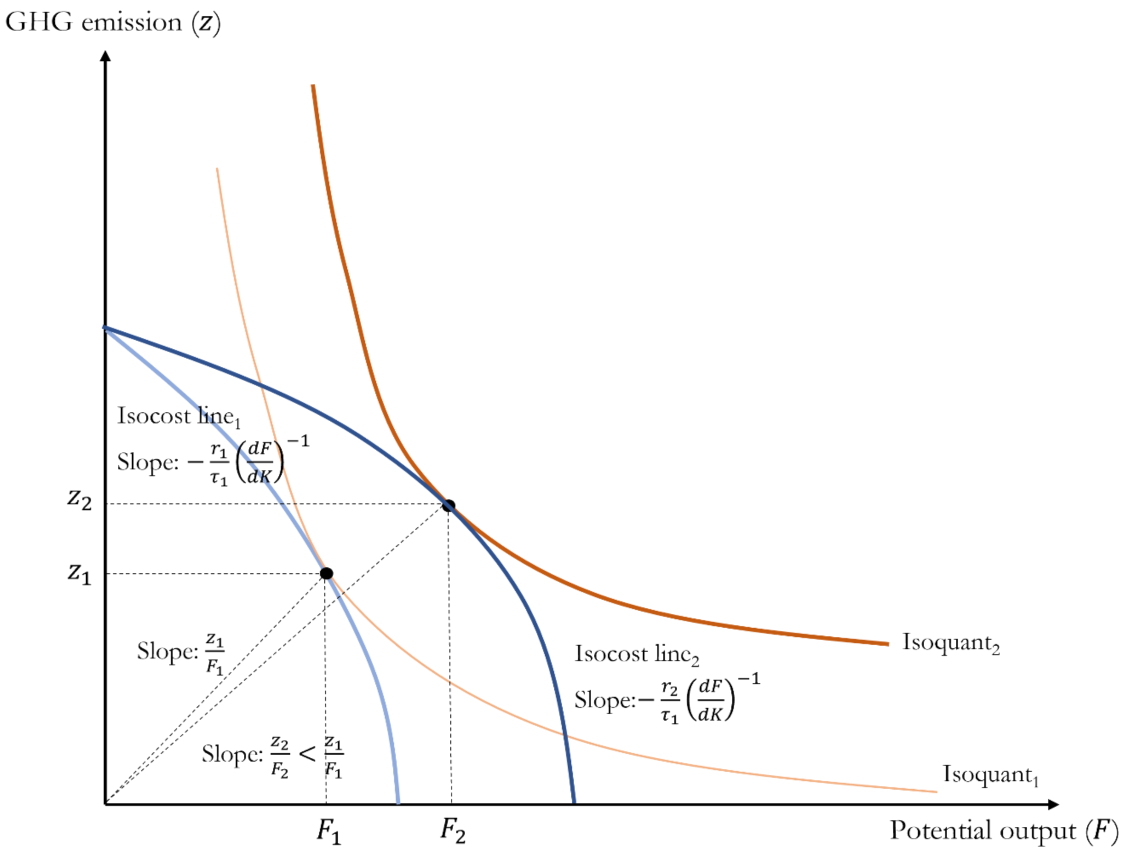


Figure 2. The effect of falls in the costs of capital ($r_1 \rightarrow r_2$) and pollution ($\tau_1 \rightarrow \tau_2$)

This figure plots how a firm adjusts its optimal input mix in the emission-potential output (z-F) space following decreases in the costs of capital from r_1 to r_2 and pollution from τ_1 to τ_2.

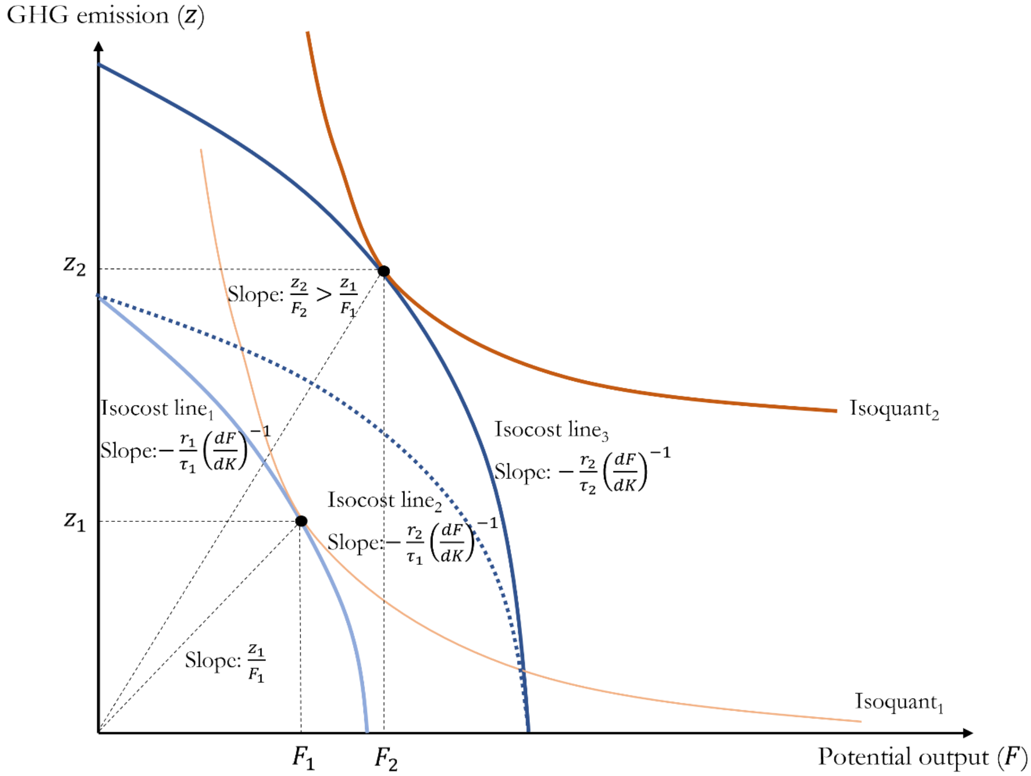
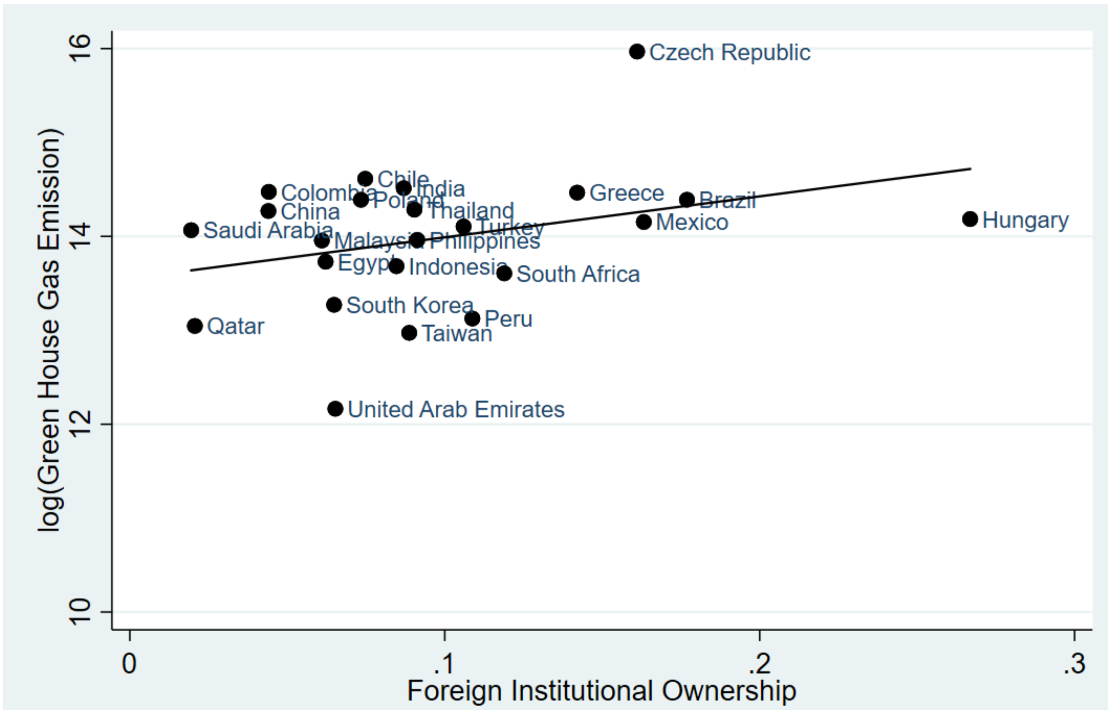


Figure 3. Foreign Institutional Ownership and Greenhouse Gas (GHG) Emission

In this figure, we present the relationship between foreign institutional ownership and GHG emission. We first aggregate the holdings of foreign institutions as reported in FactSet/Lionshare as well as the average GHG emission generated from burning fossil fuels and production processes owned or controlled by the company in million tons of CO_2 equivalent for each firm-year. We then take the country-level average of our sample firm-year observations, for a period from 2003 to 2020. Panel A presents the relationship in the emerging market, and Panel B presents the relationship in the developed market.

Panel A. Emerging Market



Panel B. Developed Market

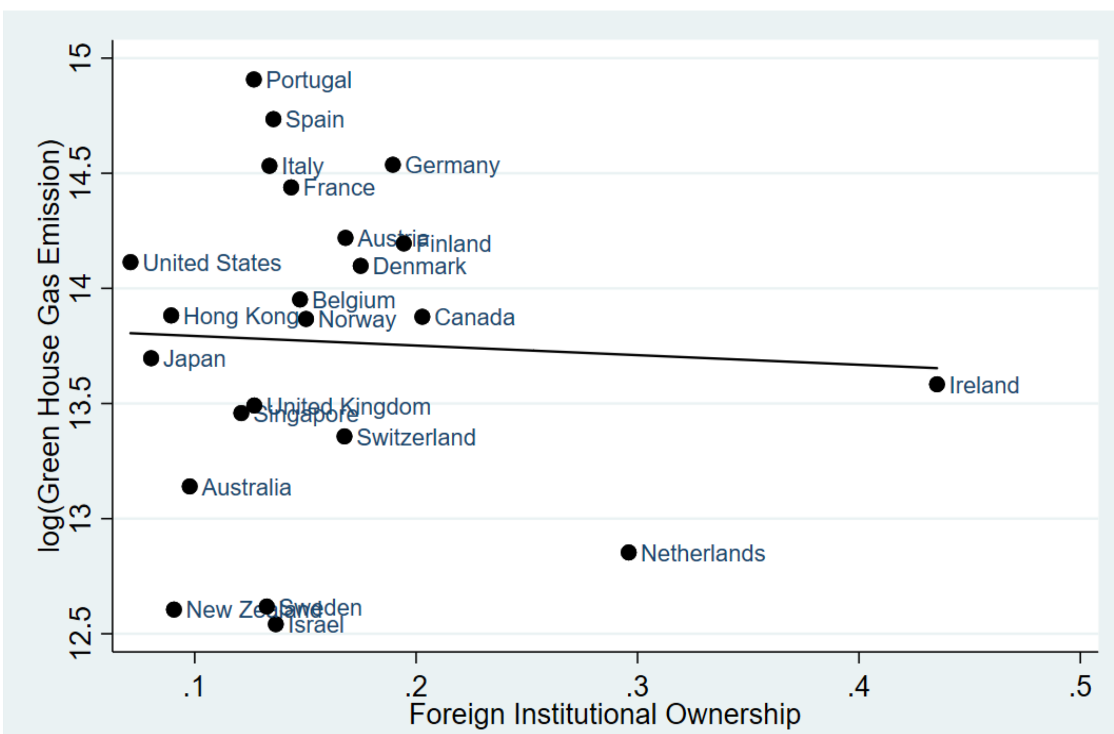
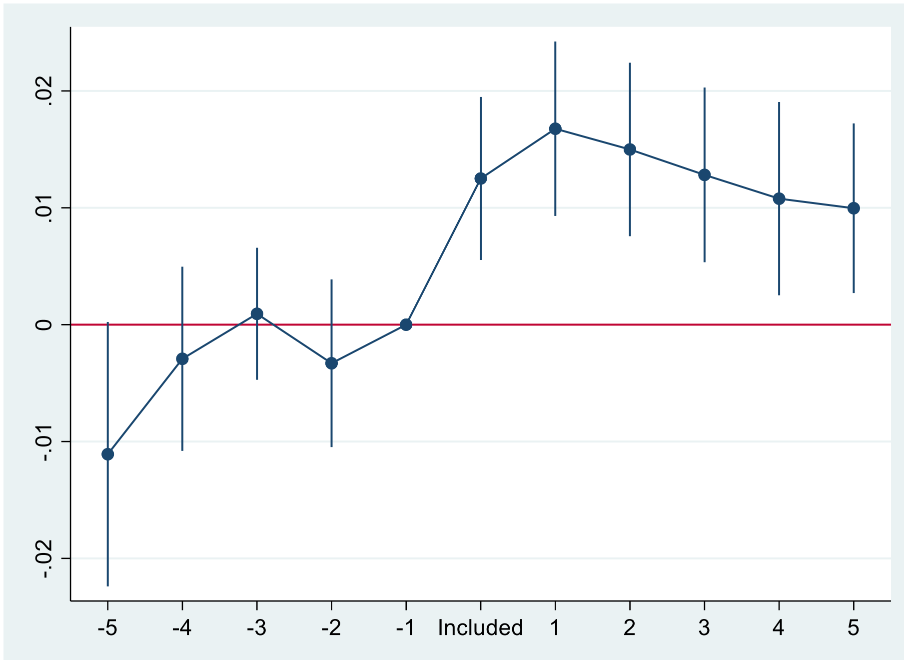


Figure 4. Changes in Mutual Fund Ownerships around MSCI Emerging Market Index Inclusions

These figures present the difference in monthly change in total (Panel A) and foreign (Panel B) mutual fund holdings between treated and matched control firms before around the MSCI index inclusion events. For each firm included in the MSCI index in a given year, we find three closest control firms within the same country at the same point in time, matched on the previous year values of log total assets, log sales, log market capitalization, log physical assets (property, plant, and equipment), log capital expenditure, market-to-book, and profitability, using the nearest neighbor propensity score matching.

Panel A. Total mutual fund holdings



Panel B. Foreign mutual fund holdings

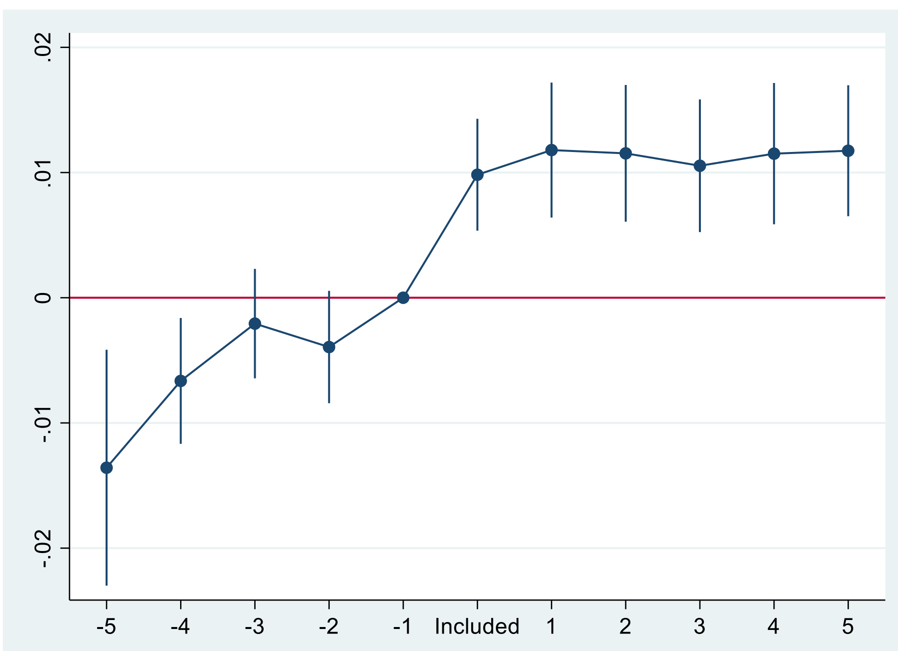
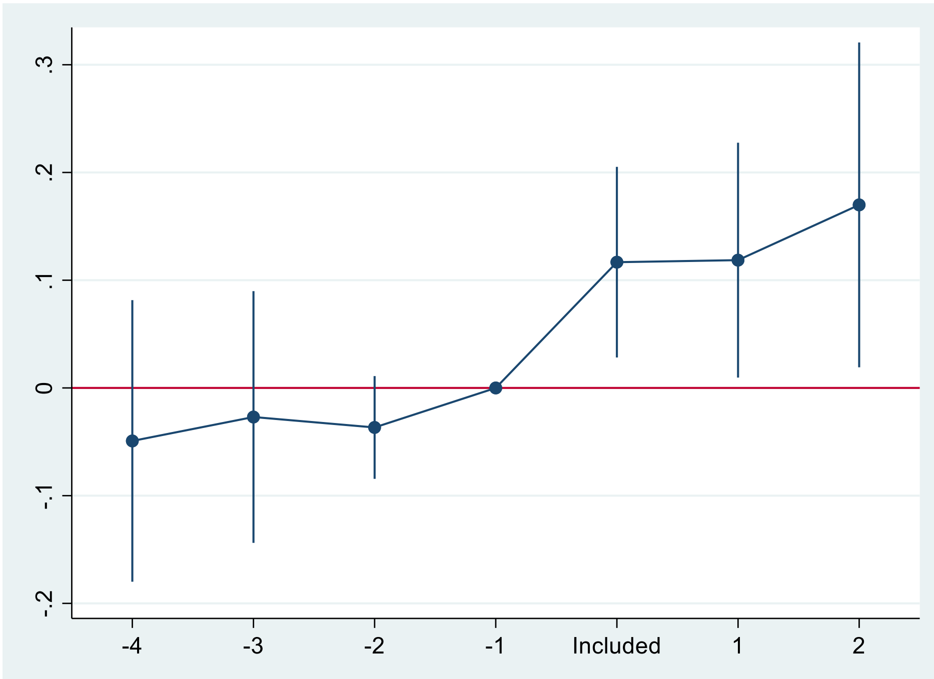


Figure 5. Changes in GHG Emission Intensity around the MSCI Index Inclusions

These figures present the difference in GHG emission intensity between treated and matched control firms before and after all firm-level inclusion into the MSCI Emerging Market (EM) index (Panel A) and market-wide Chinese A-share inclusion into the MSCI EM index (Panel B). Plots show regression coefficients on the interaction terms between included (i.e., "treated") and years relative the inclusion year indicator variables, obtained from the regressions of log Scope 1 GHG emission intensity on the aforementioned interaction as well as firm and year-by-country-by-industry fixed effects, for a window of [-4, 2] years around the index inclusions. 90% confidence intervals obtained from robust standard errors clustered by firm and year are plotted.

Panel A. All MSCI EM index inclusions



Panel B. China A-Share inclusions in the MSCI EM index

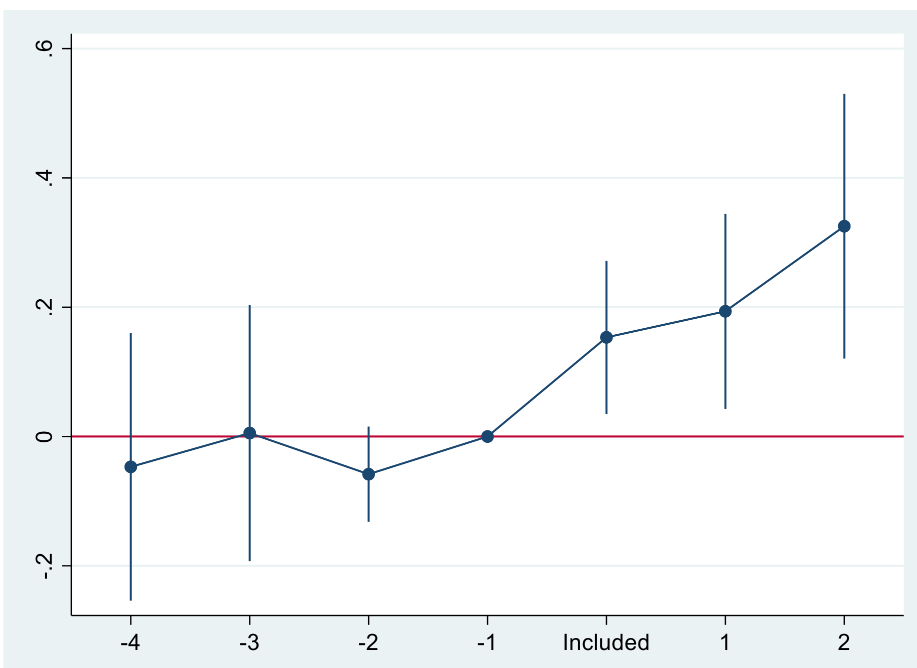


Table 1. Descriptive Statistics

This table reports the summary statistics of sample firms used in our empirical analysis from 2003 to 2020. Financial and environmental characteristics for emerging market firms are presented in Panel A. Detailed description of the variables is presented in Appendix A.1. Continuous variables are winsorized at the 1% and 99% levels.

	Obs.	Mean	St. Dev.	P1	P25	Median	P75	P99
Total assets ($ millions)	10,002	23.10	73.31	0.17	1.50	3.83	12.11	537.13
Log total assets	10,002	15.34	1.62	12.07	14.22	15.16	16.31	20.10
Log sales	9,885	14.48	1.50	11.20	13.46	14.38	15.40	18.36
Log market capitalization	9,993	15.06	1.17	12.47	14.32	14.95	15.72	18.49
Log physical assets	9,726	18.38	3.86	11.13	16.07	17.62	19.71	31.39
Log capital expenditure	9,707	16.54	3.80	9.71	14.27	15.80	17.89	29.33
Market-to-book	9,990	0.26	0.52	0.00	0.03	0.09	0.27	2.52
Profitability	9,950	0.11	0.09	-0.14	0.05	0.10	0.15	0.40
			GHG emission (million tCO_2e)					
Scope 1	10,006	2.629	8.184	0.000	0.008	0.044	0.405	46.3
Scope 2	10,006	0.252	0.674	0.000	0.010	0.040	0.161	4.451
Scope 3 (Upstream)	10,006	1.223	3.099	0.004	0.063	0.221	0.839	20.1
Direct	10,006	2.664	8.225	0.000	0.008	0.044	0.407	46.5
Indirect	10,006	0.833	2.140	0.002	0.033	0.134	0.499	14.5
			GHG emission intensity (emission/sales)					
Scope 1	9,889	0.791	6.518	0.000	0.008	0.028	0.183	12.483
Scope 2	9,889	0.072	0.208	0.000	0.010	0.026	0.062	0.798
Scope 3 (Upstream)	9,889	0.264	0.669	0.009	0.058	0.143	0.318	1.554
Direct	9,889	0.803	6.526	0.000	0.008	0.023	0.184	12.569
Indirect	9,889	0.191	0.441	0.002	0.033	0.076	0.210	1.425

Table 2. Firm Expansion and GHG Emission Levels around MSCI EM Index Inclusions

In this table, we present the difference-in-differences regression results of firm financials and GHG emission levels with various scope definitions around the MSCI EM index inclusion. The sample consists of treated and matched control firms for a window of [-3, 2] years around the index inclusions. In Panel A, we consider firm financial variables with the log sales, log total assets, log number of employees, or profitability as the dependent variables. In Panel B, we consider Scope 1, Scope 2 Scope 3, direct, or indirect GHG emission as the dependent variables, all in log terms. Included is an indicator variable that takes the value of 1 if the firm is newly included to MSCI EM index and 0 for the matched control firms. Post is an indicator variable which is 1 if a given year is on or after a firm or its matched control firms are newly included into the index and zero otherwise. We include firm, country-by-year, and industry-by-year fixed effects. All continuous variables are winsorized at the 1% and 99% levels. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Firm financials

	Dependent variables:			
	(1)	(2)	(3)	(4)
	Log sales	Log total assets	Log employees	Profitability
Post	-0.049***	-0.045***	-0.053***	-0.004
	(-3.287)	(-4.238)	(-4.205)	(-1.436)
Included × Post	0.148***	0.138***	0.103***	0.010***
	(9.745)	(9.015)	(5.51)	(3.47)
Observations	10,003	10,001	8,442	9,932
Adjusted R-squared	0.988	0.987	0.975	0.750
Firm FE	YES	YES	YES	YES
Country ×Year FE	YES	YES	YES	YES
Industry ×Year FE	YES	YES	YES	YES

Panel B. GHG emission levels

	Dependent variables: Log GHG emission				
	(1)	(2)	(3)	(4)	(5)
	Scope 1	Scope 2	Scope 3	Direct	Indirect
Post	-0.053*	-0.049**	-0.045**	-0.048*	-0.042**
	(-2.038)	(-2.555)	(-2.462)	(-1.825)	(-2.606)
Included × Post	0.205***	0.189***	0.156***	0.201***	0.173***
	(5.415)	(7.233)	(6.977)	(5.254)	(8.424)
Observations	10,006	10,006	10,006	10,006	10,006
Adjusted R-squared	0.97	0.942	0.979	0.97	0.971
Firm FE	YES	YES	YES	YES	YES
Country ×Year FE	YES	YES	YES	YES	YES
Industry ×Year FE	YES	YES	YES	YES	YES

Table 3. GHG Emission intensity Around the MSCI EM Index Inclusions

In this table, we present the difference-in-differences regression results of GHG emission intensity with various scope definitions around the MSCI EM index inclusions. The sample consists of treated and matched control firms for a window of [-3, 2] years around the index inclusions. We consider Scope 1, Scope 2 Scope 3, direct, or indirect GHG emission intensity as the dependent variables, all in log terms. Included is an indicator variable that takes the value of 1 if the firm is newly included to MSCI EM index and 0 for the matched control firms. Post is an indicator variable which is 1 if a given year is on or after a firm or its matched control firms are newly included into the index and zero otherwise. We include firm, country-by-year, and industry-by-year fixed effects. All continuous variables are winsorized at the 1% and 99% levels. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variables: Log GHG emission intensity				
	(1)	(2)	(3)	(4)	(5)
	Scope 1	Scope 2	Scope 3	Direct	Indirect
Post	-0.029	-0.029	-0.028	-0.025	-0.023
	(-1.131)	(-1.215)	(-1.523)	(-0.967)	(-1.458)
Included × Post	0.123***	0.108***	0.080***	0.120***	0.093***
	(3.233)	(4.041)	(3.962)	(3.135)	(4.373)
Observations	9,882	9,882	9,882	9,882	9,882
Adjusted R-squared	0.956	0.900	0.936	0.956	0.935
Firm FE	YES	YES	YES	YES	YES
Country ×Year FE	YES	YES	YES	YES	YES
Industry ×Year FE	YES	YES	YES	YES	YES

Table 4. China A-Share MSCI EM Index Inclusions

In this table, we present the difference-in-differences regression results of GHG emission intensity with various scope definitions as in Table 3, but with a specific focus on market-wide China A-Share inclusions into the MSCI EM index in 2018 and 2019. The sample consists of treated and matched control firms for a window of [-3, 2] years around the index inclusions. We consider Scope 1, Scope 2 Scope 3, direct, or indirect GHG emission intensity as the dependent variables, all in log terms. Included is an indicator variable that takes the value of 1 if the firm is newly included to MSCI EM index and 0 for the matched control firms. Post is an indicator variable which is 1 if a given year is on or after a firm or its matched control firms are newly included into the index and zero otherwise. We include firm, country-by-year, and industry-by-year fixed effects. All continuous variables are winsorized at the 1% and 99% levels. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variables: Log GHG emission intensity				
	(1)	(2)	(3)	(4)	(5)
	Scope 1	Scope 2	Scope 3	Direct	Indirect
Post	-0.037	-0.040	-0.056**	-0.035	-0.043
	(-0.946)	(-1.476)	(-2.283)	(-0.912)	(-1.355)
Included × Post	0.174**	0.114**	0.115***	0.172**	0.122**
	(2.610)	(2.523)	(4.207)	(2.630)	(2.971)
Observations	3,749	3,749	3,749	3,749	3,749
Adjusted R-squared	0.947	0.888	0.932	0.947	0.929
Firm FE	YES	YES	YES	YES	YES
Industry ×Year FE	YES	YES	YES	YES	YES

Table 5. GHG Emission Intensity Around the MSCI EM Index Inclusions by Geographic Regions

In this table, we present the difference-in-differences regression results of GHG emission intensity as in Table 3, but for various subsamples based on geographic regions (Panel A) or industry sectors (Panel B). In all specifications, we consider the log Scope 1 GHG emission intensity as the dependent variable. In Panel A, we divide our sample into (1) South and Southeast Asia, (2) China, (3) East Asia, (4) Europe, Middle East, and Africa, and (5) Latin America. South and Southeast Asia consists of Philippines, India, Pakistan, Indonesia, Thailand, and Malaysia, while East Asia consists of South Korea, Hong Kong, Taiwan, and Singapore. In Panel B, we divide our sample firms' industry sectors into (1) power generation, (2) manufacturing, (3) wholesale/retail, and (4) information and financial and services. All other specifications are identical to Table 3. All continuous variables are winsorized at the 1% and 99% levels. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Log Scope 1 GHG emission intensity				
	(1)	(2)	(3)	(4)	(5)
	South/SE Asia	China	East Asia	Europe, Middle East & Africa	Latin America
Post	-0.109	-0.02	0.057	-0.108	0.177
	(-1.429)	(-0.505)	(0.680)	(-0.533)	(1.161)
Included × Post	0.14*	0.119*	0.03	0.055	-0.067
	(2.054)	(2.060)	(0.307)	(0.215)	(-0.531)
Observations	1,398	4,314	1,125	615	684
Adjusted R-squared	0.981	0.950	0.932	0.944	0.954
Firm FE	YES	YES	YES	YES	YES
Country ×Year FE	YES	NO	YES	YES	YES
Industry ×Year FE	YES	YES	YES	YES	YES

Table 6. GHG Emission intensity Around the MSCI DM Index Inclusions

In this table, we present the difference-in-differences regression results of GHG emission intensity with various scope definitions as in Table 3, but for a sample of treated and matched control firms for a window of [-3, 2] years around the MSCI DM index inclusions. Matching for DM firms is performed in the identical manner to EM index inclusion events. We consider Scope 1, Scope 2, Scope 3 (upstream), direct, or indirect GHG emission intensity as the dependent variable, all in log terms. Included is an indicator variable that takes the value of 1 if the firm is newly included to MSCI DM index and 0 for the matched control firms. Post is an indicator variable which is 1 if a given year is on or after a firm or its matched control firms are newly included into the index and zero otherwise. We include firm, country-by-year, and industry-by-year fixed effects. All continuous variables are winsorized at the 1% and 99% levels. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Log GHG emission intensity				
	(1)	(2)	(3)	(4)	(5)
	Scope 1	Scope 2	Scope 3	Direct	Indirect
Post	-0.005	-0.033	-0.016	-0.003	-0.019
	(-0.182)	(-1.131)	(-1.101)	(-0.112)	(-1.112)
Included × Post	-0.004	0.058	0.026*	-0.007	0.052**
	(-0.142)	(1.41)	(1.782)	(-0.241)	(2.321)
Observations	10,532	10,532	10,532	10,532	10,532
Adjusted R-squared	0.959	0.898	0.937	0.959	0.942
Firm FE	YES	YES	YES	YES	YES
Country ×Year FE	YES	YES	YES	YES	YES
Industry ×Year FE	YES	YES	YES	YES	YES

Table 7. Evidence on GHG Emission Abatement Activities Around the MSCI Index Inclusions

In this table, we present the difference-in-differences regression results of corporate GHG emission reduction targets (Panel A) and environmental expenditure (Panel B) around the MSCI EM or DM index inclusions. The sample consists of treated and matched control firms for a window of [-3, 2] years around the index inclusions. In Panel A, we consider the firm's stated emission reduction target (expressed in percentage) as the dependent variable. In Panel B, we consider the firm's log environmental expenditure as the dependent variable. The data on emission reduction target and environmental expenditure are obtained from Refinitiv ESG (formerly Asset4). In columns (1) and (3) of both panels, we include firm and year fixed effects, while in columns (2) and (4), we include firm, country-by-year, and industry-by-year fixed effects. Columns (1) and (2) of both panels present the result for EM index inclusions, while columns (3) and (4) present the results for DM index inclusions. All continuous variables are winsorized at the 1% and 99% levels. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Percentage emission reduction target

	Dependent variable: Emission reduction target			
	Emerging Market		Developed Market	
	(1)	(2)	(3)	(4)
Post	1.322	0.729	-0.057	0.460
	(1.261)	(0.564)	(-0.093)	(0.722)
Included × Post	-2.660**	-1.232	0.366	0.055
	(-2.283)	(-1.232)	(0.500)	(0.079)
Observations	3,973	3,019	6,230	4,783
Adjusted R-squared	0.337	0.397	0.387	0.388
Firm FE	YES	YES	YES	YES
Year FE	YES	NO	YES	NO
Country ×Year FE	NO	YES	NO	YES
Industry ×Year FE	NO	YES	NO	YES

Panel B. Environmental Expenditure

	Dependent variable: Environmental expenditure/Sales			
	Emerging Market		Developed Market	
	(1)	(2)	(3)	(4)
Post	0.434	2.705**	-0.106	-0.543
	(1.422)	(3.894)	(-0.285)	(-1.030)
Included × Post	-0.529*	-2.567*	0.264	1.067***
	(-2.007)	(-2.514)	(0.946)	(4.026)
Observations	612	168	489	84
Adjusted R-squared	0.889	0.816	0.775	0.797
Firm FE	YES	YES	YES	YES
Year FE	YES	NO	YES	NO
Country ×Year FE	NO	YES	NO	YES
Industry ×Year FE	NO	YES	NO	YES

Table 8. Fund Characteristics and GHG Emission intensity

In this table, we present the difference-in-differences regression results of GHG emission intensity of our treated and matched controls around the MSCI EM index inclusions, but on the basis of whether the increased shareholdings are driven by funds with different characteristics. Panel A includes all MSCI EM index inclusions and Panel B focuses on China A-share MSCI EM index inclusions. The dependent variable is log Scope 1 GHG emission intensity. We create a number of indicator variables. First, D(Active MF > Passive MF) takes the value of one if the shareholdings of active mutual funds (MF) is higher than that of passive funds a month before the index inclusions. Second, Post X D(Big 3 > Other than Big 3 Passive MF) is the value of one if the shareholdings by Big 3 passive mutual funds is higher than that of other passive mutual funds a month before the index inclusions. Third, D(Low > High Year-to-Date Return) takes the value of one if the shareholdings of mutual funds with below-median year-to-date fund return is higher than that of above-median peers a month before the index inclusions. Fourth, D(Low > High Fossil Fuel Score MF) takes the value of one if the shareholdings of mutual funds with lower than median fossil fuel score by Morningstar is higher than that of funds with above-median score a month before the index inclusions. We obtain funds' fossil fuel score from Morningstar and use the latest quarterly median as the cut-off. Fifth, D(High > Low Env. Score MF) is computed in an analogous manner using the funds' Sustainalytics portfolio environmental score. Finally, D(Δ High > Δ Low Stringent EPS MF) takes the value of one if the shareholdings of mutual funds selling to investors in high environmental policy stringency (EPS) countries is higher than that of funds selling to investors in low EPS countries a month before the index inclusions. Countries are defined as high (low) EPS if its latest yearly OECD Environment Policy Stringency is higher (lower) than the median value for the same year. Post is an indicator variable which is 1 if a given year is on or after a firm or its matched control firms are newly included into the index or zero otherwise. All other specifications are identical to Table 3. Continuous variables are winsorized at the 1% and 99% levels. We include firm, country-by-year, and industry-by-year fixed effects in all specifications. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. All MSCI EM Index Inclusions

	Dependent variable: Log Scope 1 GHG emission intensity					
	(1)	(2)	(3)	(4)	(5)	(6)
Post	-0.034	-0.031	-0.007	-0.023	-0.013	0.019
	(-1.255)	(-1.127)	(-0.289)	(-0.779)	(-0.439)	(0.564)
Post × D(Low > High Turnover MF)	0.183***					
	(3.501)					
Post × D(Big 3 > Other than Big 3 Passive MF)		0.217***				
		(3.478)				
Post × D(Low > High Year-to-Date Return)			0.246***			
			(4.014)			
Post × D(Low > High Fossil Fuel Score MF)				0.426***		
				(2.979)		
Post × D(High > Low Env. Score MF)					0.272***	
					(4.476)	
Post × D(High > Low Stringent EPS MF)						0.285**
						(2.631)
Observations	6,643	4,835	6,536	3,674	5,376	3,822
Adjusted R-squared	0.957	0.955	0.958	0.949	0.952	0.949
Firm FE	YES	YES	YES	YES	YES	YES
Country ×Year FE	YES	YES	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES	YES	YES

Panel B. China A-Share MSCI EM Index Inclusions

	Dependent variable: Log Scope 1 GHG emission intensity					
	(1)		(2)	(3)	(4)	(5)
Post	-0.051	-0.066	-0.003	-0.041	-0.024	0.008
	(-1.014)	(-1.242)	(-0.065)	(-0.835)	(-0.643)	-0.121
Post × D(Low > High Turnover MF)	0.233**					
	(2.768)					
Post × D(Big 3 > Other than Big 3 Passive MF)		0.664***				
		(3.114)				
Post × D(Low > High Year-to-Date Return)			0.326***			
			(4.400)			
Post × D(Low > High Fossil Fuel Score MF)				0.443***		
				(5.272)		
Post × D(High > Low Env. Score MF)					0.315***	
					(4.374)	
Post × D(High > Low Stringent EPS MF)						0.318*
						(1.930)
Observations	2,941	1,996	2,714	1,230	2,686	1,101
Adjusted R-squared	0.946	0.927	0.949	0.929	0.947	0.924
Firm FE	YES	YES	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES	YES	YES

Table 9. Cross-Sectional Variation in GHG Emission intensity: Firm-Level Environmental Policy Stringency, Emission Levels, and Capital Intensity

In this table, we present the difference-in-differences regression results of GHG emission intensity of our treated and matched controls around the MSCI EM index inclusions, but on the basis of whether (i) the firm resides in countries with high or low EPS, (ii) countries with high or low GHG emission level per capita, and (iii) the firm operates in capital-intensive or non-capital-intensity industries. The dependent variable is log Scope 1 GHG emission intensity. We divide our sample into subsamples on the basis of whether the countries' latest (1) Environmental Policy Stringency, (2) market-based (taxes, permits, and certificates) Environmental Policy Stringency, and (3) public R&D expenditure on clean technology scores are higher or lower than the sample median at the same point in time. Subsamples using carbon emission per capita are calculated analogously. The data on Environmental Policy Stringency score is from the OECD. Finally, we consider firms to be in high capital-intensive industry if industry-average capital intensity, asset-to-sales, is in top tercile and in low capital-intensive industry if that is in bottom tercile at the same point in time. Post is an indicator variable which is 1 if a given year is on or after a firm or its matched control firms are newly included into the index or zero otherwise. All other specifications are identical to Table 3. Continuous variables are winsorized at the 1% and 99% levels. We include firm, country-by-year, and industry-by-year fixed effects in all specifications. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Log Scope 1 GHG emission intensity	
	(1)	(2)
(1) Environmental Policy Stringency	Low	High
Included × Post	0.140***	-0.219
	(3.013)	(-0.983)
(2) Market-based Environmental Policy Stringency	Low	High
Included × Post	0.074*	-0.552
	(1.807)	(-1.578)
(3) R&D Subsidy for environmental projects	Low	High
Included × Post	0.143***	-0.221
	(3.087)	(-1.427)
(4) Carbon emission per capita	Low	High
Included × Post	-0.003	0.130**
	(-0.039)	(2.629)
(5) Industry-level capital intensity	Low	High
Included × Post	-0.037	0.146**
	(-0.548)	(2.700)
Firm FE	YES	YES
Country ×Year FE	YES	YES
Industry ×Year FE	YES	YES

Table 10. Post-Inclusion Stock Returns of MSCI-Included Firms

In this table, we present regression results of stock returns of firms that are included in the MSCI EM and DM indices. As the dependent variable, we consider stock returns summed over the following three time horizons relative to the inclusion year: 0, [1, 2], and [0, 2]. We create an EM inclusion indicator variable that takes the value of 1 for EM included firms and 0 for DM included firms. As controls, we include log market capitalization, log market-to-book, profitability, and investment, and we include year fixed effect. Continuous variables are winsorized at the 1% and 99% levels. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Stock returns		
	(1)	(2)	(3)
	Year 0	Year [1, 2]	Year [0, 2]
EM inclusion	0.009***	0.009***	0.011***
	(5.538)	(4.076)	(4.366)
Controls	YES	YES	YES
Observations	2,682	2,682	2,682
Adjusted R-squared	0.356	0.294	0.191
Year FE	YES	YES	YES

Table 11. Portfolio-Level Changes in GHG Emission Intensity Around the MSCI Index Inclusions

In this table, we examine how the portfolio-level GHG emission intensity of funds holding MSCI-included and control firms change around the inclusion events. For each fund-year pair, we calculate holding-weighted average log emission intensity defined according to various scopes. We then classify a fund as a "treated fund" if it holds positive amounts of MSCI-included EM (or DM) firms but does not hold any control firm at the year of inclusion. Analogously, a fund is classified as a "control fund" if it holds positive amount of control firms but without any holding in a MSCI-included firm at the year of inclusion. We then compute the difference in yearly change in GHG emission intensity of treated and control funds. In columns (1) though (5), no fixed effect is included, while we include year fixed effects in columns (6) through (10). Panel A report the results for EM index inclusions, while Panel B report the results for DM index inclusions. For the standalone change in GHG emission intensity change of treated and control funds, see Table A.10. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Emerging Market

	Average log GHG emission intensity change Difference between treated funds – control funds									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Scope 1	Scope 2	Scope 3	Direct	Indirect	Scope 1	Scope 2	Scope 3	Direct	Indirect
	-0.113**	-0.035	-0.045	-0.114**	-0.045	-0.091**	0.005	-0.020	-0.090**	-0.014
	(-2.37)	(-0.98)	(-1.45)	(-2.32)	(-1.37)	(-2.22)	(0.22)	(-1.08)	(-2.13)	(-0.70)
Observations	43,286	43,286	43,286	43,286	43,286	43,286	43,286	43,286	43,286	43,286
Year FE	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES

Panel B. Developed Market

	Average log GHG emission intensity change Difference between treated funds – control funds									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Scope 1	Scope 2	Scope 3	Direct	Indirect	Scope 1	Scope 2	Scope 3	Direct	Indirect
	0.013	0.032	0.003	0.014	0.018	-0.001	0.014	0.014**	0.000	0.016*
	(0.49)	(1.67)	(0.15)	(0.52)	(1.06)	(-0.06)	(1.16)	(2.47)	(0.01)	(1.97)
Observations	72,783	72,783	72,783	72,783	72,783	72,783	72,783	72,783	72,783	72,783
Year FE	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES

Internet Appendix to:

"Does Foreign Institutional Capital Promote Green Growth for Emerging Market Firms?"

This Version: July 5, 2023

Table A.1. Firm Expansion and GHG Emission Levels around the MSCI DM Index Inclusions

In this table, we present the descriptive statistics for the sample of treated and matched control firms for the MSCI DM index inclusion events. The sample consists of treated and matched control firms for a window of [-3, 2] years around the index inclusions.

	Obs.	Mean	St. Dev.	P1	P25	Median	P75	P99
Total assets ($ millions)	10,532	24.586	69.543	0.206	2.184	5.142	14.133	537.128
Log total assets	10,532	15.606	1.553	12.237	14.597	15.453	16.464	20.102
Log sales	10,525	15.389	1.905	11.269	14.093	15.133	16.469	20.624
Log market capitalization	10,513	15.474	1.133	12.801	14.764	15.413	16.114	18.524
Log physical assets	10,526	14.198	2.235	9.196	12.661	14.159	15.619	19.894
Log capital expenditure	10,522	12.424	2.046	7.855	11.029	12.335	13.643	17.604
Market-to-book	10,513	1.795	1.715	0.117	0.815	1.225	2.066	9.020
Profitability	10,493	0.117	0.105	-0.226	0.065	0.111	0.165	0.416
GHG emission (million tCO_2e)								
Scope 1	10,532	1.659	6.448	0.000	0.008	0.044	0.269	46.300
Scope 2	10,532	0.269	0.666	0.000	0.014	0.050	0.185	4.451
Scope 3 (Upstream)	10,532	1.529	3.689	0.004	0.078	0.289	1.114	23.100
Direct	10,532	1.671	6.460	0.000	0.008	0.044	0.273	46.500
Indirect	10,532	0.890	2.213	0.002	0.039	0.159	0.615	14.500
GHG emission intensity (emission/sales)								
Scope 1	10,532	0.283	1.175	0.000	0.005	0.017	0.057	5.848
Scope 2	10,532	0.052	0.167	0.000	0.009	0.020	0.048	0.539
Scope 3 (Upstream)	10,532	0.195	0.288	0.011	0.051	0.107	0.245	1.364
Direct	10,532	0.285	1.179	0.000	0.005	0.017	0.058	5.849
Indirect	10,532	0.132	0.260	0.003	0.025	0.061	0.144	1.143

Table A.2. Characteristics of MSCI Included and Matched Control Firms

This table reports the differences in firm characteristics of treated (MSCI-included), all non-MSCI, and matched control firms. For more information on the matching procedure, refer to the explanation provided in Figure 4. Differences between the subsamples are tested using regression with year fixed effect and *p*-values associated with standard errors clustered by year are reported. All continuous variables are winsorized at the 1% and 99% levels. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

	Mean			Test of difference (*p*-value)	
	MSCI included	Non-MSCI	Matched control	MSCI – non-MSCI	MSCI – matched control
Total assets	23.295	20.234	14.318	0.007***	0.460
Market capitalization	8.34	7.92	4.722	0.211	0.145
Sales	6.211	6.835	4.783	0.483	0.554
Profitability	0.124	0.097	0.107	< 0.000***	0.041**
Physical assets	2.628	3.045	2.534	0.291	0.650
Capital expenditure	0.435	0.447	0.372	0.102*	0.924
Market-to-book	0.265	0.739	0.272	< 0.000***	0.728
GHG (Scope 1)	2.379	1.538	2.277	< 0.000***	0.720
Observations	1,073	107,498	1,019		

Table A.3. Changes in Mutual Fund Ownership Around the MSCI Index Inclusions

This table presents the monthly change in (i) total and (ii) foreign mutual fund shareholdings before and after the firms' inclusions to the MSCI Index. Included is an indicator variable that takes the value of 1 if the firm is newly included to MSCI index and 0 for the matched control. t indicates the month of index inclusion. We consider all inclusions to the EM index in columns (1) and (2), China A-Share inclusions to the EM index in 2018 and 2019 in columns (3) and (4), and DM index inclusions in 2018 and 2019 in columns (5) and (6). The month before the inclusion is the base month for the analysis, and thus all coefficients present the differences relative to month $t-1$. Continuous variables are winsorized at the 1% and 99% levels. We include firm, country-by-month, and industry-by-month fixed effects in all specifications. All continuous variables are winsorized at the 1% and 99% levels. t-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and month are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variables:					
	(1)	(2)	(3)	(4)	(5)	(6)
	EM index inclusions		China A-Share EM index inclusions		DM index inclusions	
Month	Total fund shareholdings	Foreign fund shareholdings	Total fund shareholdings	Foreign fund shareholdings	Total fund shareholdings	Foreign fund shareholdings
	(1)	(2)	(3)	(4)	(5)	(6)
$(t-5)$ × Included	-0.012*	-0.014**	-0.041**	-0.044***	0.001	-0.001
	(-1.752)	(-2.337)	(-2.144)	(-3.109)	(0.224)	(-0.621)
$(t-4)$ × Included	-0.004	-0.007**	-0.021	-0.025**	0.001	-0.000
	(-0.905)	(-2.267)	(-1.312)	(-2.295)	(0.353)	(-0.239)
$(t-3)$ × Included	-0.001	-0.004	-0.010	-0.014	0.000	-0.001
	(-0.449)	(-1.408)	(-0.991)	(-1.570)	(-0.121)	(-0.540)
$(t-2)$ × Included	-0.005	-0.004	-0.016	-0.013	0.000	-0.001
	(-1.089)	(-1.466)	(-1.340)	(-1.613)	(-0.12)	(-0.689)
t × Included	0.012***	0.009***	0.015	0.012**	0.017***	0.011***
	(2.993)	(3.376)	(1.299)	(2.270)	(5.707)	(6.382)
$(t+1)$ × Included	0.015***	0.011***	0.021**	0.014**	0.022***	0.014***
	(3.393)	(3.129)	(2.149)	(2.229)	(5.307)	(6.617)
$(t+2)$ × Included	0.013***	0.011***	0.013	0.016*	0.028***	0.016***
	(3.196)	(3.076)	(1.178)	(1.885)	(5.706)	(6.488)
$(t+3)$ × Included	0.011**	0.010***	0.002	0.002	0.027***	0.016***
	(2.342)	(2.960)	(0.081)	(0.171)	(5.597)	(6.528)
Observations	10,573	10,584	5,712	5,712	18,770	18,868
Adjusted R-squared	0.904	0.951	0.872	0.96	0.927	0.903
Firm FE	YES	YES	YES	YES	YES	YES
Country × Month FE	YES	YES	YES	YES	YES	YES
Industry × Month FE	YES	YES	YES	YES	YES	YES

Table A.4. Investment Mandates of U.S. International Equity Funds

In Panel A of this table, we report the number of U.S. international equity funds (defined as those with the first two letters of CRSP objective code "EF" in the CRSP Survivor-Bias-Free Mutual Funds database) that refers to an MSCI index in the principal investment strategy (PIS) section of their fund prospectus filed in the EDGAR database for each year-end between 2010 and 2020. We collect fund prospectuses between 2010Q1 and 2020Q4. For each fund-quarter, we classify a fund as having an "MSCI mandate" if the reference to an MSCI index is made at least once within the latest four quarters (as many funds report full prospectuses to the EDGAR database only at annual frequency). In Panel B, we report their aggregate assets under management (AUM). In both panels, we separately report the figures for passive and active funds.

Panel A. Number of MSCI mandate funds

	No. of U.S. International Equity Funds								
	Full sample			Passive funds			Active funds		
Year-End	Funds with MSCI mandate	All funds	MSCI mandate %	Funds with MSCI mandate	All funds	MSCI mandate %	Funds with MSCI mandate	All funds	MSCI mandate %
2010	174	1472	11.8%	42	311	13.5%	132	1161	11.4%
2011	238	1574	15.1%	85	354	24.0%	153	1220	12.5%
2012	313	1700	18.4%	115	395	29.1%	198	1305	15.2%
2013	380	1765	21.5%	130	428	30.4%	250	1337	18.7%
2014	406	1857	21.9%	134	468	28.6%	272	1389	19.6%
2015	471	2006	23.5%	156	527	29.6%	315	1479	21.3%
2016	548	2041	26.8%	189	570	33.2%	359	1471	24.4%
2017	586	2009	29.2%	198	567	34.9%	388	1442	26.9%
2018	612	2042	30.0%	206	623	33.1%	406	1419	28.6%
2019	607	2026	30.0%	198	631	31.4%	409	1395	29.3%
2020	595	1894	31.4%	199	584	34.1%	396	1310	30.2%

Panel B. MSCI mandate funds' AUMs

	AUM of U.S. International Equity Funds ($ bn)								
	Full sample			Passive funds			Active funds		
Year-End	Funds with MSCI mandate	All funds	MSCI mandate %	Funds with MSCI mandate	All funds	MSCI mandate %	Funds with MSCI mandate	All funds	MSCI mandate %
2010	384.3	1840.1	20.9%	191.4	454.0	42.2%	192.9	1386.1	13.9%
2011	366.2	1595.9	22.9%	279.5	408.1	68.5%	86.6	1187.8	7.3%
2012	522.3	1957.5	26.7%	371.4	539.6	68.8%	150.8	1417.9	10.6%
2013	625.9	2471.9	25.3%	411.7	708.7	58.1%	214.2	1763.2	12.1%
2014	467.2	2513.2	18.6%	238.9	755.7	31.6%	228.3	1757.4	13.0%
2015	521.2	2633.9	19.8%	272.1	783.7	34.7%	249.1	1850.2	13.5%
2016	622.4	2844.4	21.9%	308.3	870.0	35.4%	314.2	1974.3	15.9%
2017	890.7	3834.4	23.2%	487.8	1365.5	35.7%	403.0	2469.0	16.3%
2018	777.7	3324.2	23.4%	424.9	1257.9	33.8%	352.8	2066.4	17.1%
2019	836.9	3997.9	20.9%	347.0	1532.7	22.6%	489.9	2465.2	19.9%
2020	801.8	4341.4	18.5%	370.9	1633.2	22.7%	431.0	2708.2	15.9%

Table A.5. Mutual fund shareholdings and GHG Emission intensity

In this table, we present the regression results of next-year log Scope 1 GHG emission intensity on various measures of mutual fund shareholdings for all EM firms, regardless of whether they are included in the MSCI EM index. As the dependent variable, we focus on one-year-ahead GHG emission intensity with various scope definitions. We control for log total assets, leverage, market-to-book, profitability, and tangibility, all in lagged values, as well as firm and country-by-industry-by-year fixed effects. All continuous variables are winsorized at the 1% and 99% levels. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Log Scope 1 GHG emission intensity					
	(1)	(2)	(3)	(4)	(5)	(6)
Domestic fund shareholdings	-0.061					
	(-0.585)					
Domestic passive shareholdings		-0.455				
		(-1.240)				
Domestic active shareholdings			-0.019			
			(-0.169)			
Foreign fund shareholdings				0.128**		
				(1.975)		
Foreign passive fund shareholdings					0.139	
					(0.585)	
Foreign active fund shareholdings						0.122*
						(1.838)
Controls	YES	YES	YES	YES	YES	YES
Observations	67,757	67,757	67,757	67,757	67,757	67,757
Adjusted R-squared	0.987	0.988	0.988	0.988	0.988	0.988
Firm FE	YES	YES	YES	YES	YES	YES
Country × Industry × Year FE	YES	YES	YES	YES	YES	YES

Table A.6. Firm Expansion and GHG Emission Levels around China A-Share MSCI EM Index Inclusions

In this table, we present the difference-in-differences regression results of firm financials and GHG emission levels with various scope definitions as in Table 2, but with a specific focus on China A-Share inclusions into the EM index in 2018 and 2019 as in Table 4. The sample consists of treated and matched control firms for a window of [-3, 2] years around the index inclusions. In Panel A, we consider firm financial variables with the log sales, log total assets, log number of employees, or profitability as the dependent variable. In Panel B, we consider Scope 1, Scope 2 Scope 3, direct, or indirect GHG emission as the dependent variable, all in log terms. Included is an indicator variable that takes the value of 1 if the firm is newly included to MSCI EM index and 0 for the matched control firms. Post is an indicator variable which is 1 if a given year is on or after a firm or its matched control firms are newly included into the index and zero otherwise. We include firm, country-by-year, and industry-by-year fixed effects. All continuous variables are winsorized at the 1% and 99% levels. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Firm financials

	Dependent variables:			
	(1)	(2)	(3)	(4)
	Log sales	Log total assets	Log employees	Profitability
Post	-0.055*	-0.035**	-0.039**	-0.006
	(-1.857)	(-2.698)	(-2.392)	(0.006)
Included × Post	0.131***	0.111***	0.089***	0.015***
	(5.598)	(5.19)	(3.423)	(.004)
Observations	3,747	3,747	3,717	3,710
Adjusted R-squared	0.973	0.989	0.98	0.801
Firm FE	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES

Panel B. GHG emission levels

	Dependent variables: Log GHG emission				
	(1)	(2)	(3)	(4)	(5)
	Scope 1	Scope 2	Scope 3	Direct	Indirect
Post	-0.037	-0.041*	-0.057	-0.035	-0.043
	(-0.704)	(-1.945)	(-1.56)	(-0.675)	(-0.981)
Included × Post	0.218***	0.158***	0.159***	0.216***	0.167***
	(3.404)	(4.099)	(4.606)	(3.414)	(4.435)
Observations	3,749	3,749	3,749	3,749	3,749
Adjusted R-squared	0.963	0.941	0.976	0.963	0.967
Firm FE	YES	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES	YES

Table A.7. GHG Emissions Around Local Index Inclusions

In this table, we present the difference-in-differences regression results of GHG emission intensity with various scope definitions as in Table 3, but for a sample of treated and matched control firms for a window of [-3, 2] years around the CSI 300 index inclusions. Matching is performed in the identical manner to EM index inclusion events. In Panel A, we consider firm financial variables with the log sales, log total assets, log number of employees, or profitability as the dependent variables. In Panel B, We consider Scope 1, Scope 2, and Scope 3 (upstream), GHG level emissions and intensity as the dependent variables, all in log terms. Included is an indicator variable that takes the value of 1 if the firm is newly included to CSI 300 index and 0 for the matched control firms. Post is an indicator variable which is 1 if a given year is on or after a firm or its matched control firms are newly included into the index and zero otherwise. We include firm and industry-by-year fixed effects. All continuous variables are winsorized at the 1% and 99% levels. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Firm financials

	Dependent variables:			
	(1)	(2)	(3)	(4)
	Log sales	Log total assets	Log employee	Profitability
Post	-0.007	-0.011	0.004	0.005
	(-0.231)	(-0.445)	(0.149)	(1.245)
Included × Post	0.047	0.067*	0.023	-0.001
	(1.119)	(2.095)	(0.521)	(-0.169)
Observations	1,810	1,810	1,794	1,804
Adjusted R-squared	0.976	0.985	0.976	0.650
Firm FE	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES

Panel B. GHG emission

	Dependent variables:					
	(1)	(2)	(3)	(4)	(5)	(6)
	GHG Scope 1		GHG Scope 2		GHG Scope 3	
	Level	Intensity	Level	Intensity	Level	Intensity
Post	0.004	-0.027	-0.100	-0.076	0.022	0.010
	(0.059)	(-0.459)	(-1.671)	(-1.635)	(0.729)	(0.256)
Included × Post	0.041	0.114	0.088	0.084	0.016	0.040
	(0.429)	(1.280)	(1.227)	(1.153)	(0.371)	(0.803)
Observations	1,810	1,762	1,810	1,762	1,810	1,762
Adjusted R-squared	0.969	0.950	0.950	0.904	0.979	0.907
Firm FE	YES	YES	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES	YES	YES

Table A.8. Disclosure Quality and GHG Emission Intensity

In this table, we present the difference-in-differences regression results of disclosure quality on carbon emission and GHG Scope 1 intensity around MSCI index inclusions. Disclosure quality is the weighted disclosure score of various scopes of carbon emissions from Trucost, with the amount of emission of each scope as the weight. Log Scope 1 GHG emission intensity is defined as in Table 3. Included is an indicator variable that takes the value of 1 if the firm is newly included to MSCI EM index and 0 for the matched control firms. Post is an indicator variable which is 1 if a given year is on or after a firm or its matched control firms are newly included into the index and zero otherwise. We consider all inclusions to the EM index in columns (1) and (3) and China A-Share inclusions to the EM index in 2018 and 2019 in columns (2) and (4). The sample consists of treated and matched control firms for a window of [-3, 2] years around the index inclusions. In columns (3) and (4), the sample includes the firms whose disclosure quality did not change after the index inclusions. We include firm, country-by-year, and industry-by-year fixed effects. All continuous variables are winsorized at the 1% and 99% levels. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variables:			
	(1)	(2)	(3)	(4)
	Disclosure quality		Log Scope 1 GHG emission intensity	
	All EM index inclusions	China A-share inclusions	All EM index inclusions	China A-share inclusions
Post	-2.361	-3.044	0.011	-0.067
	(-1.454)	(-1.707)	(0.254)	(-1.011)
Included × Post	3.644**	4.504**	0.125**	0.263**
	(2.815)	(2.493)	(2.183)	(3.029)
Observations	9,993	3,749	5,954	2,176
Adjusted R-squared	0.813	0.747	0.962	0.953
Firm FE	YES	YES	YES	YES
Country × Year FE	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES

Table A.9. Firm Expansion and GHG Emission Levels around the MSCI DM Index Inclusions

In this table, we present the difference-in-differences regression results of firm financials and GHG emission levels with various scope definitions as in Table 2, but for the sample of treated and matched control firms for the MSCI DM index inclusion events. The sample consists of treated and matched control firms for a window of [-3, 2] years around the index inclusions. In Panel A, we consider firm financial variables with the log sales, log total assets, log number of employees, or profitability as the dependent variables. In Panel B, we consider Scope 1, Scope 2 Scope 3, direct, or indirect GHG emission as the dependent variables, all in log terms. All other specifications are identical to Table 2. All continuous variables are winsorized at the 1% and 99% levels. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Firm financials

	Dependent variables:			
	(1)	(2)	(3)	(4)
	Log sales	Log total assets	Log employees	Profitability
Post	-0.056***	-0.039**	-0.012	-0.004
	(-3.290)	(-2.234)	(-0.802)	(-0.939)
Included × Post	0.134***	0.178***	0.101***	0.006*
	(8.383)	(10.568)	(6.177)	(1.755)
Observations	10,556	10,565	9,859	10,517
Adjusted R-squared	0.986	0.976	0.984	0.733
Firm FE	YES	YES	YES	YES
Country × Year FE	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES

Panel B. GHG emission levels

	Dependent variables: Log GHG emission				
	(1)	(2)	(3)	(4)	(5)
	Scope 1	Scope 2	Scope 3	Direct	Indirect
Post	-0.044	-0.073**	-0.056***	-0.042	-0.059**
	(-1.301)	(-2.325)	(-3.27)	(-1.228)	(-2.522)
Included × Post	0.093***	0.156***	0.125***	0.09***	0.15***
	(3.046)	(4.124)	(7.263)	(2.96)	(7.147)
Observations	10,565	10,565	10,565	10,565	10,565
Adjusted R-squared	0.971	0.946	0.981	0.972	0.975
Firm FE	YES	YES	YES	YES	YES
Country × Year FE	YES	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES	YES

Table A.10. Other Types of Local Pollution Around MSCI EM Index Inclusions

In this table, we present the difference-in-differences regression results of waste and air pollution around the MSCI Emerging Market (EM) index (Panel A) and market-wide China A-Share inclusions into the MSCI EM index (Panel B). The sample consists of treated and matched control firms for a window of [-3, 2] years around the index inclusions. We consider air and waste pollution intensity as the dependent variables, all in log terms. Air pollution is pollutants released to air by the consumption of fossil fuels and production processes. Waste pollution consists of the (1) amount of waste generation deposited in landfill and (2) amount of incinerated waste. Included is an indicator variable that takes the value of 1 if the firm is newly included to MSCI EM index and 0 for the matched control firms. Post is an indicator variable which is 1 if a given year is on or after a firm or its matched control firms are newly included into the index and zero otherwise. We include firm, country-by-year, and industry-by-year fixed effects in Panel A and include firm and industry-by-year fixed effects in Panel B. All continuous variables are winsorized at the 1% and 99% levels. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. All MSCI EM Index Inclusions

	Dependent variables:		
	(1)	(2)	(3)
	Air pollution intensity	Waste landfill intensity	Waste incineration intensity
Post	-0.021	-0.047*	-0.025
	(-1.210)	(-2.107)	(-0.787)
Included × Post	0.066***	0.106***	0.12***
	(3.178)	(4.221)	(4.420)
Observations	9,882	9,803	9,692
Adjusted R-squared	0.947	0.868	0.813
Firm FE	YES	YES	YES
Country × Year FE	YES	YES	YES
Industry × Year FE	YES	YES	YES

Panel B. China A-Share MSCI EM Inclusions

	Dependent variables:		
	(1)	(2)	(3)
	Air pollution intensity	Waste landfill intensity	Waste incineration intensity
Post	-0.043	-0.071**	-0.046
	(-1.782)	(-2.194)	(-1.316)
Included × Post	0.107***	0.131***	0.145***
	(3.636)	(4.472)	(5.144)
Observations	3,749	3,688	3,699
Adjusted R-squared	0.943	0.846	0.835
Firm FE	YES	YES	YES
Industry × Year FE	YES	YES	YES

Table A.11. Portfolio-Level Changes in GHG Emission Intensity Around the MSCI Index Inclusions

In this table, we report the average log GHG emission intensity change of treated and control funds. Treated and control funds are defined as follows. For each fund-year pair, we calculate holding-weighted average log emission intensity defined according to various scopes. We then classify a fund as a "treated fund" if it holds positive amounts of MSCI-included EM (or DM) firms but does not hold any control firm at the year of inclusion. Analogously, a fund is classified as a "control fund" if it holds positive amount of control firms but without any holding in a MSCI-included firm at the year of inclusion. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Emerging Market

	Average log GHG emission intensity change									
	Treated funds					Control funds				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Scope 1	Scope 2	Scope 3	Direct	Indirect	Scope 1	Scope 2	Scope 3	Direct	Indirect
	-0.134***	-0.026	-0.051	-0.133***	-0.042	-0.021	0.009	-0.006	-0.019	0.003
	(-3.98)	(-0.71)	(-1.66)	(-3.63)	(-1.35)	(-0.54)	(0.33)	(-0.17)	(-0.50)	(0.09)
Observations	23,789	23,789	23,789	23,789	23,789	19,497	19,497	19,497	19,497	19,497
Year FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Panel B. Developed Market

	Average log GHG emission intensity change									
	Treated funds					Control funds				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Scope 1	Scope 2	Scope 3	Direct	Indirect	Scope 1	Scope 2	Scope 3	Direct	Indirect
	-0.064**	-0.003	-0.019	-0.061**	-0.011	-0.076**	-0.035	-0.021	-0.075**	-0.029
	(-2.33)	(-0.12)	(-0.83)	(-2.28)	(-0.52)	(-2.30)	(-1.23)	(-0.74)	(-2.23)	(-1.12)
Observations	57,898	57,898	57,898	57,898	57,898	14,885	14,885	14,885	14,885	14,885
Year FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Table A.12. Portfolio-Level Changes in GHG Emission Intensity Around the MSCI Index Inclusions: Alternative Classification

In this table, we examine how the portfolio-level GHG emission intensity of funds holding MSCI-included and control firms change around the inclusion events. For each fund-year pair, we calculate holding-weighted average log emission intensity defined according to various scopes. We then classify a fund as a "treated fund" if it holds positive amounts of MSCI-included EM (or DM) firms that has been included within the past three years but does not hold any control firm over the same horizon. A "control fund" is defined analogously. We then compute the difference in yearly change in GHG emission intensity of treated and control funds. In columns (1) though (5), no fixed effect is included, while we include year fixed effects in columns (6) through (10). Panel A report the results for EM index inclusions, while Panel B report the results for DM index inclusions. For the standalone change in GHG emission intensity change of treated and control funds, see Table A.10. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Emerging Market

	Average log GHG emission intensity change Difference between treated funds – control funds									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Scope 1	Scope 2	Scope 3	Direct	Indirect	Scope 1	Scope 2	Scope 3	Direct	Indirect
	-0.076**	-0.031	-0.036*	-0.073*	-0.034	-0.059*	-0.012	-0.019	-0.056	-0.018
	(-2.21)	(-1.30)	(-1.86)	(-2.02)	(-1.66)	(-1.82)	(-0.51)	(-1.21)	(-1.61)	(-0.96)
Observations	65,888	65,888	65,888	65,888	65,888	65,888	65,888	65,888	65,888	65,888
Year FE	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES

Panel B. Developed Market

	Average log GHG emission intensity change Difference between treated funds – control funds									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Scope 1	Scope 2	Scope 3	Direct	Indirect	Scope 1	Scope 2	Scope 3	Direct	Indirect
	0.036	0.023	0.019	0.036	0.023*	0.009	-0.011	0.015**	0.009	0.007
	(1.64)	(1.42)	(1.37)	(1.65)	(1.95)	(0.43)	(-0.69)	(2.16)	(0.45)	(0.72)
Observations	94,377	94,377	94,377	94,377	94,377	94,377	94,377	94,377	94,377	94,377
Year FE	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES

Table A.13. Shareholder Activism Around the MSCI Index Inclusion

In this table, we present the difference-in-difference regression on the shareholder proposals around MSCI index inclusion. Dependent variables are number of agreed profit-driven shareholder proposals (e.g. proposal is regarding short-term profit-seeking, for example on sale of assets, share repurchases, or dividend policies) divided by the number of agreed shareholder proposals in each firm-year for columns for columns (1) and (3), and number of agreed environment-related shareholder proposals (e.g. proposal is regarding environment, for example on climate change, sustainability, or energy policies of the firm, or requirements for the board members or directors of the firm) divided by the number of agreed shareholder proposals in each firm-year for columns (2) and (4). In columns (1) and (2), the sample consists of emerging market firms, and in columns (3) and (4), the sample consists of developed market firms. All other specifications are identical to Table 3. We include firm, country-by-year, and industry-by-year fixed effects. All continuous variables are winsorized at the 1% and 99% levels. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variables: Proportion of shareholder proposals agreed			
	Emerging Market		Developed Market	
	(1) Profit-driven agendas	(2) Environmental agendas	(3) Profit-driven agendas	(4) Environmental agendas
Post	-3.178***	0.020**	0.170	0.010
	(-4.374)	(2.245)	(0.279)	(0.145)
Included × Post	2.997***	-0.026**	0.158	-0.019
	(3.668)	(-2.557)	(0.261)	(-0.266)
Observations	4,539	4,539	4,476	4,476
Adjusted R-squared	0.362	0.722	0.640	0.326
Firm FE	YES	YES	YES	YES
Country × Year FE	YES	YES	YES	YES
Industry × Year FE	YES	YES	YES	YES

Table A.14. Environment-Related ESG Violation Around the MSCI Index Inclusions

In Panel A of this table, we present the difference-in-differences regression results of the likelihood of environment-related ESG violation around the MSCI EM index inclusions. The sample consists of treated and matched control firms for a window of [-3, 2] years around the index inclusions. The dependent variables are indicator variables that take the value of one if a firm has violation linked to (1) all environmental-related, (2) climate and GHG pollution, (3) local pollution, or (4) waste issues in a given year. Included is an indicator variable that takes the value of 1 if the firm is newly included to MSCI EM index and 0 for the matched control firms. Post is an indicator variable which is 1 if a given year is on or after a firm or its matched control firms are newly included into the index and zero otherwise. Then, in Panel B, we run difference-in-difference regressions separately for each geographic region, with all environment-related violation indicator as the dependent variable. Finally, in Panel C, we present the results for our sample firms around the MSCI DM index inclusions instead. We include firm, country-by-year, and industry-by-year fixed effects in all specifications. All continuous variables are winsorized at the 1% and 99% levels. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and year are presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Emerging Market

	Dependent variables: ESG violation indicator			
	Incidents related to			
	(1)	(2)	(3)	(4)
	All environment-related	Climate and GHG pollution	Local pollution	Waste
Post	-0.032	0.034	-0.160	-0.018
	(-.136)	(0.310)	(-1.083)	(-.201)
Included × Post	0.425**	0.163*	0.362**	0.185***
	(2.492)	(1.707)	(2.883)	(3.080)
Observations	2,145	2,145	2,145	2,145
Adjusted R-squared	0.853	0.717	0.798	0.585
Firm FE	YES	YES	YES	YES
Country ×Year FE	YES	YES	YES	YES
Industry ×Year FE	YES	YES	YES	YES

Panel B. Developed Market

	Dependent variables: ESG violation indicator			
	(1)	(2)	(3)	(4)
	Incidents related to			
	All environment-related	Climate and GHG pollution	Local pollution	Waste
Post	0.693	0.196	0.410	0.083
	(1.050)	(0.929)	(0.810)	(0.551)
Included × Post	-0.082	-0.010	-0.078	0.086
	(-0.153)	(-0.083)	(-0.205)	(0.370)
Observations	2,076	2,076	2,076	2,076
Adjusted R-squared	0.851	0.852	0.733	0.605
Firm FE	YES	YES	YES	YES
Country ×Year FE	YES	YES	YES	YES
Industry ×Year FE	YES	YES	YES	YES