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

Sophia Chiyoung Cheong City University of Hong Kong Jaewon Choi University of Illinois and Yonsei University Sangeun Ha Copenhagen

**Business School** 

Ji Yeol Jimmy Oh Hanyang University

This draft: January 15, 2023

#### Abstract

We examine how foreign institutional capital affects carbon emissions in emerging market firms. As shocks to foreign institutional capital, we consider firm-level inclusions in the MSCI Index as well as the market-level inclusion of China A-Shares, the latter of which further isolates foreign capital shocks unrelated to firm characteristics. After index inclusions, emerging market firms grow substantially in sales and profit margins, but at the expense of both higher direct and indirect carbon emission levels, with further increases in emission intensity over the longer term. In contrast, carbon emissions decrease for developed market firms after MSCI inclusions. We also find that capital inflows from markets with more stringent environmental policies lead to greater emissions for firms in markets with less stringent environmental policies. Overall, our results suggest greenwashing and outsourcing of pollution on the part of foreign institutional investors, and that environmental considerations may be given a lower priority when emerging market firms utilize foreign capital for firm growth.

JEL Classification: G15, G23, Q54

Keywords: Carbon emission, climate risk, corporate social responsibility, ESG, international institutional investors, emerging market, MSCI

<sup>\*</sup> Sophia Chiyoung Cheong, Department of Economics and Finance, City University of Hong Kong. E-mail: <u>c.cheong@cityu.edu.hk</u>. Jaewon Choi, University of Illinois Urbana-Champaign and Yonsei University. E-mail: <u>jaewchoi@illinois.edu</u>. Sangeun Ha, Copenhagen Business School. Email: <u>sha.fi@cbs.dk</u>. Ji Yeol Jimmy Oh, Hanyang Business School, Hanyang University. E-mail: <u>jyjoh@hanyang.ac.kr</u>.

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## 1. Introduction

Carbon net zero has become the primary goal among global asset managers. Achieving this goal in emerging markets is particularly important as greenhouse gas (GHG) emissions in emerging economies have exceeded those of the developed economies.<sup>1</sup> Despite the sustained effort of developed economies in curbing GHG emissions, carbon net zero would be extremely difficult unless there is accompanying GHG reductions in emerging economies. Nevertheless, reliance on fossil fuels is viewed by many as an unavoidable cost to pay to reduce poverty and drive development in emerging economies, an integral part of the United Nation's Sustainable Development Goals along with climate awareness. In this paper, we examine whether global asset managers, most of whom are based in developed markets, help reduce GHG emissions in emerging market firms while also facilitating their economic growth—that is, green growth for these emerging market companies.

It is a priori not clear how foreign investors affect green growth for emerging market firms visà-vis developed market firms. On one hand, foreign institutional investors, particularly from those markets with better climate awareness and regulations, would promote green growth, as much as spreading better environmental, social, and governance (ESG) in international firms as a whole.<sup>3</sup> To the extent that foreign investors do not have diverging incentives between developed and emerging market investing, we would expect the relationship between foreign investment and carbon emissions for developed market firms to extend for emerging market firms.

On the other hand, foreign investors might not necessarily stimulate green growth in emerging market firms. First, public attention and social pressure on environmental issues (e.g., DellaVigna, List, and Malmendier, 2012) as well as the regulatory agenda on corporate environmental performance, may be less ambitious in emerging markets than in developed markets. As Matos (2020) notes, "[d]ifferent

<sup>&</sup>lt;sup>1</sup> China's GHG emissions alone, at 14 gigatons per year, surpassed the emissions of all developed countries combined as of 2019 (https://rhg.com/research/chinas-emissions-surpass-developed-countries/).

<sup>&</sup>lt;sup>3</sup> as shown in Aggarwal et al. (2011), Chen et al. (2020), Dyck et al. (2019), Krueger, Sautner, and Starks (2020).

regions around the world are proceeding at different speeds on ESG regulation (p. 11)," with the European Union setting particularly aggressive agenda compared to the rest of the world.<sup>4</sup> If the institutional investors face different levels of social pressure on "greenness" in emerging markets compared with developed markets, their willingness to improve the environmental performances of their portfolio firms in emerging markets may also consequently change. Second, foreign investors may choose to focus on financial performances rather than carbon reductions of their portfolio firms in emerging markets can underperform their less-friendly counterparts (e.g., Hong and Kacperczyk, 2009; Chava, 2014; Barber, Morse, and Yasuda, 2021), an equilibrium outcome emanating from investors having different tastes on ESG investing (Pástor, Stambaugh, and Taylor, 2021) as ESG-oriented investors accept a lower return in equilibrium. Institutional investors may opt to compensate for such compromised financial performances with emerging market investments.

To examine foreign-investor-driven green growth, we focus on index inclusions to the Morgan Stanley Capital International (MSCI) Emerging Markets Index as an exogenous driver of foreign institutional investments. Our first identification setting uses firm-level inclusions to the MSCI Emerging market Index in line with the approaches of 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), comparing firms newly added to the Index with peer firms in the same country-industry pair that are similar in observable characteristics, selected through nearest neighbor matching to ensure a meaningful comparison. As these index inclusions can be driven by changes in unobservable firm-level factors, our second identification setting exploits the effect of market-level inclusions to the MSCI Emerging Market Index, which are less likely to be affected by firm-level factors. To this end, we consider

<sup>&</sup>lt;sup>4</sup> After all, ample studies document notable differences between developed and emerging markets in various other facets of asset pricing and corporate finance. For example, developed and emerging markets are known to differ substantially in terms of stock market illiquidity and illiquidity premium (e.g., Lesmond, 2005; Amihud, Hameed, Kang, and Zhang, 2015), information environment (e.g., Morck, Yeung, and Yu, 2000; Griffin, Kelly, and Nardari, 2010), debt and equity financing patterns (e.g., Demirgüç-Kunt and Maksimovic, 1999; Booth, Aivazian, Demirgüç-Kunt, and Maksimovic, 2008), and corporate governance (e.g., Doidge, Karolyi, and Stulz, 2007).

the inclusion of China A shares to the Index in May 2018, which added *en masse*, for the first time, Chinese large- and mid-cap A shares that are into the index. This event, which increased the weights of Chinese A shares in the index between May 2018 and November 2019 in several steps, was not driven by changes in market capitalization of any individual firm, enabling us to examine the impact of an exogenous change in foreign investor capital on carbon emissions in Chinese A Share firms.

This empirical setting based on MSCI index inclusions also provides us with a nice laboratory for firm expansion opportunities. Given the sheer amounts of investor money following the MSCI Emerging Market Index (equivalent to US\$1.6 trillion as of 2017), the influx of foreign institutional capital into an emerging market would provide such an expansion opportunity for newly indexed firms, lowering their cost of capital and subsequently stimulating firm expansion. Importantly, many of global asset managers are increasingly subject to heightened investor scrutiny on the environmental performance of their portfolios and proactively assess climate risks in their investment considerations (e.g., Krueger, Sautner, and Starks, 2020). Thus, their presence may not only provide the portfolio firms with an expansion opportunity but also an opportunity to reshape their environmental, social, and governance (ESG) practices (Dyck, Lins, Roth, and Wagner, 2019). If these investors act as a catalyst for both firm expansion as well as an improvement in ESG performance, their presence would be an unambiguously positive influence for sustainable, green growth.

We examine the extent to which the entry of foreign institutional capital following MSCI index inclusions alleviates GHG emissions in emerging market firms for the period from 2003 and 2020. We employ a novel portfolio holdings data of equity mutual funds from 57 countries, provided by the Morningstar. Our measure of firm environmental performance is constructed using the data on corporate greenhouse gas (GHG) emission from Trucost, a widely accepted source of carbon emission data used by both Morgan Stanley Capital International (MSCI) and Standard and Poor's (S&P) in their ESG index evaluation (Azar, Duro, Kadach, and Ormazabal, 2021). In particular, by focusing on an objective, output-based measure of carbon emission rather than a potentially subjective assessment of a firm's general environment-related activities, we abstract from the ongoing debate over whether the conventional ESG scores truly capture the 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).

We document the following results from the empirical analysis of index-included firms in a difference-in-difference (DiD) setting. We first verify that inclusions into the MSCI index serve as shocks to foreign mutual fund holdings. Compared with the matched peer firms within the same country-industry pair, emerging market firms included into the MSCI Emerging Markets index experience a substantial increase in foreign mutual fund holdings, on average by 2.1% during inclusion months. A substantial part of this increase appears to be driven by foreign passive mutual funds, whose holdings naturally respond to a stock's inclusion into the benchmark index.

Our key research question is whether this influx of foreign institutional capital into the emerging markets brings about a significant reduction in corporate GHG emissions of their portfolio firms and thereby promotes green growth. We find evidence to the contrary. Relative to their matched peer firms, firms that are newly included in the MSCI Emerging Markets index subsequently increase their GHG emissions, both directly as well as indirectly. In terms of economic magnitude, we observe a nearly 7% increase in both direct and indirect GHG emissions relative to matched peer firms. These increases in GHG emissions are particularly evident in manufacturing-heavy regions such as China and South and Southeast Asia, compared with other regions including Europe, Americas, and East Asia. We confirm our findings when we focus on inclusions of Chinese A shares in the MSCI Emerging Markets index, with a sizeable increase in both direct and indirect GHG emissions following these firms' inclusion. In contrast to these results for emerging market firms, we find little evidence of increases in GHG emissions in developed market firms, following their inclusions into the MSCI World index for the developed markets.

This increase in GHG emission among MSCI-included firms in the emerging markets could stem from two sources. First, it may be a by-product of increased sales and productions, resulting from firm production expansion with the influx of foreign capital into the firm following index inclusions. Second, it can even be a result of the deterioration in emission standards if these emerging firms after index inclusions focus more on short-term profitability while sacrificing carbon reduction efforts. For a further examination of the source of the increased GHG emission, we examine the MSCI-included firm's financial performance as well as *per-dollar-revenue* intensity of GHG emission around index inclusions. As expected, the entry of foreign investors following the MSCI index inclusion acts as a catalyst for firm expansion, with sizable increases in firm sales, assets, and profit margin. Interestingly, we find the perrevenue intensity of GHG emission to remain largely unchanged in the short term (i.e., within three years), with a notable deterioration of direct emission intensity over the longer term (over the five-year horizons). The observed results are consistent with the MSCI-included firms utilizing the favorable equity financing conditions to expand production capacity at the prevailing levels of GHG emission standards, with a lack of investment in cleaner production technology eventually manifesting itself as a reduction in emission standards over the long term. Thus, while the foreign investor's presence promotes firm growth in the emerging market, the nature of the growth does not appear to be conducive to the carbon net zero goal, with a "migration of pollution standards" to the emerging markets over the long term (Vuillemey, 2020).

We then examine whether the cross-sectional variations in foreign fund characteristics matter for their portfolio firms' subsequent GHG emission decisions. First, we examine whether the investment horizon of foreign mutual fund matters. As Starks, Venkat, and Zhu (2020) note, investors with longer horizons may behave more patiently toward high-ESG-profile firms. In line with their findings, we find the increase in GHG emission to be more prominent among firms that experience an influx of shorthorizon mutual funds with high turnover. Second, we document strong evidence of "greenwashing," with the increased GHG emission of MSCI-included firms in the emerging market more evident among those that witness an influx of mutual funds with Morningstar Low Carbon designation and higher fundlevel portfolio environment score, suggesting that these "greener" funds' presence does not help reduce GHG emission of their portfolio firms in the emerging market. Finally, in line with the "migration of pollution standards" hypothesis, we find the increase in GHG emission to be more prominent when the MSCI-included firm experiences an influx of mutual fund investors from more stringent environmental policy standards. As a further support of the hypothesis, we find that the increased GHG emission is more notable among MSCI-included firms residing in countries with relatively lax environmental policy stringency with little public expenditure on clean technology research and development.

In addition to the carbon emissions, we provide additional evidence on how the influx of foreign investors affect the environmental performance of MSCI-included firms in the emerging market. To this end, we collect firm-level negative ESG news events from RepRisk, which comprehensively screens media, regulatory, and commercial documents for adverse ESG incidents. In line with the increased GHG emission, we document a significant increase in environment, pollution, and climate-related negative news events among our emerging market firms following the index inclusion. In contrast, we do not find a similar increase in adverse ESG events among MSCI-included firms in the developed market. The results are in line with the conjecture that the improvements to environmental standards are given a lower priority when firms in the emerging market utilize foreign investor capital for their expansion.

In the final analysis, we explore further into the mechanism through which foreign mutual fund investors could express their "voices" and influence the portfolio firms. Using the ISS Voting Analytics data, we check whether our sample of MSCI-included firms in the emerging market subsequently put forward more agenda items in the shareholder meetings. Given that proposals relating to ESG issues are very sparse among emerging market firms, we identify and focus on agenda items that are related to "profit-driven" issues. We find evidence that MSCI-included firms in the emerging market appear to prioritize profit-motivated shareholder agenda, with a significant increase in the number of such agenda items. Our RepRisk and voting analyses appear to be consistent with the conjecture that, during the firm expansion phase resulting from the index-inclusion-induced influx of foreign mutual fund investors, our sample firms in the emerging market prioritize conventional financial performance metrics at the longerterm detriment to the firm's environmental performance.

Literature Review. We contribute to the literature in 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 is in documenting whether the access to foreign investor financing acts not only as a catalyst for firm expansion but also better corporate environmental performance. Our evidence suggests that, while there is significant growth in firm sales and profit margin, the expansion occurs at the expense of short-term increase in overall GHG emission as well as longer-term deterioration in the emission intensity, suggesting the increased presence of foreign mutual fund investors is insufficient to promote green growth among emerging market firms.

Second, we contribute to the literature on whether institutional investors' engagement has a material impact on their portfolio firms, particularly with regards to 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). 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 the emerging market compared to the developed market. By employing a plausibly exogenous shock to foreign investor holdings using the inclusion of Chinese A shares into the MSCI Emerging Markets index, we reveal a causal link, namely that the increased presence of foreign passive investors may not have a favorable implication for their portfolio firms' GHG emissions in the emerging market. In doing so, 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 institutional investors' role in reducing the climate risk of portfolio firms may not be homogeneous across the world, and that in emerging markets, they may actually exacerbate these risks.

Finally, our paper is also related to the literature on the investors' ESG preferences. While studies find that investors do respond to sustainability profiles of mutual funds (e.g., Hartzmark and Sussman, 2019), studies also reveal some noticeable differences in the degree to which investors prefer assets with strong ESG characteristics. Indeed, a number of recent papers theoretically explore the asset pricing implications of ESG investors on the premise of such heterogeneity in ESG preferences (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 worsening the GHG emission among firms residing in countries with poor environmental regulatory standards. In fact, our evidence appears largely consistent with the "outsourcing" of pollution standards, whereby investors from stringent regulatory environments worsening the GHG emission of their portfolio firms in less stringent environments (e.g., Dai et al, 2022). Thus, we highlight that investors' ESG preferences may not yield the identical corporate GHG emission outcomes across firms operating in different regulatory environments.

## 2. 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 this data with the data on GHG emission from S&P Global Trucost Environmental, global fund holding data from Morningstar, and international financial statement data from Datastream Worldscope. In addition to the GHG emission data, we collect the data on adverse ESG-related events from RepRisk and shareholder voting agenda and mutual fund voting record from ISS Voting Analytics.

#### 2.1. MSCI equity indices

MSCI's international equity indices are widely used by institutional investors, with the assets under management of ETFs following MSCI's ACWI, World, and Emerging Markets indices exceeding \$170 billion dollars. MSCI classifies the global stock markets into World (developed), Emerging Markets, and Frontier Markets, with the countries not included in any of these indices being Standalone Market. MSCI first defines their equity universe by identifying eligible securities in each country's stock market. The inclusion depends on a mechanical set of criteria, details of which are illustrated in the Appendix. The countries are then classified into World, Emerging, Frontier, or Standalone Markets. For the purpose of our study, we classify firms to be in the developed market if it resides in a country constituting the MSCI World index and in the emerging market if the country is part of the MSCI Emerging Markets index.

Individual firms can be included and excluded from the indices, and similarly, countries can be reclassified in and out of these indices. For example, most recently, Russia was removed from the Emerging Markets in March 2022 following the outbreak of the War in Ukraine. A country may be reclassified into and out of an index on multiple occasions; for example, Pakistan was classified from Frontier to Emerging Markets in May 2017 but reclassified back into Frontier Markets in November 2021. For the purpose of our paper, we focus on the inclusion of Chinese A shares into the MSCI Emerging Markets. Chinese A shares had initially been designed for purchases by mainland Chinese citizens only. They are listed in one of the two mainland Chinese exchanges, namely Shanghai Stock Exchange (SSE) or Shenzhen Stock Exchange (SZSE), are quoted in RMB, and were completely unavailable for foreign purchases until 2002. Given their lack of investability from the foreign institutional investors' perspective, they were initially not included in the MSCI Emerging Markets index. However, following a set of market reforms by the Chinese government that relaxed these capital control measures, MSCI decided to partially include these A shares in the Emerging Markets in addition to the B shares that were already part of the Emerging Markets index in May 2018. In five gradual steps between May 2018 and November 2019, large- and mid-cap Chinese A shares were gradually assigned a larger weight

within the Emerging Markets index, with their combined weight within the index rising from 0% to 5.1% by August 2020.

#### 2.2. Firm-level GHG Emission

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

The main variable used in this study is GHG emissions in metric tons of  $CO_2$  equivalent), which is divided into three "scopes." Scope 1 measures GHG emissions from resources owned directly by the company itself. Scope 2 measures emissions from resources that are owned by other companies but produced specifically for the company, mostly the emissions 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 travels by suppliers and product disposals. Using these three scopes, Trucost also calculates a firm's "direct" and "indirect" GHG emission, both in terms of  $CO_2$  emission as well as in dollar terms of the externality costs associated with the emission. 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 itself but along the entire supply chain, allowing us to better discern the firm's role in the global effort toward the "carbon net zero" process.

## 2.3. Fund characteristics and holdings

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

We then supplement this information with the information on fund characteristics from Morningstar Direct, including the data on monthly returns and flows, assets under management, expenses, Morningstar category and ratings (both in terms of financial and sustainability performance), and the sustainability characteristics of the funds' portfolios. The data also contains information on whether a fund is a passive or an active fund. We convert the assets under management, expressed in local currency, into U.S. dollars using the month-end exchange rate available in Datastream Worldscope to make fund sizes comparable across different countries. Since international securities are either identified through CINS (CUSIP International Numbering System) or ISIN, we first convert all CINS to ISIN by obtaining the CINS-ISIN matching data from Thomson Eikon.

By summing the number of shares held at each month-end, and by dividing this 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 funds that satisfy a particular fund characteristic criterion. For example, we separately calculate the percentage holdings of passive versus active funds as well as those of foreign versus domestic funds. We calculate the percentage holdings of a firm's common shares only, using the security type information in Morningstar as well as Datastream Worldscope to exclude preferred and other non-common shares. For the purpose of classifying mutual funds into "foreign" and "domestic," we consider the sales region of the fund as reported in Morningstar Direct. This is important, as many of the funds in the European Union, for example, tend to be domiciled in Luxembourg to take advantage of "passporting" rights and market across other countries in the European Union. Thus, we define a fund to be "foreign" if local investors in the market do not have access to the said fund when making investment decisions.

#### 2.4. Financial accounting information

Data on financial accounting and stock security information are collected from Datastream Worldscope. We use this to compute financial variables such as the market-to-book ratio following the standard definition in the literature. We collect the data expressed in local currency first and calculate percentage and percentage growth variables to exclude any change induced by the change in exchange rate. We then convert assets and sales figure into U.S. dollars to ensure full comparability between different countries. We match these financial and stock information to the S&P Trucost data, which enables us to examine the effect of foreign investor holdings on GHG emissions while controlling for an array of firm-level financial characteristics.

### 2.5. Information on negative ESG events

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

#### 2.6. Mutual fund voting information

We use ISS Voting Analytics to obtain data on mutual fund voting records. ISS Voting Analytics provide the U.S. mutual fund voting records for all institutions that file the SEC Form N-PX, and other global institutions outside of SEC disclosure requirements that ISS covers. The coverage spans over 25,000 funds voting for over 35,000 companies from over 100 countries. We count the number of agendas proposed by the companies, and the number of agendas that were voted in favor of the companies by mutual funds, for each firm-year. We then map this to our main dataset, that covers the firm included in the MSCI ACWI index and the matched control firms.

#### **TABLE 1 HERE**

In Table 1, we report the summary statistics of our sample, separately for developed and emerging markets. 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 emission between developed and emerging market firms. For example, the mean value of direct GHG emission among emerging market firms is 2.3 million tons of  $CO_2$  equivalent, while the comparable figure for developed market firms stands at 0.9 million tons, which is only around 40% of the emerging market firms' emission. A similar picture emerges for indirect GHG emission, with the emerging and developed market firms' average indirect emission at 0.4 and 0.8 million tons of  $CO_2$  equivalent, respectively. Given that the average level of corporate GHG emission is substantially higher among emerging market firms, understanding the factors that drive their level of overall GHG emission is integral to the global efforts to reduce the level of climate risk.

#### FIGURE 1 HERE

Prior to examining the relationship between foreign institutional ownership and the level of corporate GHG emission in more detail, we graphically illustrate their *prima facie* association in Figure 1. Specifically, we average the firm-level foreign institutional ownership (using the holdings information from the FactSet/Lionshare database) and direct GHG emission for each country over our sample period. Panel A presents the relationship in the emerging market, while Panel B does so for the developed market. Whereas there is little association between the two in the developed market, with the fitted slope trending marginally downward, as illustrated in Panel B, we observe a more noticeable positive relation between the two variables among emerging market countries in Panel A. The graphical evidence in Figure 1 suggests that an increase foreign ownership may not have a homogeneous impact on the environmental profile of their portfolio firms depending on the level of financial development of where the firm resides.

## 3. MSCI Inclusion and Fund Holding Change

Our key empirical analysis requires instances whereby an exogenous influx of foreign investors that provides an expansion opportunity for firms in the emerging markets. After all, an empirical analysis of changes to a firm's foreign investor holdings and its environmental performance has a challenge, namely that both factors may be driven by an unobserved firm-specific factor. Thus, to establish a causal relationship between the two, we require a plausibly exogenous change in the holdings of foreign institutional investors. To this end, we exploit a firm's inclusion to the MSCI World or Emerging Markets index (Aggarwal, Erel, Ferreira, and Matos, 2011; Bena, Ferreira, Matos, and Pires, 2017; Dyck, Lins, Roth, and Wagner, 2019), given that a firm's inclusion in the MSCI index is largely mechanically determined based on float-adjusted market capitalization. Specifically, we perform a difference-indifferences estimation around a firm's addition to the MSCI index. Even though the criteria for stock addition is mechanical, this is known to increase the presence of foreign investors that follow the MSCI indices as their benchmark, thus enabling us to use the inclusion as an exogenous shock to exposure to foreign investor holdings.

However, a stock's addition to the MSCI index is determined by observable firm characteristics such as market capitalization, raising the possibility that these firms may systematically differ from the rest of the sample firms in the S&P Trucost database. To address this issue, for every firm that has been added to the MSCI index in a given year, we identify control firms that are similar in their observable firm characteristics. We identify these control firms that have never been included in any of the MSCI indices using one-to-three nearest neighbor matching, with log total assets, leverage, market-to-book, profitability, and tangibility as matching variables, and with exact matching on country and year. This enables us to gauge the effect of a firm's inclusion in the MSCI index among firms with similar financial characteristics *within the same country* in a given year. Table A.1 in the Appendix reports whether firm characteristics differ systematically between MSCI-included and matched control firms in the emerging market. Prior to matching, we find that firms newly added to the MSCI index are, on average, substantially larger in size. In addition to being larger, MSCI-included firms hold significantly lower debt, are substantially more profitable, and enjoy more favorable market valuation as evidenced by a higher market-to-book ratio. Most importantly, MSCI-included firms are heavy polluters that emit nearly 1.5 million tons of CO<sub>2</sub> equivalent more than their non-included counterpart. When we compare MSCI-included and matched control firms, however, many of these glaring differences in firm financial characteristics disappear. While the MSCI-included firms are, by definition, smaller than the MSCI-included firms, differences in leverage and market-to-book largely disappear and lose statistical significance. The economic magnitude of the differences in log total assets and profitability of MSCI-included and matched control firms are noticeably smaller than when we compare the MSCI-included firms against the entire universe of non-MSCI firms. Above all, we no longer observe any statistically significant difference in the level of direct GHG emission prior to the MSCI included and matched control firms, our main variable of interest.

Using these MSCI-included and matched control firms, we examine the effect of an increase in foreign investor holdings following a firm's inclusion in the MSCI index using a difference-in-difference set-up. We consider the event window of three years prior to and after the MSCI index inclusion. Then, we interact the inclusion indicator, which takes the value of one for firms included in the MSCI index and zero for matched control firms, with the post-MSCI-inclusion indicator. Although we use firm-level financial variables as matching variables, we further include them as controls in all regressions. We use this set-up to examine whether (i) there is a material increase in foreign mutual fund holdings following a firm's inclusion in the MSCI index, and (ii) whether these firms subsequently increase or decrease their GHG emissions, both directly (as measured through Trucost's Scope 1) as well as indirectly along the entire supply chain (Scopes 2 and 3). These regressions are run separately for developed and emerging

markets to compare how the increase in foreign investor holdings affect their portfolio firms depending on the degree of the country's financial development.

While the firm-level stock additions have been widely used in the existing literature, we further corroborate our empirical analysis by focusing on a country-level inclusion, specifically the inclusion of Chinese A shares to the Emerging Markets index in May 2018, to further sharpen our identification strategy. Whereas individual firm-level additions may be driven by various firm characteristics, Chinese A share inclusions have distinct advantages for the purpose of identification, namely that (i) it is not driven by factors beyond the control of individual firms, and (ii) Chinese B shares have already been part of the MSCI Emerging Markets index for a long time at the time of Chinese A share inclusions, so this does not constitute the introduction of a "new" country into the index. We further rule out the effect of any China-specific factors that may have changed around the time of A share index inclusion at the industry level by including the country-by-industry-by-time fixed effect, which enables us to compare the environmental performance of firms within the same industry in a country at a given point in time.

## 4. Empirical Results

#### 4.1. MSCI index inclusion and foreign mutual fund shareholdings

Based on our identification strategy outlined in the previous section, we first examine whether foreign mutual funds increase their presence in firms that have been included in the MSCI index. For a window of [-5, 5] months around the MSCI index inclusion, and using the month-end prior to inclusion month as the basis of comparison, we compute the differences in mutual fund holdings between MSCIincluded and matched control firms. Specifically, we interact the MSCI-included indicator variable, which takes the value of one for firms included in the MSCI index and zero for matched control firms, with an indicator variable that takes the value of one for each of the month(s) relative to the inclusion month. As the dependent variable, we first consider total mutual fund shareholdings as well as separately for passive and active funds (following Morningstar's definition of index funds and ETFs). In addition, we consider foreign mutual fund shareholdings as well as foreign passive mutual fund shareholdings, the last of which is most likely to be affected by the MSCI index reconstitution. In addition to the difference-in-difference terms, we further include firm and country-by-industry-by-month fixed effect to focus on within-countryindustry variation in mutual fund shareholdings. Table 2 presents our results.

#### **TABLE 2 HERE**

Table 2 reports the results for the inclusion in the MSCI Emerging Markets index and MSCI World index. Regarding the Emerging Market index, reported in Columns (1) and (2), we observe an immediate increase in total and foreign fund shareholdings of MSCI-included firms relative to matched control firms by 1.49% and 2.09%, respectively. The difference remains highly significant in the first two months following the inclusion. This increase in shareholdings appear to be driven by foreign mutual funds; the increase in the shareholdings of foreign mutual funds is immediate from the month of inclusion, in both economic and statistical magnitude. The seeming delay in reaction may be accounted for by the fact that funds investing in the emerging market often report their holdings quarterly, gradually updating their change in holdings in response to the MSCI index reconstitution. Thus, we confirm that firms newly included in the MSCI index witness an ensuing increase in the presence of index-following foreign mutual funds.

We then repeat the analysis for the inclusion in the MSCI World index. The overall increase in mutual fund shareholdings following the inclusion in the MSCI index is also sizable in the developed market, with total fund shareholdings increasing significantly relative to matched control firms in the months following the index inclusion. We observe a similar, sustained increase in the shareholdings of foreign mutual funds as well. We graphically illustrate these differences in mutual fund shareholdings between MSCI-included and matched control firms in Figure 2; as is evident from both panels, we observe a noticeable upward spike in shareholdings at the month of inclusion in both the emerging and the developed markets, with the level of mutual fund shareholdings remaining higher in the ensuing months.

#### **FIGURE 2 HERE**

#### 4.2. MSCI index inclusion and corporate GHG emission in the emerging market

Prior to examining the impact of the influx of foreign mutual fund investors in emerging market firms following their inclusion in the MSCI index, we first document the relationship between the log level of GHG emissions and mutual fund investor holdings as *prima facie* evidence of whether foreign mutual fund investors' presence is significantly associated with GHG emission. To this end, we run a series of OLS regressions of next-year log GHG emission (scope 1) on various measures of mutual fund investor holdings and present the results in Table A.2., with lagged log total assets, leverage, market-tobook, profitability, and tangibility as firm-level controls and with firm and country-by-industry-by-year fixed effects. We find the association between total or passive fund holdings (either foreign or aggregated across foreign and domestic investors) and the level of GHG emissions to be largely insignificant, while (foreign) active fund holdings and GHG emissions have marginally significant positive association, with significance at the 10% level. Though we ought not to interpret this result as causal, given that mutual fund holdings and corporate GHG emissions may be driven by various unobserved heterogeneity, the evidence appears largely inconsistent with the notion of "green" growth, with the presence of (foreign) mutual fund investors not exhibiting a significantly negative association with GHG emission levels.

#### **TABLE 3 HERE**

We now ask the central research question of the paper: following a plausibly exogenous increase in foreign mutual fund shareholdings, does this increased presence have a detrimental effect on carbon emissions of their portfolio firms in the emerging market? To this end, we engage in difference-indifference regressions of GHG emission on the interaction of MSCI-included indicator variable and the post-inclusion indicator. Given that GHG emission data are available at an annual frequency, we separately consider both the short-term, defined as [-3, 2] years around the inclusion year, as well as the long-term, defined as [-3, 5] years, to examine both the immediate as well as the longer-term effect of the influx of foreign mutual funds into an MSCI-included firm in the emerging market. As the dependent variable, we examine the one-year-ahead log GHG emission, more specifically the three scopes of GHG emission, as well as direct and indirect emission of a firm. As earlier, we include both firm and countryby-industry-by-year fixed effects in all specifications, and in addition to the fixed effects, we include firmlevel financial variables used in the matching procedure, i.e., log total assets, leverage, market-to-book, profitability, and tangibility, as control variables. Table 3 presents the results for the emerging market.

Table 3 Columns (1), (2), (5), and (6) present the GHG emission results for the two scopes as defined in the Trucost database. Following the inclusion of our sample firms to the MSCI Emerging Markets index, we find that the direct measure of corporate GHG emission (scope 1) increase substantially relative to their matched control peers in both short and long term, specifically by 5.9% and 6.9%. The firms' use of electricity and energy (scope 2) also increases in the long run, but the coefficient lacks statistical significance in the short run. When we reclassify these emission measures into direct and indirect corporate emission in columns (3), (4), (7), and (8), we observe a significant increase in both measures by 5.7% and 4.1% in the short run, and 6.8% and 5.2% in the long run, respectively. Given that the average value of direct and indirect GHG emission stands at 2.32 and 0.76 million tons of CO<sub>2</sub> equivalent, respectively, this amounts to an increase in direct emission by 0.16 million tons of  $CO_2$ equivalent and indirect emission by another 0.04 million tons of CO2 equivalent. Thus, in total, we observe an increase in total emission by almost 0.2 million tons of CO<sub>2</sub> equivalent per firm index inclusion, which is a sizable increase. To put this number into perspective, one acre of U.S. forestland absorbs around 2.5 tons of carbon annually, so to neutralize the total increase in emission amounts from just one of our sample MSCI-included firms in the emerging market, an additional 80,000 acres of forestland is needed, more than a tenth the size of Yosemite National Park. Figure 3 Panel A presents this relationship graphically. On the X-axis are the years relative to index inclusion, and on the Y-axis are the difference in log GHG emission (scope 1) between the firms that were included in the MSCI Emerging Markets index and their matched control firms. The figure shows that the difference is hardly statistically

significant before index inclusion, but after inclusion, there is a statistically and economically significant difference in the emission level between the two groups that last for several years.

#### **FIGURE 3 HERE**

4.3. MSCI index inclusion and firm financial outcome in the emerging market

#### **TABLE 4 HERE**

For a better understanding of how MSCI-included firms' GHG emission changes with firm financial performance over time, we run similar difference-in-difference regressions with various financial outcome variables as the dependent variable instead in Table 4. Figure 4 presents this graphically as well. Specifically, we consider log total assets, log total sales, log total number of employees, profit margin, and capital investment. We find strong evidence of firm expansion following the influx of foreign mutual funds, in both short and long term, with firm assets, revenue, and the number of employees all significantly increasing after our sample firms' inclusion in the MSCI Emerging Markets index. In addition, the firm's profit margin, i.e., the ratio of net income over sales, also increase significantly. While capital investment does not respond significantly, the overall results strongly indicate that firms newly included in the MSCI Emerging Markets index use the influx of foreign investor capital to grow and produce more. It thus appears that, while substantial financial growth is achieved in the emerging market through the entry of foreign mutual funds, the nature of the growth does not seem to be "greener," occurring at the expense of the firm's longer-term environmental performance.

## **FIGURE 4 HERE**

#### 4.4. MSCI index inclusion and GHG emission intensity in the emerging market

The previous subsection establishes that an increase in foreign mutual fund ownership following the MSCI index inclusion induces an increase in the *level* of both direct and indirect corporate GHG emission in the emerging market. This increase in the level of GHG emission may occur for several reasons. On the one hand, foreign mutual funds may pressure firms in developing countries to deliver greater financial performance at all costs, with a deterioration in the overall environmental standards that lead to a subsequent increase in the per-revenue increase in GHG emission intensity. This would be the "worst case" scenario whereby the influx of foreign investors leads to a worsening of the standards itself. On the other hand, it is also possible that the focus of foreign mutual funds on conventional financial metrics may encourage their portfolio firms to produce and sell more output without a worsening of the environmental standards. Even so, if the increased production is not sufficiently negated through an accompanying improvement in the emission intensity, the total *level* of GHG emission would increase. Though this may not be as problematic as the worsening of the environmental standards, the economic magnitude considerations of the previous subsection suggests that the increased level of GHG emission alone would place supererogatory burden on the global efforts to achieve "carbon net zero." In any case, it is worth exploring into the relative likelihood of the two hypotheses.

#### **TABLE 5 HERE**

To this end, in Table 5, we examine whether an increase in the presence of foreign passive funds in the emerging market following the inclusion of the MSCI Emerging Markets index has a significant impact on the intensity of GHG emission, defined as the amount of GHG emission in million tons of CO<sub>2</sub> equivalent per each dollar of revenue. Specifically, we repeat the difference-in-difference regressions using the identical setting as in Table 3, but with these intensity measures as the dependent variable instead. Columns (1) through (4) of Table 5 indicates that the change in GHG emission intensity is largely insignificant in the short term, with most of the difference-in-difference terms lacking statistical significance regardless of how the emission scope is defined. However, columns (5) and (7) reveal the negative impact of the influx of foreign mutual fund capital on long-term direct GHG emission intensity; the direct per-revenue GHG emission intensity increases close to 6% over the 5 years following the MSCI inclusion compared to the 3-year period beforehand. While the GHG emission intensity does not deteriorate significantly in the short run, the sheer increase in production appears to be responsible for the increased level of GHG emission. However, the GHG emission intensity does deteriorate over the longer term, which, along with the significant increase in profit margin documented in column (4) of Table 4, suggests that the firm may be prioritizing financial profits at the expense of costly longer-term investment in clean technology, which eventually worsens the firm's longer-term GHG emission intensity.

#### 4.5. MSCI index inclusion and corporate GHG emission in the developed market

Our result so far documents how the GHG emission of emerging market firms respond to an influx of foreign mutual fund capital following their inclusion in the MSCI Emerging Market index. In this subsection, we examine whether we obtain similar patterns for MSCI-included firms in the developed market. To this end, we estimate the difference-in-difference regressions in the manner comparable to the previous three subsections using the carbon level, intensity, and financial outcome variables as the dependent variable, respectively. The results are presented in Table A.4.

In contrast to the firms in the emerging market, we do not observe a similar increase in the level of GHG emission following a developed market firm's inclusion in the MSCI World index, as evidenced in Table A.4. Panel A. We find that most of the difference-in-difference terms lack any statistical significance, and if anything, we find a slight decrease in indirect GHG emission relative to matched control firms in externality cost terms, with the coefficient marginally significant at the 10% level, in column (4) and (8). Thus, the increased presence of index-following mutual funds in response to the MSCI index inclusion appears to deteriorate the total GHG emission only in the emerging market but not in the developed market. We obtain a similar result when we examine per-revenue GHG emission intensity in Panel B, which does not respond significantly positively either in the short or in the long term, regardless of how we define the scope of GHG emission. In short, although the inclusion into the MSCI World index elicits a significant increase in mutual fund holdings in both the developed and the emerging market, we document that the deterioration in both the level and long-term intensity of GHG emission is largely a phenomenon pertaining only to the emerging market.

Panel C provides a hint as to why this might be the case. In contrast to the emerging market, we do not observe a similarly significant increase in firm size, sales, profit margin, or capital investment

following a firm's inclusion in the MSCI World index. In other words, the influx of mutual fund capital in response to the MSCI index inclusion does not appear to lead to a significant firm expansion in the developed market. One possible explanation for this is that, due to a higher level of financial development, the market frictions that impedes access to external capital and the ensuing need to set aside costly internal capital are less likely to be severe in the developed market in the first place. If so, the entry of mutual fund capital into an MSCI-included firm is less likely to make a material impact on firm expansion in the developed market, in contrast to the emerging market where the increased access to foreign external capital provides the MSCI-included firm with a significant expansion opportunity.

4.6. Regional analyses

#### **TABLE 6 HERE**

We also examine the estimates separately for various geographic regions, as reported in Table 6. We consider South and Southeast Asia, China, East Asia, and the rest of the world. We find the significant increase in GHG emissions to be particularly prominent in manufacturing-heavy countries in South/SE Asia and China, as Panel A Columns (1) and (2) indicate. We find a similar pattern for emission intensity as well. In the short run, for East Asian countries and European, Middle Eastern, and African countries, we find that the influx of foreign mutual funds into MSCI-included firms subsequently reduces the GHG emission intensity, with marginal statistical significance at the 10% level, as revealed in Panel B Column (3) and (4). However, in the long run, all of these columns lose statistical significance. If anything, Chinese firms increase their emission intensity, as evidenced by Panel B Column (2), suggesting that the increase in emission intensity is focused on manufacturing-heavy regions.

## 4.7. Country-level MSCI index inclusion of Chinese A shares

Our results so far examine the setting of MSCI index inclusions that occur at the individual firm level. Though the index inclusions are based on observable firm characteristics, the most important of which is market capitalization, it is preferable to consider a setting whereby index inclusion is not driven by individual firm characteristics that may be influenced by unobserved firm-level heterogeneity. To this end, in this subsection, we consider an arguably cleaner setting of the country-level inclusion of Chinese A shares into the MSCI Emerging Markets index between May 2018 and November 2019. Specifically, in Table 7, we estimate the difference-in-difference regressions comparing MSCI-included Chinese A share firms and their Chinese matched control peers, with the log level of GHG emission as the dependent variable, in the manner identical to Table 3. Table 7 presents the results.

#### **TABLE 7 HERE**

Following a plausible exogenous increase of foreign index-following investors,<sup>5</sup> we find that the GHG emission of Chinese A share firms substantially increase relative to their matched control peers. As before, both direct as well as indirect measures of GHG emission increase significantly, as revealed through the response of scopes 1 and 2 in Panel A Columns (1) and (2). In particular, the statistical significance of the difference-in-difference term is particularly strong for scope 3, with the *t*-statistic in excess of 3.7, with the coefficient implying an increase in indirect supply chain GHG emission of 6.02%, suggesting that the indirect impact of MSCI index inclusion on GHG emission is particularly noteworthy. This result is presented graphically in Figure 3 Panel B as well. Above all, we obtain larger statistical and economic significance of the difference-in-difference terms when we limit our attention to Chinese A share inclusion rather than all firm-level inclusions into the MSCI Emerging Markets index, lending more support to the existence of a causal link between foreign passive fund shareholdings and corporate GHG emission in emerging markets. We also find consistent results regarding firm financial performance in Panel B and emission intensity in Panel C.

## 5. Further Evidence on Foreign Investors and GHG Emission

5.1. Mutual fund incentives and GHG emission

<sup>&</sup>lt;sup>5</sup> We confirm this to be the case in Table A.2 in the Appendix.

The empirical results in Section 4 strongly indicate that, while the influx of foreign mutual fund capital following an emerging market firm's inclusion in the MSCI index provides the firm a substantial expansion opportunity, the expansion does not occur hand in hand with an improvement in corporate environmental performance, with short-term increases in the level of GHG emission as well as a longerterm deterioration in GHG emission intensity. Given that mutual funds exhibit substantial heterogeneity in terms of ESG preferences, we examine whether cross-sectional differences in fund characteristics are relevant in explaining the MSCI-included firms' GHG emission in the emerging market.

To this end, we first consider the funds' investment horizon. As Starks, Venkat, and Zhu (2020) note, long-term mutual funds are known to increase their portfolio firms' ESG profile in a more patient manner. We thus divide our sample of funds into two equal-sized subsamples based on fund turnover, with the sample median at each quarter-end as the cut-off. We then calculate for each MSCI-included and control firm in our sample the pre-inclusion and post-inclusion average holdings of short-term (i.e., high turnover) and long-term (low-turnover) funds. This allows us to create indicator variables that take the value of one if the average holdings of short- or long-term funds increase following the MSCI inclusion, respectively. We then interact these two variables with the post-inclusion indicator variable to see if the increased presence of foreign mutual funds around the MSCI inclusion has a differential impact on the firm's subsequent GHG emission depending on these funds' investment horizon.

Second, we consider the funds' ESG performance in a similar manner. Specifically, we consider (i) whether the fund is a Morningstar's Low Carbon fund, which awards funds with low carbon risk rating and portfolio fossil fuel footprint a specific designation, as well as (ii) the fund's portfolio environmental score is above or below the sample median as measured by Sustainalytics. This allows us to discern whether the influx of foreign mutual funds affects their portfolio firms' GHG emission depending on their ESG preferences. Finally, we consider whether the mutual fund originates from a country with high Environmental Policy Stringency according to the OECD's definition,<sup>6</sup> with the annual sample median

<sup>&</sup>lt;sup>6</sup> We focus on the policy stringency of market-based (e.g., taxes, permits, and certificates) environmental policy.

as the cut-off. This allows us to discern whether the funds subject to tighter environmental regulatory environment affect their emerging market portfolio firms differently. Table 8 presents the results.

#### **TABLE 8 HERE**

Column (1) of Table 8 presents the results for mutual fund investors' investment horizon. We find that the increase presence of short-term mutual funds is strongly associated with subsequent GHG emission of their portfolio firms, with statistical significance at the 5% level, whereas we do not observe any significant relationship between long-term mutual funds' increased presence and GHG emission. The results suggest that the presence of short-term mutual funds, i.e., transient investors that are likely subject to greater short-term profit incentives shapes their portfolio firms' post-inclusion expansion in a more "brown" manner. Columns (2) and (3) then presents the results with regards to the mutual funds' ESG incentives. Interestingly, we find the significant increase in corporate GHG emission to be strongly associated with the increased presence of mutual funds with Low Carbon designation and high portfolio Sustainalytics environmental score. In contrast, the increased presence of funds without Low Carbon designation or low portfolio environmental score either has insignificant or even negative association with the level of GHG emission. The evidence in the two columns point strongly toward "greenwashing," whereby funds that are designated as "environment-friendly" ironically worsening the carbon footprint of their portfolio firms in the emerging market. Finally, column (4) reveals that the increase in GHG emission of MSCI-included firms in the emerging market is driven largely by mutual funds selling to investors in high environmental policy stringency countries. The evidence once again points towards "greenwashing" and appears consistent with the "migration of pollution standards" as hypothesized in Vuillemey (2020).

For a further examination of the "migration of pollution standards" hypothesis, we examine whether the increased GHG emission of MSCI-included firms is more evident in countries with relatively less stringent environmental regulations as defined by the OECD. To this end, we interact our differencein-difference term with an indicator variable that takes the value of one if the firm resides in a country with (i) less stringent overall Environmental Policy Stringency, (ii) less stringent market-based Environmental Policy Stringency, or (iii) less public R&D investment in clean technology, with the country-level sample median for each year as the cut-off. Table 9 presents our results.

#### **TABLE 9 HERE**

Regardless of whether we focus on the overall vs. market-based measure of environmental policy stringency or R&D expenditure on innovations in clean technologies, we find a consistent picture, namely that the increased GHG emission of MSCI-included firms is particularly evident in countries with less stringent environmental regulatory standards, with statistical significance either at the 5% or 10% levels in each instance. Thus, it appears that, at the fund-level, the influx of investors from high environmental regulatory standards is more likely to worsen the overall GHG emission of their portfolio firms, while at the firm-level, firms in countries with relatively low environmental regulatory standards are the main culprits of increased GHG emission. The observed evidence is very much in line with the "outsourcing" of pollution, with financing from a stringent regulatory environment triggering greater GHG emission in countries with lax environmental regulations.

## 5.2. MSCI index inclusion and negative ESG incidents

In addition to the overall level of GHG emission, we proceed to check whether our sample of MSCI-included firms in the emerging market are more likely to be embroiled in negative ESG incidents following the index inclusion. If the firm expansion stimulated through the influx of foreign mutual fund capital is more "brown" than "green" in nature, we expect the firm activities to be more prioritized toward observable financial goals such as asset and sales growths. If the firm's corporate environmental activities are consequently given a lower priority, we expect the number of environment-related ESG violations to increase. To this end, we count the number of negative ESG incidents reported in RepRisk, which collects information on a firm's ESG violation incidents reported in various sources including the regulators, print media, newsletters, non-profits, and social media. In particular, we focus on issues

pertaining to environment, climate pollution, local pollution, and waste. We present the results separately for the emerging market as well as the developed market in Table 10 Panels A and B.

#### **TABLE 10 HERE**

Table 9 Panel A presents the results around the MSCI index inclusion in the emerging market. Across all issue categories, we document a significant increase in the number of environment-related negative ESG incidents in MSCI-included firms in comparison with their matched control peers, with the difference-in-difference term significant at the 10% in all instances and at the 1% level when we consider all environment-related issues in column (1). In contrast, we do not observe a similar increase in the number of negative ESG incidents around the MSCI index inclusion in the developed market; if anything, the coefficient on the difference-in-difference term is negative and marginally significant for climate-related issues. The evidence further indicates that the influx of foreign investor capital in response to the MSCI index inclusion offers a growth opportunity, but at the expense of the firm's environmental performance, with a greater incidence of environment-related violations and adverse events.

#### 5.3. MSCI index inclusion and shareholder agenda

As a final analysis, we look for evidence of foreign mutual fund investors' engagement within the emerging market firms following their inclusion in the MSCI Emerging Markets index. Though we would ideally like to focus on ESG-related issues as in He, Kahraman, and Lowry (2022), the number of shareholder meeting agenda items on these issues is very small in most emerging market firms. Thus, as an indirect test, we check whether there are more agenda items that could be classified as "profit-driven" when the foreign mutual funds enter the newly added MSCI-included emerging market firms. We classify shareholder meeting agenda items to be "profit-driven" if the agenda concerns dividends, share repurchases, or selling of company assets, for example. If, as we hypothesize, foreign-investor-driven firm expansion is "brown" in nature and prioritize conventional financial metrics, we expect to see an increase in the number of such agenda items. For each firm-year pair around the MSCI index inclusion, we separately count the number of all profit-driven agenda items as well as those that are voted "for" by

institutional investors. Table 11 presents the results, separately for the emerging market as well as the developed market.

#### **TABLE 11 HERE**

Columns (1) and (2) of Table 11 report the results for the emerging market. We find that, following the index inclusion, our sample of MSCI-included firms puts forward nearly 15 more profitdriven agenda items per year compared to their matched control peers, with statistical significance at the 5% level. The results remain intact regardless of whether we focus on all profit-driven agenda or those that obtain approval of the institutional investors at the meeting. In contrast, we do not observe a similar increase in the number of profit-driven agenda in developed market firms following the MSCI index inclusion. Our evidence in Table 11 is thus consistent with the conjecture that the influx of foreign mutual fund capital in the emerging market serves to prioritize growth along the conventional financial performance metric dimension, with a lower priority being given to achieving "green" growth along the process.

## 6. Conclusion

Whether emerging market countries can achieve growth without compromising environmental sustainability of the planet, as well as the role of the financial sector along this road to economic growth, is a question of crucial importance in the global efforts to achieve carbon net zero by 2050. In this paper, we examine whether the influx of foreign mutual funds into these countries following the MSCI index inclusion can promote both firm growth as well as better corporate environmental profile. Unfortunately, we find evidence to the contrary. Whereas the MSCI-included firms utilize greater availability of foreign external financing to engage in significant asset and sales growth, we document that this firm expansion is accompanied by short-term increases in the overall level of GHG emission as well as longer-term deterioration in *per-revenue* GHG emission intensity. This is in contrast to the developed market, where we do not observe any significant deterioration in the level or intensity of GHG emission. We confirm

the causal direction of foreign investor entry and GHG emission through an arguably cleaner setting of country-level inclusion of Chinese A shares into the MSCI Emerging Market index. The evidence appears consistent with the notion of "brown" firm expansion, whereby the MSCI-included firms prioritize financial performance metrics at the expense of long-term deterioration in their emission standards.

Further analysis indicates that the increase in GHG emissions is more prominent when the fund investors' investment horizons are short, suggesting that myopic focus on short-term profits may be a contributing factor. We further document evidence consistent with greenwashing, with the increase in GHG emissions particularly noticeable among portfolio firms of mutual funds touting environmentfriendly labels. We also document a "migration of pollution standards" whereby the increased GHG emissions evident among mutual fund investors coming in from countries with stringent environmental regulatory standards investing in countries with relatively lax regulatory standards. Along with the GHG emission, our sample of MSCI-included emerging market firms are more likely to be embroiled in adverse environment-related ESG events and puts forward more profit-driven shareholder agenda items. We thus document the sheer difficulty of the challenges faced by the financial sector over its role in the global efforts to address climate change and providing meaningful economic growth opportunities to emerging market countries at the same time.

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#### Figure 1. Foreign Institutional Ownership and Greenhouse Gas Emissions

In these figures, we present the relationship between foreign institutional ownership, measured by aggregating the holdings of foreign institutions reported in FactSet/Lionshare, and the average greenhouse gas (GHG) emission at the country level, averaged for our sample firms throughout our sample period. Panel A presents the relationship in the emerging market, and Panel B presents the relationship in the developed market. We plot GHG emission generated from burning fossil fuels and production processes owned or controlled by the company in million tons of  $CO_2$  equivalent in the Y-axis. Our sample period spans from 2003 to 2020.





Panel B. Developed market



#### Figure 2. Changes in Mutual Fund Ownerships around MSCI Index Inclusion

These figures present the difference in monthly change in total mutual fund holdings and foreign mutual fund holdings between the MSCI-included (treated) and matched control firms before and after the inclusion to MSCI Index. We plot the results for the inclusion in the MSCI Emerging Markets index in Panel A and the World (developed market) index in Panel B. For each firm included in the MSCI index, we find three closest control firms matched on log total assets, leverage, market-to-book, profitability, and tangibility, with exact matching on country and year using nearest neighbor method propensity score matching.

#### Panel A. Emerging Market



Panel B. Developed Market





#### Figure 3. Change in Carbon Emission around MSCI Index Inclusion

These figures present the difference in the carbon emission between the MSCI-included (treated) and matched control firms before and after the inclusion to MSCI Index. We plot the results for the firm-level inclusion into the MSCI Emerging Markets index in Panel A and the country-level Chinse A share inclusion into the MSCI Emerging Markets index in Panel B. On the Y-axis are the log carbon emission (GHG scope 1), and on the X-axis are the years relative to MSCI index inclusion. For each firm included in the MSCI index, we find three closest control firms matched on log total assets, leverage, market-to-book, profitability, and tangibility, with exact matching on country and year using nearest neighbor method propensity score matching.





Panel B. Chinese A-share MSCI Inclusion



# Figure 4. Changes in Economic Outcomes around MSCI Emerging Markets Index Inclusion

These figures present the difference in the firm economic outcome between the MSCI-included (treated) and matched control firms before and after the inclusion to MSCI Emerging Markets Index. On the Y-axis, we plot the results for log sales, log total assets, log employment, and profit margin. On the X-axis are the years relative to MSCI index inclusion. For each firm included in the MSCI index, we find three closest control firms matched on log total assets, leverage, market-to-book, profitability, and tangibility, with exact matching on country and year using nearest neighbor method propensity score matching.



-0.04

-0.15

-0.2

## **Table 1. Descriptive Statistics**

This table reports the summary statistics of sample firms used in our empirical analysis from 2003 to 2020. Characteristics for emerging market firms are presented in Panel A and developed market firms in Panel B. Detailed description of the variables are 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)                | 7,178 | 35.366 | 211.636  | 0.223  | 1.559  | 3.946  | 11.965 | 790.441 |
| Log total assets                          | 7,178 | 15.385 | 1.583    | 12.317 | 14.259 | 15.188 | 16.298 | 20.102  |
| Leverage                                  | 7,178 | 0.260  | 0.178    | 0.000  | 0.115  | 0.251  | 0.378  | 0.718   |
| Market-to-book                            | 7,178 | 1.432  | 1.321    | 0.140  | 0.677  | 1.021  | 1.714  | 6.687   |
| Profitability                             | 7,134 | 0.108  | 0.092    | -0.137 | 0.053  | 0.097  | 0.153  | 0.410   |
| Tangibility                               | 7,179 | 0.282  | 0.244    | 0.001  | 0.058  | 0.228  | 0.466  | 0.870   |
| GHG Scope 1 (million tCO <sub>2</sub> e)  | 7,179 | 2.277  | 7.353    | 0.000  | 0.007  | 0.037  | 0.329  | 46.340  |
| Direct GHG (million tCO <sub>2</sub> e)   | 7,179 | 2.320  | 7.397    | 0.000  | 0.008  | 0.037  | 0.329  | 46.456  |
| Indirect GHG (million tCO <sub>2</sub> e) | 7,179 | 0.761  | 1.956    | 0.002  | 0.032  | 0.128  | 0.487  | 12.978  |

## Panel A: Emerging market

## Panel B: Developed market

|   | Obs.  | Mean   | St. Dev. | P1     | P25    | Median | P75    | P99     |
|---|-------|--------|----------|--------|--------|--------|--------|---------|
| Total assets (\$ millions)                | 4,209 | 36.271 | 216.745  | 0.048  | 0.603  | 2.019  | 7.571  | 960.119 |
| Log total assets                          | 4,209 | 14.700 | 1.964    | 10.776 | 13.310 | 14.518 | 15.840 | 20.102  |
| Leverage                                  | 4,209 | 0.251  | 0.199    | 0.000  | 0.082  | 0.226  | 0.376  | 0.807   |
| Market-to-book                            | 4,145 | 1.353  | 1.327    | 0.140  | 0.621  | 0.969  | 1.537  | 7.380   |
| Profitability                             | 4,198 | 0.086  | 0.111    | -0.400 | 0.035  | 0.087  | 0.142  | 0.383   |
| Tangibility                               | 4,209 | 0.272  | 0.278    | 0.001  | 0.031  | 0.175  | 0.453  | 0.949   |
| GHG Scope 1 (million tCO <sub>2</sub> e)  | 4,209 | 0.898  | 4.549    | 0.000  | 0.002  | 0.012  | 0.059  | 21.675  |
| Direct GHG (million tCO <sub>2</sub> e)   | 4,209 | 0.945  | 4.638    | 0.000  | 0.002  | 0.012  | 0.060  | 22.671  |
| Indirect GHG (million tCO <sub>2</sub> e) | 4,209 | 0.424  | 1.451    | 0.000  | 0.011  | 0.044  | 0.196  | 8.078   |

## Table 2. Changes in Mutual Fund Ownership Around the MSCI Index Inclusion

This table presents the monthly change in mutual fund shareholdings before and after the firms' inclusion to the MSCI Emerging Markets Index Included indicates an indicator variable taking the value of 1 if the firm is newly included to MSCI Emerging Market index and 0 for the matched control firms. t indicates the month of index inclusion. 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 and country-by-industry-by-month fixed effects in all specifications. t-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and country-by-month are presented in parentheses. \*, \*\*, and \*\*\* represent statistical significance at the 10%, 5%, and 1% levels, respectively.

|                               | Dependent Variables |               |               |               |  |  |  |  |
|-------------------------------|---------------------|---------------|---------------|---------------|--|--|--|--|
|                               | Emergin             | g Market      | Develope      | ed Market     |  |  |  |  |
|                               | Total fund          | Foreign fund  | Total fund    | Foreign fund  |  |  |  |  |
|                               | shareholdings       | shareholdings | shareholdings | shareholdings |  |  |  |  |
| Month                         | (1)                 | (2)           | (3)           | (4)           |  |  |  |  |
| $(t-5) \times$ Included       | -0.0270             | -0.0168       | -0.0186**     | -0.0070*      |  |  |  |  |
|                               | (-1.2190)           | (-0.7249)     | (-2.1260)     | (-1.6625)     |  |  |  |  |
| $(t-4) \times$ Included       | -0.0132             | -0.0088       | -0.0184**     | -0.0078*      |  |  |  |  |
|                               | (-1.1627)           | (-0.9540)     | (-2.2445)     | (-1.8446)     |  |  |  |  |
| $(t-3) \times$ Included       | 0.0023              | -0.0081       | -0.0122       | -0.0061       |  |  |  |  |
|                               | (0.1909)            | (-1.0292)     | (-1.6042)     | (-1.5345)     |  |  |  |  |
| $(t-2) \times$ Included       | -0.0091             | -0.0057       | -0.0118*      | -0.0069*      |  |  |  |  |
|                               | (-1.1049)           | (-0.7043)     | (-1.6649)     | (-1.8459)     |  |  |  |  |
| $t \times Included$           | 0.0149              | 0.0209**      | 0.0174*       | 0.0060        |  |  |  |  |
|                               | (1.5063)            | (2.2511)      | (1.7099)      | (1.1673)      |  |  |  |  |
| $(t + 1) \times$ Included     | 0.0145*             | 0.0129*       | 0.0271**      | 0.0133**      |  |  |  |  |
|                               | (1.7304)            | (1.7344)      | (2.4855)      | (1.9641)      |  |  |  |  |
| $(t + 2) \times $ Included    | 0.0237**            | 0.0190**      | 0.0378***     | 0.0120**      |  |  |  |  |
|                               | (2.4470)            | (1.9858)      | (3.2502)      | (2.4665)      |  |  |  |  |
| $(t + 3) \times $ Included    | 0.0089              | 0.0127        | 0.0375***     | 0.0133***     |  |  |  |  |
|                               | (0.9350)            | (1.5431)      | (3.1077)      | (2.8241)      |  |  |  |  |
| $(t + 4) \times $ Included    | 0.0085              | 0.0160*       | 0.0320***     | 0.0134***     |  |  |  |  |
|                               | (0.8024)            | (1.8495)      | (3.0527)      | (2.7748)      |  |  |  |  |
| (t + 5) x Included            | 0.0079              | 0.0163*       | 0.0203**      | 0.0118**      |  |  |  |  |
|                               | (0.7308)            | (1.7555)      | (2.2467)      | (2.4679)      |  |  |  |  |
| Observations                  | 10,966              | 10,966        | 7,106         | 7,106         |  |  |  |  |
| Adjusted R-squared            | 0.8531              | 0.8705        | 0.8872        | 0.7520        |  |  |  |  |
| Firm FE                       | YES                 | YES           | YES           | YES           |  |  |  |  |
| Country × Industry × Month FE | YES                 | YES           | YES           | YES           |  |  |  |  |

## Table 3. Corporate GHG Emissions and Foreign Shareholdings

This table presents the difference-in-differences regression results of corporate GHG emission with various scope definitions and estimated cost of GHG emission around the MSCI Emerging market index inclusion. The sample is comprised of firms that are newly included into the index and their matched control firms. Included indicates an indicator variable taking the value of 1 if the firm is newly included to MSCI Emerging Market 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 or zero otherwise. Short-term (long-term) refers to the sample period that spans from 3 years before and 3 years (5 years) after the MSCI index inclusion. We control for logged 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 country-by-year are presented in parentheses. \*, \*\*, and \*\*\* represent statistical significance at the 10%, 5%, and 1% levels, respectively.

|                           | Dependent Variables: |          |          |          |          |          |          |          |
|---------------------------|----------------------|----------|----------|----------|----------|----------|----------|----------|
|                           | GHG                  | GHG      | GHG      | GHG      | GHG      | GHG      | GHG      | GHG      |
|                           | Scope 1              | Scope 2  | Direct   | Indirect | Scope1   | Scope 2  | Direct   | Indirect |
|                           | (1)                  | (2)      | (3)      | (4)      | (5)      | (6)      | (7)      | (8)      |
|                           |                      | Short    | -term    |          |          | Long     | -term    |          |
| Post                      | -0.056*              | -0.034   | -0.048   | -0.026   | -0.070** | -0.047   | -0.067** | -0.037*  |
|                           | (-1.851)             | (-1.010) | (-1.601) | (-1.205) | (-2.131) | (-1.556) | (-2.031) | (-1.858) |
|                           |                      | . ,      |          |          |          | . ,      |          | . ,      |
| Included $\times$ Post    | 0.059**              | 0.042    | 0.057**  | 0.041**  | 0.069**  | 0.050*   | 0.068**  | 0.052**  |
|                           | (2.130)              | (1.554)  | (2.030)  | (2.042)  | (2.327)  | (1.652)  | (2.236)  | (2.414)  |
|                           |                      |          |          |          |          |          |          |          |
| Profitability             | 0.201                | 0.450**  | 0.174    | 0.328**  | 0.234    | 0.632*** | 0.206    | 0.480*** |
|                           | (0.757)              | (2.568)  | (0.662)  | (2.307)  | (0.865)  | (2.835)  | (0.762)  | (2.685)  |
|                           |                      |          |          |          |          |          |          |          |
| Tangibility               | 0.056                | -0.193   | 0.051    | -0.073   | 0.325    | 0.195    | 0.317    | 0.119    |
|                           | (0.249)              | (-0.919) | (0.227)  | (-0.513) | (1.536)  | (0.861)  | (1.503)  | (0.837)  |
|                           |                      |          |          |          |          |          |          |          |
| Log total assets          | 0.255***             | 0.256*** | 0.253*** | 0.200*** | 0.238*** | 0.325*** | 0.234*** | 0.285*** |
|                           | (4.179)              | (4.786)  | (4.191)  | (5.027)  | (4.154)  | (6.196)  | (4.053)  | (7.036)  |
|                           |                      |          |          |          |          |          |          |          |
| Leverage                  | -0.136               | -0.334   | -0.160   | -0.249   | -0.335   | -0.303   | -0.362*  | -0.233   |
|                           | (-0.665)             | (-1.419) | (-0.792) | (-1.470) | (-1.634) | (-1.308) | (-1.755) | (-1.427) |
|                           |                      |          |          |          |          |          |          |          |
| Market to Book            | 0.008                | -0.133   | -0.011   | -0.288*  | 0.014    | 0.016    | -0.004   | -0.071   |
|                           | (0.042)              | (-0.730) | (-0.058) | (-1.945) | (0.071)  | (0.081)  | (-0.019) | (-0.501) |
| Observations              | 12,732               | 12,732   | 12,732   | 12,732   | 15,844   | 15,844   | 15,844   | 15,844   |
| Adjusted R-squared        | 0.987                | 0.974    | 0.987    | 0.987    | 0.984    | 0.969    | 0.984    | 0.988    |
| Firm FE                   | YES                  | YES      | YES      | YES      | YES      | YES      | YES      | YES      |
| Country $\times$ Industry |                      |          |          | _        |          |          |          |          |
| ×Year FE                  | YES                  | YES      | YES      | YES      | YES      | YES      | YES      | YES      |

## Table 4. Firm Outputs Around the MSCI Index Inclusion

In this table, we present the difference-in-difference regression results of economic outcomes of firms around the MSCI Emerging Markets index inclusion. Included indicates an indicator variable taking the value of 1 if the firm is newly included to MSCI Emerging Market index and 0 for the matched control firms. Short-term (long-term) refers to the sample period that spans from 3 years before and 3 years (5 years) after the MSCI index inclusion. We control for logged 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. 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 country-by-year are presented in parentheses. \*, \*\*, and \*\*\* represent statistical significance at the 10%, 5%, and 1% levels, respectively.

|  |           | Ι                | Dependent variabl | es:           |            |
|--|-----------|------------------|-------------------|---------------|------------|
|  | Log sales | Log total assets | Log employees     | Profit margin | Capital    |
|  |           |                  |                   |               | investment |
|  | (1)       | (2)              | (3)               | (4)           | (5)        |
|  |           | 1                | Short-term        |               |            |
| Post                                     | -0.014    | -0.018           | -0.029*           | -0.033**      | 0.003      |
|  | (-1.408)  | (-1.351)         | (-1.870)          | (-2.406)      | (1.627)    |
|  |           |                  |                   |               |            |
| Included $\times$ Post                   | 0.056***  | 0.045***         | 0.058***          | 0.043***      | -0.002     |
|  | (5.085)   | (3.731)          | (4.004)           | (2.969)       | (-1.298)   |
|  |           |                  |                   |               |            |
| Observations                             | 12,738    | 12,703           | 11,546            | 12,703        | 12,713     |
| Adjusted R-squared                       | 0.996     | 0.995            | 0.989             | 0.654         | 0.887      |
| Firm FE                                  | YES       | YES              | YES               | YES           | YES        |
| Country × Industry ×Year FE              | YES       | YES              | YES               | YES           | YES        |
|  |           |                  | Long-term         |               |            |
| Post                                     | 0.005     | 0.005            | -0.026**          | 0.004         | -0.001     |
|  | (0.481)   | (0.302)          | (-2.017)          | (0.255)       | (-0.635)   |
|  |           |                  |                   |               |            |
| Included $\times$ Post                   | 0.037***  | 0.050***         | 0.033**           | 0.006         | 0.000      |
|  | (3.178)   | (2.711)          | (2.301)           | (0.498)       | (0.172)    |
|  |           |                  |                   |               |            |
| Observations                             | 15,834    | 15,792           | 13,941            | 15,794        | 15,795     |
| Adjusted R-squared                       | 0.993     | 0.992            | 0.988             | 0.679         | 0.867      |
| Firm FE                                  | YES       | YES              | YES               | YES           | YES        |
| Country $	imes$ Industry $	imes$ Year FE | YES       | YES              | YES               | YES           | YES        |

## Table 5. Understanding Corporate GHG Emission Around the MSCI Index Inclusion

In this table, we present the difference-in-difference regression results of corporate GHG emission intensity around the MSCI Emerging Market index inclusion. Short-term (long-term) refers to the sample period that spans from 3 years before and 3 years (5 years) after the MSCI index inclusion. Included indicates a dummy variable which is 1 if the firm is newly included to MSCI Emerging Market index, and 0 for matched control firms. Control variables are log total assets, leverage, market-to-book, profitability, and tangibility, all in lagged values. Continuous variables are winsorized at the 1% and 99% levels. We include firm and country-by-industry-by-year fixed effects in all specifications. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and country-by-year are presented in parentheses. \*, \*\*, and \*\*\* represent statistical significance at the 10%, 5%, and 1% levels, respectively.

|                           |          | Dependent Variables: |          |           |          |           |           |           |
|---------------------------|----------|----------------------|----------|-----------|----------|-----------|-----------|-----------|
|                           | GHG      | GHG                  | GHG      | GHG       | GHG      | GHG       | GHG       | GHG       |
|                           | Scope 1  | Scope 2              | Direct   | Indirect  | Scope1   | Scope 2   | Direct    | Indirect  |
|                           | /Revenue | /Revenue             | /Revenue | /Revenue  | /Revenue | /Revenue  | /Revenue  | /Revenue  |
|                           | (1)      | (2)                  | (3)      | (4)       | (5)      | (6)       | (7)       | (8)       |
|                           |          | Short                | -term    |           |          | Long      | -term     |           |
| Post                      | -0.024   | -0.004               | -0.016   | 0.0001    | -0.065*  | -0.035    | -0.062*   | -0.014    |
|                           | (-0.826) | (-0.129)             | (-0.548) | (0.042)   | (-1.742) | (-1.14)   | (-1.659)  | (-0.745)  |
|                           |          |                      |          |           |          |           |           |           |
| Included $\times$ Post    | 0.026    | -0.004               | 0.024    | -0.004    | 0.055*   | 0.017     | 0.053*    | 0.012     |
|                           | (0.872)  | (-0.129)             | (0.779)  | (-0.16)   | (1.789)  | (0.563)   | (1.703)   | (0.543)   |
|                           |          |                      |          |           |          |           |           |           |
| Profitability             | -0.398   | -0.096               | -0.43    | -0.286*   | -0.603** | -0.175    | -0.631**  | -0.16     |
|                           | (-1.29)  | (-0.424)             | (-1.412) | (-1.691)  | (-1.986) | (-0.823)  | (-2.085)  | (-0.97)   |
|                           |          |                      |          |           |          |           |           |           |
| Tangibility               | 0.063    | -0.125               | 0.056    | -0.027    | 0.406*   | 0.203     | 0.398     | 0.067     |
| 0,                        | (0.24)   | (-0.586)             | (0.215)  | (-0.173)  | (1.663)  | (0.973)   | (1.626)   | (0.55)    |
|                           |          |                      |          |           |          |           |           |           |
| Log total assets          | -0.125*  | -0.123**             | -0.127*  | -0.178*** | -0.12*** | -0.133*** | -0.205*** | -0.194*** |
| 0                         | (-1.668) | (-2.298)             | (-1.705) | (-4.316)  | (-2.733) | (-2.779)  | (-2.765)  | (-5.363)  |
|                           |          |                      |          |           |          |           |           |           |
| Leverage                  | 0.289    | 0.146                | 0.264    | 0.231     | 0.27     | 0.2       | 0.241     | 0.248*    |
| 0                         | (1.109)  | (0.643)              | (1.018)  | (1.274)   | (1.223)  | (1.0)     | (1.081)   | (1.663)   |
|                           |          |                      |          |           |          |           |           |           |
| Market to Book            | 0.611*** | 0.507***             | 0.591*** | 0.346**   | 0.777*** | 0.71***   | 0.756***  | 0.426***  |
|                           | (3.019)  | (2.689)              | (2.99)   | (2.406)   | (3.338)  | (3.432)   | (3.279)   | (3.201)   |
| Observations              | 11,518   | 11,518               | 11,518   | 11,518    | 14,027   | 14,027    | 14,027    | 14,027    |
| Adjusted R-squared        | 0.983    | 0.96                 | 0.983    | 0.97      | 0.979    | 0.947     | 0.979     | 0.962     |
| Firm FE                   | YES      | YES                  | YES      | YES       | YES      | YES       | YES       | YES       |
| Country $\times$ Industry |          |                      |          |           |          |           |           |           |
| ×Year FE                  | YES      | YES                  | YES      | YES       | YES      | YES       | YES       | YES       |

## Table 6. Understanding Corporate GHG Emission: Geographic regions

This table presents the difference-in-difference regression results of corporate GHG emission level and intensity around the MSCI index inclusion in different geographic regions. Panel A reports the GHG emission level, and Panel B reports the emission intensity. Definition of Included and Post variables are the same as in Table 3. South/Southeast Asia in column (1) includes Philippines/India/Pakistan/Indonesia/Thailand/Malaysia, and East Asia in column (3) includes South Korea/Hong Kong/Taiwan/Singapore. We control for logged 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. 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 country-by-year are presented in parentheses. \*, \*\*, and \*\*\* represent statistical significance at the 10%, 5%, and 1% levels, respectively.

|                          | Dependent Variable:                 |                 |           |                                |          |  |  |  |
|--------------------------|-------------------------------------|-----------------|-----------|--------------------------------|----------|--|--|--|
|                          | Log Greenhouse Gas Emission Scope 1 |                 |           |                                |          |  |  |  |
|                          | (1)                                 | (1) (2) (3) (4) |           |                                |          |  |  |  |
|                          | South/SE<br>Asia                    | China           | East Asia | Europe, Middle<br>East, Africa | America  |  |  |  |
| Post                     | -0.158*                             | -0.057*         | -0.062    | 0.257**                        | -0.034   |  |  |  |
|                          | (-1.896)                            | (-2.051)        | (-1.094)  | (2.505)                        | (-0.223) |  |  |  |
|                          |                                     |                 |           |                                |          |  |  |  |
| Included $\times$ Post   | 0.153**                             | 0.104***        | -0.102    | -0.119                         | 0.109    |  |  |  |
|                          | (2.029)                             | (3.074)         | (-1.392)  | (-1.440)                       | (0.923)  |  |  |  |
| Controls                 | YES                                 | YES             | YES       | YES                            | YES      |  |  |  |
| Observations             | 1,908                               | 5,976           | 1,520     | 1,131                          | 1,114    |  |  |  |
| Adjusted R-squared       | 0.985                               | 0.990           | 0.985     | 0.991                          | 0.975    |  |  |  |
| Firm FE                  | YES                                 | YES             | YES       | YES                            | YES      |  |  |  |
| Industry $	imes$ Year FE | YES                                 | YES             | YES       | YES                            | YES      |  |  |  |

## Panel A: GHG Emission

#### Panel B. GHG emission intensity

|                           |                  | Dependen | it Variable: Ln (G | HG Scope 1/Revenue)            |          |
|---------------------------|------------------|----------|--------------------|--------------------------------|----------|
|                           | (1)              | (2)      | (3)                | (4)                            | (5)      |
|                           | South/SE<br>Asia | China    | East Asia          | Europe, Middle<br>East, Africa | America  |
|                           |                  |          | Short-te           | erm                            |          |
| Post                      | -0.072           | -0.027   | -0.040             | 0.387***                       | 0.047    |
|                           | (-0.806)         | (-1.238) | (-0.587)           | (3.178)                        | (0.281)  |
| Included $\times$ Post    | 0.060            | 0.050    | -0.115*            | -0.211*                        | 0.060    |
|                           | (0.674)          | (1.519)  | (-1.885)           | (-1.745)                       | (0.472)  |
| Controls                  | YES              | YES      | YES                | YES                            | YES      |
| Observations              | 1,908            | 5,971    | 1,520              | 968                            | 1,108    |
| Adjusted R-squared        | 0.981            | 0.986    | 0.956              | 0.988                          | 0.973    |
| Firm FE                   | YES              | YES      | YES                | YES                            | YES      |
| Industry $\times$ Year FE | YES              | YES      | YES                | YES                            | YES      |
|                           |                  |          | Long-te            | erm                            |          |
| Post                      | -0.089           | -0.016   | 0.030              | 0.108                          | -0.213   |
|                           | (-1.011)         | (-0.806) | (0.383)            | (0.929)                        | (-1.547) |
| Included $\times$ Post    | 0.070            | 0.059*   | -0.108             | -0.185                         | 0.038    |
|                           | (0.768)          | (1.855)  | (-1.290)           | (-1.396)                       | (0.279)  |
| Controls                  | YES              | YES      | YES                | YES                            | YES      |
| Observations              | 2,590            | 6,322    | 2,322              | 1,416                          | 1,601    |
| Adjusted R-squared        | 0.974            | 0.986    | 0.943              | 0.979                          | 0.955    |
| Firm FE                   | YES              | YES      | YES                | YES                            | YES      |
| Industry $\times$ Year FE | YES              | YES      | YES                | YES                            | YES      |

## Table 7. Chinese A-share MSCI Inclusion

In this table, we present the difference-in-difference regression results of corporate GHG emission around the MSCI index inclusion as in Table 3, but with a specific focus on the Chinese A-share inclusion into the MSCI Emerging Markets index in May 2018. In Panel A, as the dependent variable, we focus on one-year-ahead corporate GHG emission with various scope definitions, and in Panel B, the firm level outcome variables. Panel C focuses on the emission intensity, defined as GHG Emission/Revenue. We control for logged total assets, leverage, market-to-book, profitability, and tangibility, all in lagged values, as well as firm and industry-by-year fixed effects. 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.

|                        | De          | pendent Variable: Log | Greenhouse Gas Emis | sion         |
|------------------------|-------------|-----------------------|---------------------|--------------|
|                        | GHG Scope 1 | GHG Scope 2           | GHG Direct          | GHG Indirect |
|                        | (1)         | (2)                   | (3)                 | (4)          |
| Post                   | -0.058*     | -0.005                | -0.057*             | -0.041       |
|                        | (-2.057)    | (-0.108)              | (-1.966)            | (-1.175)     |
| Included $\times$ Post | 0.106**     | 0.066                 | 0.105**             | 0.080**      |
|                        | (3.017)     | (1.621)               | (3.021)             | (2.853)      |
| Profitability          | 0.723*      | 0.602***              | 0.713*              | 0.360**      |
|                        | (1.874)     | (3.771)               | (1.923)             | (2.791)      |
| Tangibility            | -0.009      | -0.013                | -0.014              | -0.133       |
|                        | (-0.027)    | (-0.037)              | (-0.040)            | (-0.542)     |
| Log total assets       | 0.049       | 0.088                 | 0.049               | 0.072        |
|                        | (0.570)     | (1.352)               | (0.554)             | (1.394)      |
| Leverage               | -0.186      | -0.589                | -0.215              | -0.253       |
|                        | (-0.755)    | (-1.650)              | (-0.899)            | (-1.051)     |
| Market to Book         | -0.443      | -0.495                | -0.476              | -0.429       |
|                        | (-1.138)    | (-1.636)              | (-1.279)            | (-1.401)     |
| Observations           | 5,466       | 5,466                 | 5,466               | 5,466        |
| Adjusted R-squared     | 0.989       | 0.973                 | 0.989               | 0.985        |
| Firm FE                | YES         | YES                   | YES                 | YES          |
| Industry ×Year FE      | YES         | YES                   | YES                 | YES          |

| Panel B. Firm | outcome variables |
|---------------|-------------------|
|---------------|-------------------|

|  | Dependent variables: |                  |               |               |            |  |  |  |
|--|----------------------|------------------|---------------|---------------|------------|--|--|--|
|  | Log sales            | Log total assets | Log employees | Profit margin | Capital    |  |  |  |
|  |                      |                  |               |               | investment |  |  |  |
|  | (1)                  | (2)              | (3)           | (4)           | (5)        |  |  |  |
| Post                                     | -0.035**             | -0.029*          | -0.029        | -0.029        | 0.001      |  |  |  |
|  | (-2.821)             | (-1.786)         | (-1.235)      | (-1.365)      | (0.581)    |  |  |  |
|  |                      |                  |               |               |            |  |  |  |
| Included $\times$ Post                   | 0.068***             | 0.049***         | 0.054***      | 0.069***      | -0.000     |  |  |  |
|  | (3.653)              | (3.479)          | (3.451)       | (4.103)       | (-0.281)   |  |  |  |
| Controls                                 | YES                  | YES              | YES           | YES           | YES        |  |  |  |
| Observations                             | 5,466                | 5,466            | 5,431         | 5,466         | 5,461      |  |  |  |
| Adjusted R-squared                       | 0.996                | 0.991            | 0.992         | 0.536         | 0.854      |  |  |  |
| Firm FE                                  | YES                  | YES              | YES           | YES           | YES        |  |  |  |
| Country $	imes$ Industry $	imes$ Year FE | YES                  | YES              | YES           | YES           | YES        |  |  |  |

Panel C. GHG emission intensity

|                    |             | Dependen    | t variables: |              |
|--------------------|-------------|-------------|--------------|--------------|
|                    | GHG Scope 1 | GHG Scope 2 | GHG Direct   | GHG Indirect |
|                    | /Revenue    | /Revenue    | /Revenue     | /Revenue     |
|                    | (1)         | (2)         | (3)          | (4)          |
| Post               | -0.034      | 0.019       | -0.033       | -0.018       |
|                    | (-1.543)    | (0.449)     | (-1.494)     | (-0.666)     |
|                    |             |             |              |              |
| Included × Post    | 0.066*      | 0.027       | 0.066*       | 0.040        |
|                    | (2.068)     | (0.702)     | (2.055)      | (1.690)      |
| Controls           | YES         | YES         | YES          | YES          |
| Observations       | 5,466       | 5,466       | 5,466        | 5,466        |
| Adjusted R-squared | 0.985       | 0.953       | 0.985        | 0.971        |
| Firm FE            | YES         | YES         | YES          | YES          |
| Industry ×Year FE  | YES         | YES         | YES          | YES          |

#### Table 8. Funds' Environmental Policy Stringency and Emerging Market GHG Emission

In this table, we present the difference-in-difference regression results of one-year-ahead logged corporate GHG emission, but with the difference-in-difference terms interacted with the dummy variable that indicates the positive change in shareholdings of mutual funds (MF) with (1) long-term vs. short-term investment horizon, measured using whether a fund's turnover ratio is higher or lower the sample median at previous quarter-end, (2) with or without Morningstar's Low Carbon Designation, (3) Sustainalytics portfolio environment score higher vs. lower than median value of the sample median at previous quarter-end, and (4) selling to investors in countries with high vs. low environmental policy stringency (EPS), specifically whether the country's market-based policy (e.g., taxes, permits and certificates) components of the OECD's Environmental Policy Stringency measure is above or below the sample median of the previous year-end. Change in shareholdings is difference between average of funds' shareholdings after and before MSCI index inclusion of sample firms and their matched firms. All other specifications are identical to Table 3. Continuous variables are winsorized at the 1% and 99% levels. We include firm and country-by-industry-by-year fixed effects in all specifications. *t*-statistics based on standard errors robust to heteroskedasticity and two-way clustered by firm and country-by-year are presented in parentheses. \*, \*\*, and \*\*\* represent statistical significance at the 10%, 5%, and 1% levels, respectively.

|  | Dependent Variable: Log Greenhouse Gas Emission |           |           |          |  |  |
|--|---|-----------|-----------|----------|--|--|
|  | (1)   | (Sco      | ope 1)    | (4)      |  |  |
| D. (   | (1)   | (2)       | (3)       | (4)      |  |  |
| Post   | -0.085**  | -0.096*** | -0.0//**  | -0.034   |  |  |
|  | (-2.456)  | (-2.707)  | (-2.364)  | (-1.225) |  |  |
| Post $\times$ D(A Short term ME $> 0$ )                      | 0.140**   |           |           |          |  |  |
| $1 \text{ Ost } \times D(\Delta \text{ Short-term Wit} > 0)$ | (2.148)   |           |           |          |  |  |
|  | (2.140)   |           |           |          |  |  |
| Post $\times$ D(A Long-term MF > 0)                          | -0.047  |           |           |          |  |  |
|  | (-0.714)  |           |           |          |  |  |
|  | ( 0.7 1 1)                                      |           |           |          |  |  |
| Post $\times$ D( $\Delta$ Low Carbon MF > 0)                 |   | 0.123*    |           |          |  |  |
|  |   | (1.824)   |           |          |  |  |
|  |   |           |           |          |  |  |
| Post $\times$ D( $\Delta$ Non-Low Carbon MF > 0)             |   | 0.012     |           |          |  |  |
|  |   | (0.209)   |           |          |  |  |
|  |   | ~ /       |           |          |  |  |
| Post $\times$ D( $\Delta$ High Env. Score MF > 0)            |   |           | 0.187***  |          |  |  |
|  |   |           | (3.631)   |          |  |  |
|  |   |           | × ,       |          |  |  |
| Post × D( $\Delta$ Low Env. Score MF > 0)                    |   |           | -0.140*** |          |  |  |
|  |   |           | (-2.635)  |          |  |  |
|  |   |           |           |          |  |  |
| Post $\times$ D( $\Delta$ More Stringent EPS MF > 0)         |   |           |           | 0.083*   |  |  |
|  |   |           |           | (1.769)  |  |  |
|  |   |           |           |          |  |  |
| Post $\times$ D( $\Delta$ Less Stringent EPS MF > 0)         |   |           |           | -0.117*  |  |  |
|  |   |           |           | (-1.728) |  |  |
| Controls   | YES   | YES       | YES       | YES      |  |  |
| Observations   | 9,386   | 9,386     | 9,386     | 8,249    |  |  |
| Adjusted R-squared   | 0.986   | 0.986     | 0.986     | 0.985    |  |  |
| Firm FE  | YES   | YES       | YES       | YES      |  |  |
| Country $\times$ Industry $\times$ Year FE                   | YES   | YES       | YES       | YES      |  |  |

#### Table 9. Country characteristics and carbon emissions around MSCI index inclusion

In this table, we present the difference-in-difference regression results of one-year-ahead logged corporate GHG emission, but with the difference-in-difference terms interacted with the indicator variable that takes the value of 1 if the firm resides in a country with lower than the median (1) Environmental Policy Stringency score, (2) market-based (e.g., taxes, permits and certificates) Environmental Policy Stringency score, and (3) public R&D expenditure that encourages and finance innovation in clean technologies by OECD of its operating countries in each year. All other specifications are identical to Table 3. We control for logged 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. 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 country-by-year are presented in parentheses. \*, \*\*, and \*\*\* represent statistical significance at the 10%, 5%, and 1% levels, respectively.

|  | Dependent Variable: Log Greenhouse Gas Emission |                     |                          |  |
|--|---|---------------------|--------------------------|--|
|  | (50   | ope I) (million tCC | <i>J</i> <sub>2</sub> e) |  |
|  | (1)   | (2)                 | (3)                      |  |
| Treated $\times$ Post $\times$ Low EPS                           | 0.277**   |                     |                          |  |
|  | (2.038)   |                     |                          |  |
|  |   |                     |                          |  |
| Treated $\times$ Post $\times$ Low market-based EPS              |   | 0.244*              |                          |  |
|  |   | (1.920)             |                          |  |
|  |   |                     |                          |  |
| Treated $\times$ Post $\times$ Low environmental R&D expenditure |   |                     | 0.575**                  |  |
|  |   |                     | (2.581)                  |  |
| Controls   | YES   | YES                 | YES                      |  |
| Observations   | 9,525   | 9,525               | 9,525                    |  |
| Adjusted R-squared   | 0.972   | 0.972               | 0.972                    |  |
| Firm FE  | YES   | YES                 | YES                      |  |
| Country $\times$ Industry $\times$ Year FE                       | YES   | YES                 | YES                      |  |

## Table 10. Environmental Risk Incidents Around the MSCI Index Inclusion

In this table, we present the difference-in-difference regression results of dummy variables that indicate whether the firm has risk incidents linked to (1) environmental, (2) climate and pollution, (3) local pollution, or (4) waste issues. In Panel A, the sample consists of emerging market firms, and in Panel B, the sample consists of developed market firms. All other specifications are identical to Table 3. We control for logged 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. 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 country-by-year are presented in parentheses. \*, \*\*, and \*\*\* represent statistical significance at the 10%, 5%, and 1% levels, respectively.

|                             |             | Depender      | nt variable     |          |
|-----------------------------|-------------|---------------|-----------------|----------|
|                             | (1)         | (2)           | (3)             | (4)      |
|                             | Environment | Climate and   | Local Pollution | Waste    |
|                             |             | GHG Pollution |                 |          |
| Post                        | -0.049*     | -0.019        | -0.033**        | -0.014   |
|                             | (-1.744)    | (-0.710)      | (-2.209)        | (-1.175) |
| Included $\times$ Post      | 0.116***    | 0.049*        | 0.048*          | 0.039**  |
|                             | (2.742)     | (1.905)       | (1.689)         | (2.154)  |
| Controls                    | YES         | YES           | YES             | YES      |
| Observations                | 15,265      | 15,265        | 15,265          | 15,265   |
| Adjusted R-squared          | 0.905       | 0.759         | 0.851           | 0.696    |
| Firm FE                     | YES         | YES           | YES             | YES      |
| Country × Industry ×Year FE | YES         | YES           | YES             | YES      |

## Panel A. Emerging Market

## Panel B. Developed Market

|                             |             | Depender      | nt variable     |          |
|-----------------------------|-------------|---------------|-----------------|----------|
|                             | (1)         | (2)           | (3)             | (4)      |
|                             | Environment | Climate and   | Local Pollution | Waste    |
|                             |             | GHG Pollution |                 |          |
| Post                        | 0.022       | 0.013         | -0.000          | 0.022    |
|                             | (0.375)     | (0.531)       | (-0.006)        | (0.985)  |
|                             |             |               |                 |          |
| Included $\times$ Post      | -0.027      | -0.065*       | -0.021          | -0.025   |
|                             | (-0.522)    | (-1.921)      | (-0.523)        | (-0.820) |
| Controls                    | YES         | YES           | YES             | YES      |
| Observations                | 6,982       | 6,982         | 6,982           | 6,982    |
| Adjusted R-squared          | 0.905       | 0.856         | 0.878           | 0.677    |
| Firm FE                     | YES         | YES           | YES             | YES      |
| Country × Industry ×Year FE | YES         | YES           | YES             | YES      |

#### Table 11. Shareholder Activism Around the MSCI Index Inclusion

In this table, we present the difference-in-difference regression on the number of shareholder proposals around MSCI index inclusion. Dependent variables are number of profit-driven shareholder proposals for columns (1) and (3), and number of profit-driven shareholder proposals that institutional investors agreed to in each firm-year for columns (2) and (4). In Columns (1) and (2), the sample is comprised of emerging market firms, and in Columns (3) and (4), the sample is comprised of developed market firms. All other specifications are identical to Table 3. We control for logged 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. 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 country-by-year are presented in parentheses. \*, \*\*, and \*\*\* represent statistical significance at the 10%, 5%, and 1% levels, respectively.

|                             | Dependent variable   |                      |                      |                      |  |  |  |
|-----------------------------|----------------------|----------------------|----------------------|----------------------|--|--|--|
|                             | Emergin              | g Market             | Developed Market     |                      |  |  |  |
|                             | (1)                  | (2)                  | (3)                  | (4)                  |  |  |  |
|                             | No. of profit-driven | No. of profit-driven | No. of profit-driven | No. of profit-driven |  |  |  |
|                             | agendas              | agendas agreed       | agendas              | agendas agreed       |  |  |  |
| Post                        | -23.622*             | -23.313*             | 4.342                | 4.663                |  |  |  |
|                             | (-1.942)             | (-1.952)             | (1.238)              | (1.323)              |  |  |  |
|                             |                      |                      |                      |                      |  |  |  |
| Included $\times$ Post      | 14.752**             | 14.692**             | -6.122               | -6.094               |  |  |  |
|                             | (2.363)              | (2.396)              | (-1.148)             | (-1.129)             |  |  |  |
| Controls                    | YES                  | YES                  | YES                  | YES                  |  |  |  |
| Observations                | 3,634                | 3,634                | 3,634                | 3,634                |  |  |  |
| Adjusted R-squared          | 0.353                | 0.347                | 0.353                | 0.347                |  |  |  |
| Firm FE                     | YES                  | YES                  | YES                  | YES                  |  |  |  |
| Country × Industry ×Year FE | YES                  | YES                  | YES                  | YES                  |  |  |  |

#### Appendix 1. 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<sub>2</sub>e 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<sub>2</sub>e 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<sub>2</sub>e 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<sub>2</sub>e unit.

*Indirect greenhouse gas (Trucost):* Greenhouse gas emissions generated from direct suppliers in million tCO<sub>2</sub>e 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).

Profit driven (ISS Voting Analytics): An indicator variable set to 1 if the agenda item is included in the following.

| ISS Agenda Item ID | Agenda Description  |
|--------------------|---|
| M0107              | Approve Dividends   |
| M0108              | Approve Special/Interim Dividends   |
| M0124              | Approve Stock Dividend Program  |
| M0147              | Approve Dividend Distribution Policy                                      |
| M0152              | Approve Allocation of Income and Dividends                                |
| M0191              | Approve Investment and Financing Policy                                   |
| M0192              | Approve Provision for Asset Impairment                                    |
| M0318              | Authorize Share Repurchase Program  |
| M0346              | Authorize Share Repurchase Program and Reissuance of Repurchased Shares   |
| M0347              | Authorize Share Repurchase Program and Cancellation of Repurchased Shares |
| M0348              | Authorize Directed Share Repurchase Program                               |
| M0404              | Approve Reorganization/Restructuring Plan                                 |
| M0415              | Approve Sale of Company Assets  |
| M0422              | Approve Squeeze-Out of Minority Shareholders by the Majority Shareholder  |
| S0108              | Liquidate Company Assets and Distribute Proceeds                          |
| S0315              | Initiate Share Repurchase Program   |
| S0512              | Performance-Based and/or Time-Based Equity Awards                         |
| S0520              | Pay For Superior Performance  |
| S0617              | Hire Advisor/Maximize Shareholder Value                                   |
| S0618              | Seek Sale of Company/Assets   |

## Appendix 2. 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.

| Γ | Criteria  | ٦ | Frontier         | Emerging        |   | Developed  |
|---|---|---|------------------|-----------------|---|--|
| A | A.1 Sustainability of economic development                            |   | No requirement   | No requirement  |   | Country GNI per<br>capita 25% above the<br>World Bank high<br>income threshold* for<br>3 consecutive years |
| в | Size and Liquidity Requirements                                       | 1 |                  |                 |   |  |
|   | 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   |
| С | Market Accessibility Criteria   | 1 |                  |                 |   |  |
|   | 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  |
|   |   |   |                  |                 | J |  |

\* 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<br>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<br>local accounts (e.g., documents to be provided, approvals required). The time to complete the process includes the preparation of the<br>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<br>entities involved in the financial markets, an important weight is assigned to: ease of access (including in English), lack of ambiguity and<br>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<br>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<br>delivery versus payment (DVP), the absence of pre-funding requirements/practices and the possibility to use overdrafts. Availability of real<br>onnibus 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<br>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.  |
|  | Basic institutional principles such as the rule of law and its enforcement as well as the stability of the "free-market" economic system. Track   |
| Stability of institutional framework         | record or government intervention with regards to foreign investors.  |

## Table A.1. Characteristics of MSCI Included and Matched Control Firms

This table reports how our MSCI-included and matched control firms differ in their key characteristics. Panel A reports various firm-level characteristics of MSCI-included, non-MSCI, and matched control firms in the emerging market. Panel B repeats the same analysis for the developed market. For more information on the matching procedure, refer to the explanation in Figure 2. Continuous variables are winsorized at the 1% and 99% levels.

|                  |               | Mean     |         | Test of d         | Test of difference |  |  |
|------------------|---------------|----------|---------|-------------------|--------------------|--|--|
|                  | MSCI included | Non-MSCI | Matched | MSCI –            | MSCI –             |  |  |
|                  |               |          | control | non-MSCI          | matched control    |  |  |
| Log total assets | 15.139        | 14.693   | 15.029  | 0.440***          | 0.099***           |  |  |
|                  |               |          |         | (8.678)           | (2.86)             |  |  |
|                  |               |          |         |                   |                    |  |  |
| Leverage         | 0.243         | 0.257    | 0.245   | -0.016***         | -0.002             |  |  |
|                  |               |          |         | (-2.82)           | (-0.58)            |  |  |
| Due Chellille    | 0.126         | 0.009    | 0.117   | 0.0 <b>2</b> 9*** | 0.000***           |  |  |
| Profitability    | 0.120         | 0.098    | 0.117   | 0.028             | (2.450)            |  |  |
|                  |               |          |         | (5.954)           | (2.459)            |  |  |
| Tangibility      | 0.285         | 0.289    | 0.289   | -0.004            | -0.004             |  |  |
|                  |               |          |         | (-0.633)          | (-0.569)           |  |  |
|                  |               |          |         |                   | × ,                |  |  |
| Market-to-book   | 0.442         | 0.421    | 0.445   | 0.021***          | -0.004             |  |  |
|                  |               |          |         | (3.016)           | (-0.741)           |  |  |
|                  |               |          |         |                   |                    |  |  |
| GHG (Scope 1)    | 3.388         | 1.927    | 2.693   | 1.461***          | 0.694              |  |  |
|                  |               |          |         | (4.551)           | (1.077)            |  |  |
| No. of obs.      | 1,446         | 65,367   | 3,131   |                   |                    |  |  |

#### Panel A: Emerging market

## Panel B: Developed market

|                  |               | Mean     |         | Test of d | Test of difference |  |  |
|------------------|---------------|----------|---------|-----------|--------------------|--|--|
|                  | MSCI included | Non-MSCI | Matched | MSCI –    | MSCI –             |  |  |
|                  |               |          | control | non-MSCI  | matched control    |  |  |
| Log total assets | 14.535        | 14.597   | 14.626  | -0.061    | -0.090             |  |  |
|                  |               |          |         | (-1.183)  | (-1.483)           |  |  |
| Leverage         | 0.251         | 0.249    | 0.251   | 0.002     | -0.000             |  |  |
|                  |               |          |         | (0.41)    | (-0.058)           |  |  |
| Profitability    | 0.099         | 0.096    | 0.103   | 0.002     | -0.004             |  |  |
|                  |               |          |         | (0.562)   | (-0.735)           |  |  |
| Tangibility      | 0.288         | 0.289    | 0.281   | -0.002    | 0.007              |  |  |
|                  |               |          |         | (-0.237)  | (0.871)            |  |  |
| Markat to book   | 0.420         | 0.432    | 0.427   | 0.011     | 0.007              |  |  |
| Market-to-book   | 0.420         | 0.432    | 0.427   | (1.602)   | (0.828)            |  |  |
|                  |               |          |         | (-1.002)  | (-0.828)           |  |  |
| GHG (Scope 1)    | 1.441         | 2.167    | 2.036   | -0.726*   | -0.595             |  |  |
|                  |               |          |         | (-1.886)  | (-1.579)           |  |  |
| No. of obs.      | 1,400         | 96,996   | 3,507   |           |                    |  |  |

## Table A.2. Foreign investment and carbon emissions

Table presents the regression results of next-year log Scope 1 GHG emissions on mutual fund shareholdings for emerging market firms. As the dependent variable, we focus on one-year-ahead corporate GHG emission with various scope definitions. We control for logged 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. 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 country-by-year are presented in parentheses. \*, \*\*, and \*\*\* represent statistical significance at the 10%, 5%, and 1% levels, respectively.

|  |                    | Dependent variable: |                    |                    |                  |                   |  |
|--|--------------------|---------------------|--------------------|--------------------|------------------|-------------------|--|
|  | (1)                | (2)                 | (3)                | (4)                | (5)              | (6)               |  |
| Domestic fund shareholdings              | -0.061<br>(-0.585) |                     |                    |                    |                  |                   |  |
| Domestic passive shareholdings           |                    | -0.455<br>(-1.240)  |                    |                    |                  |                   |  |
| Domestic active shareholdings            |                    |                     | -0.019<br>(-0.169) |                    |                  |                   |  |
| Foreign fund shareholdings               |                    |                     |                    | 0.128**<br>(1.975) |                  |                   |  |
| Foreign passive fund shareholdings       |                    |                     |                    |                    | 0.139<br>(0.585) |                   |  |
| Foreign active fund shareholdings        |                    |                     |                    |                    |                  | 0.122*<br>(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                       | 0.970              | 0.988               | 0.988              | 0.988              | 0.988            | 0.988             |  |
| Firm FE                                  | YES                | YES                 | YES                | YES                | YES              | YES               |  |
| Country $	imes$ Industry $	imes$ Year FE | YES                | YES                 | YES                | YES                | YES              | YES               |  |

## Table A.3. Foreign Mutual Fund Ownership Around Chinese A-share MSCI Inclusion

This table presents the monthly change in mutual fund shareholdings before and after the firms' inclusion to the MSCI Index as in Table 2, but with the specific focus on the inclusion of the Chinese A shares into the MSCI Emerging Markets index in May 2018. All other control and fixed effect specifications are identical to Table 3. Continuous variables are winsorized at the 1% and 99% levels. We include firm 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 month are presented in parentheses. \*, \*\*, and \*\*\* represent statistical significance at the 10%, 5%, and 1% levels, respectively.

|                                  | Dependent Variable       |                            |  |  |  |  |
|----------------------------------|--------------------------|----------------------------|--|--|--|--|
|                                  | Total fund shareholdings | Foreign fund shareholdings |  |  |  |  |
| Month                            | (1)                      | (2)                        |  |  |  |  |
| $(t-5) \times$ Included          | -0.0102                  | -0.0005                    |  |  |  |  |
|                                  | (-1.2250)                | (-0.8513)                  |  |  |  |  |
| $(t-4) \times$ Included          | -0.0099                  | -0.0007                    |  |  |  |  |
|                                  | (-1.1847)                | (-1.2141)                  |  |  |  |  |
| $(t-3) \times$ Included          | -0.0065                  | -0.0001                    |  |  |  |  |
|                                  | (-0.8515)                | (-0.6680)                  |  |  |  |  |
| $(t-2) \times$ Included          | -0.0011                  | 0.0000                     |  |  |  |  |
|                                  | (-0.3274)                | (0.2074)                   |  |  |  |  |
| $t \times Included$              | 0.0017                   | 0.0006*                    |  |  |  |  |
|                                  | (0.5266)                 | (1.9945)                   |  |  |  |  |
| $(t + 1) \times$ Included        | -0.0073                  | 0.0006                     |  |  |  |  |
|                                  | (-0.8005)                | (1.5814)                   |  |  |  |  |
| $(t + 2) \times $ Included       | -0.0029                  | 0.0002                     |  |  |  |  |
|                                  | (-0.4208)                | (0.3773)                   |  |  |  |  |
| $(t + 3) \times $ Included       | -0.0043                  | 0.0006                     |  |  |  |  |
|                                  | (-0.7914)                | (1.2134)                   |  |  |  |  |
| $(t + 4) \times \text{Included}$ | -0.0054                  | -0.0007                    |  |  |  |  |
|                                  | (-0.9331)                | (-0.6219)                  |  |  |  |  |
| (t + 5) x Included               | -0.0058                  | -0.0006                    |  |  |  |  |
|                                  | (-0.9951)                | (-0.6337)                  |  |  |  |  |
| Observations                     | 1,210                    | 1,210                      |  |  |  |  |
| Adjusted R-squared               | 0.6580                   | 0.9709                     |  |  |  |  |
| Firm FE                          | YES                      | YES                        |  |  |  |  |
| Industry × Month FE              | YES                      | YES                        |  |  |  |  |

## Table A.4. GHG Emission Around the MSCI Index Inclusion in the Developed Market

In this table, we present the difference-in-difference regression results of corporate GHG emission (Panel A), economic outcomes (Panel B), and GHG emission intensity (Panel C) around the MSCI World index inclusion, in the manner comparable to Tables 3, 4, and 5. In Panel A, as the dependent variable, we focus on one-year-ahead corporate GHG emission with various scope definitions and estimated cost of GHG emission. Included indicates an indicator variable taking the value of 1 if the firm is newly included to MSCI World index and 0 for the matched control firms. We control for logged 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. 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 country-by-year are presented in parentheses. \*, \*\*, and \*\*\* represent statistical significance at the 10%, 5%, and 1% levels, respectively.

|                        | Dependent Variables: |           |          |          |           |          |          |          |  |
|------------------------|----------------------|-----------|----------|----------|-----------|----------|----------|----------|--|
|                        | GHG                  | GHG       | GHG      | GHG      | GHG       | GHG      | GHG      | GHG      |  |
|                        | Scope 1              | Scope 2   | Direct   | Indirect | Scope1    | Scope 2  | Direct   | Indirect |  |
|                        | (1)                  | (2)       | (3)      | (4)      | (5)       | (6)      | (7)      | (8)      |  |
|                        |                      | Short     | -term    |          | Long-term |          |          |          |  |
| Post                   | 0.035                | -0.025    | 0.037    | 0.000    | 0.033     | -0.007   | 0.035    | 0.012    |  |
|                        | (1.176)              | (-0.797)  | (1.240)  | (0.010)  | (1.054)   | (-0.196) | (1.136)  | (0.568)  |  |
|                        |                      |           |          |          |           |          |          |          |  |
| Included $\times$ Post | -0.051               | 0.035     | -0.047   | -0.057** | -0.051    | 0.018    | -0.048   | -0.053*  |  |
|                        | (-1.225)             | (0.700)   | (-1.135) | (-2.125) | (-1.024)  | (0.327)  | (-0.983) | (-1.802) |  |
|                        |                      | × /       |          | · · ·    | · · · ·   | · · · ·  |          | · · ·    |  |
| Profitability          | 0.020                | -0.064    | 0.020    | 0.015    | 0.107     | -0.038   | 0.106    | 0.039    |  |
|                        | (0.221)              | (-0.696)  | (0.215)  | (0.318)  | (1.366)   | (-0.426) | (1.350)  | (0.814)  |  |
|                        |                      |           |          |          |           |          |          |          |  |
| Tangibility            | -0.106               | 0.131     | -0.105   | 0.009    | -0.014    | -0.248   | -0.017   | 0.048    |  |
| 0,                     | (-0.337)             | (0.352)   | (-0.333) | (0.035)  | (-0.045)  | (-0.850) | (-0.055) | (0.269)  |  |
|                        | ( · )                | ()        | ( )      | ()       | ( )       | ( )      | ( )      | ()       |  |
| Log total assets       | 0.254***             | 0.181***  | 0.256*** | 0.232*** | 0.254***  | 0.279*** | 0.254*** | 0.284*** |  |
| 0                      | (4.161)              | (2.612)   | (4.211)  | (4.791)  | (4.466)   | (5.106)  | (4.472)  | (7.220)  |  |
|                        | (                    | ()        | ()       | (, -)    | (         | (0.100)  | ()       | (,,,)    |  |
| Leverage               | 0.009                | 0.137     | -0.014   | 0.160    | 0.111     | -0.069   | 0.092    | 0.005    |  |
| 0                      | (0.045)              | (0.718)   | (-0.074) | (1.097)  | (0.511)   | (-0.336) | (0.422)  | (0.033)  |  |
|                        | (010.0)              | (011 - 0) | (        | ()       | (0.011)   | ( 0.000) | (****==) | (0.000)  |  |
| Market to Book         | 0.040                | 0.079     | 0.026    | 0.085    | 0.111     | -0.013   | 0.095    | 0.050    |  |
|                        | (0.250)              | (0.464)   | (0.161)  | (0.687)  | (0.696)   | (-0.081) | (0.590)  | (0.416)  |  |
| Observations           | 5 097                | 5.097     | 5 097    | 5 097    | 6 668     | 6 668    | 6 668    | 6 668    |  |
| Adjusted R-squared     | 0.974                | 0.951     | 0.974    | 0.980    | 0.969     | 0.946    | 0.970    | 0.979    |  |
| Firm FE                | VES                  | VES       | VES      | VES      | VES       | VES      | VES      | VES      |  |
| Country X Industry     | 1120                 | 1120      | 1123     | 1120     | 1120      | 1120     | 1120     | 1120     |  |
| ×Year FE               | YES                  | YES       | YES      | YES      | YES       | YES      | YES      | YES      |  |

## Panel A. Corporate GHG emission

# Panel B. GHG emission intensity

|  | Dependent Variables: |          |          |           |          |          |          |          |
|--|----------------------|----------|----------|-----------|----------|----------|----------|----------|
|  | GHG                  | GHG      | GHG      | GHG       | GHG      | GHG      | GHG      | GHG      |
|  | Scope 1              | Scope 2  | Direct   | Indirect  | Scope1   | Scope 2  | Direct   | Indirect |
|  | /Revenue             | /Revenue | /Revenue | /Revenue  | /Revenue | /Revenue | /Revenue | /Revenue |
|  | (1)                  | (2)      | (3)      | (4)       | (5)      | (6)      | (7)      | (8)      |
|  |                      | Short    | t-term   |           |          |          |          |          |
| Post                                       | 0.061*               | 0.000    | 0.062*   | 0.025     | 0.033    | -0.004   | 0.036    | 0.013    |
|  | (1.684)              | (0.004)  | (1.742)  | (0.838)   | (0.900)  | (-0.103) | (0.969)  | (0.484)  |
|  |                      |          |          |           |          |          |          |          |
| Included $\times$ Post                     | -0.084*              | 0.003    | -0.080   | -0.089*** | -0.054   | 0.007    | -0.052   | -0.059*  |
|  | (-1.690)             | (0.047)  | (-1.613) | (-2.641)  | (-1.035) | (0.121)  | (-0.992) | (-1.833) |
| Controls                                   | YES                  | YES      | YES      | YES       | YES      | YES      | YES      | YES      |
| Observations                               | 5,096                | 5,096    | 5,096    | 5,096     | 6,663    | 6,663    | 6,663    | 6,663    |
| Adjusted R-squared                         | 0.950                | 0.883    | 0.950    | 0.920     | 0.945    | 0.877    | 0.945    | 0.921    |
| Firm FE                                    | YES                  | YES      | YES      | YES       | YES      | YES      | YES      | YES      |
| Country $\times$ Industry $\times$ Year FE | YES                  | YES      | YES      | YES       | YES      | YES      | YES      | YES      |

## Panel C. Firm outcome variables

|  | Dependent Variables: |                  |               |               |            |  |  |  |
|--|----------------------|------------------|---------------|---------------|------------|--|--|--|
|  | Log sales            | Log total assets | Log employees | Profit margin | Capital    |  |  |  |
|  |                      |                  |               |               | investment |  |  |  |
|  | (1)                  | (2)              | (3)           | (4)           | (5)        |  |  |  |
| Post                                     | 0.002                | -0.031           | -0.006        | 0.023         | -0.002     |  |  |  |
|  | (0.171)              | (-1.334)         | (-0.392)      | (0.898)       | (-1.335)   |  |  |  |
| Included $\times$ Post                   | -0.028               | 0.037            | -0.003        | -0.061**      | 0.001      |  |  |  |
|  | (-1.576)             | (1.241)          | (-0.121)      | (-1.969)      | (0.404)    |  |  |  |
| Controls                                 | YES                  | YES              | YES           | YES           | YES        |  |  |  |
| Observations                             | 5,097                | 5,092            | 3,936         | 5,092         | 5,088      |  |  |  |
| Adjusted R-squared                       | 0.992                | 0.976            | 0.992         | 0.600         | 0.756      |  |  |  |
| Firm FE                                  | YES                  | YES              | YES           | YES           | YES        |  |  |  |
| Country $	imes$ Industry $	imes$ Year FE | YES                  | YES              | YES           | YES           | YES        |  |  |  |