Foreign Institutional Investors and Corporate Carbon Emissions: Evidence from China

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Abstract

This paper examines the effect of qualified foreign institutional investors (QFIIs) on the reduction of corporate carbon emissions in China. Using a sample of 1,977 Chinese publicly listed firms over the period 2012-2018, I find that the presence of QFIIs reduces firms' carbon emissions. This association is stronger when QFIIs are domiciled in countries with higher social norm (i.e., better environmental performance and higher regulatory quality), suggesting the importance of social motivation behind QFIIs' push for carbon reduction. I provide further evidence that QFIIs' engagement can be realized through two mechanisms: voting power and common ownership. In addition, I also find that the effect of QFIIs' decarbonization is more pronounced when firms operate in the inland provinces with higher exposures to air pollution, and when QFIIs are domiciled in Asia and Australasia with closer geographical distance to China.

Keywords: Qualified foreign institutional investors (QFII); Carbon emissions; Social norm; Voting power; Common ownership

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1. Introduction

In the era of globalization, foreign institutional investors have become increasingly important for global economy in recent years. As major players in global financial markets, they tend to build and maintain diversified portfolios by holding a large number of companies across the world to reduce volatility risk (Bena et al., 2017). Unlike domestic institutions which often have affiliations with local firms they invest in, foreign institutional investors are more likely to be independent of a solo firm's incumbent management and are less tolerant to manager opportunism (Gillan and Starks, 2003; Ferreira and Matos, 2008; Bena et al., 2017). They could also bring forward the knowledge, skills and global networks to address corporate matters of investee firms (Luong et al., 2017). Because of these marked positive features, foreign institutions are generally viewed as firms' value creators, through which they can promote long-term investment (Bena et al., 2017), stimulate corporate innovation (Luong et al., 2017; Bena et al., 2017), drive corporate social responsibility (Dyck et al., 2019; Li et al., 2020), accelerate convergence in global financial reporting (Fang et al., 2015), and affect earnings management as well as smoothing activities (Lel, 2019; Wu et al., 2015). Previous literature on the governance function of foreign institutional investors either focuses on the US market or uses a cross-country setting. Yet, the evidence of these foreign investors' role in emerging markets is relatively sparse (Li et al., 2021).[1] Moreover, following the 2015 Paris Agreement, there is a growing concern about environmental pollution and sustainability issues, such as climate change. As the negative externality of greenhouse gas emissions makes it challenging for establishing a top-down cross-country climate cooperation, corporate governance is seen as an alternative strategy for addressing environmental issues, particularly slashing emissions (Stern, 2008; Azar et al., 2021). Given the growing prevalence of sustainable investment and ESG activism in the context of global warming (Dimson et al., 2015), this paper investigates the influence of foreign institutional investors, an important element of corporate governance, on dealing with a detailed cutting-edge issue, the reduction of carbon emissions embedded in the ESG governance.

China provides an ideal setting to study whether foreign institutions help investee firms reduce their carbon emissions for the following two reasons. First, China has been one of the highest global carbon emitters and chronically experienced severe environmental pollution, despite its miraculous achievement in the economy. According to a research report released by

[1] There is some literature supporting the view that (qualified) foreign institutional investors can function as a governance mechanism in the Chinese context (Huang and Zhu, 2015; Li et al., 2015; Wu et al., 2015; Li et al., 2020; Chen et al., 2013; Li et al., 2021; Kim et al., 2020; Xiong et al., 2021; Huo and Ahmed, 2017).

the Rhodium Group, an independent research provider, China alone emitted around 27% of the world's greenhouse gases in total in 2019, which surpassed those emitted by the OECD and all EU member states.[2] In 2020, China became the largest polluter around the world by releasing 10.67 billion metric tons of carbon emissions. In this context, Chinese policymakers have implemented a series of policies aligned with the 2015 Paris Agreement to curb emissions and fight against environmental degradation, such as announcing the commitment to hit carbon emission peak before 2030 and reach carbon neutrality before 2060.[3] To support the transition towards net-zero emissions, a paramount initiative is to facilitate sustainable financing by attracting those experienced international institutional investors and promoting their engagement with local firms. Second, as a milestone of China's global financial integration, the launch of the Qualified Foreign Institutional Investor (QFII) scheme in 2002 has attracted a substantial number of international institutional investors piling into the Chinese capital markets.[4] One important objective of this ongoing reform is to improve firm-level governance structure through allowing domestic firms to benefit from international investment practices. Environmental issues relating to greenhouse carbon dioxide emissions are crucial aspects of corporate governance from the view of stakeholders. Given the pivotal role of QFIIs in China, exploring the effectiveness of foreign investors on corporate carbon reduction is meaningful, as it echoes the call for urgent action from these leading global institutions on climate change.

I hypothesize that QFIIs are able to push Chinese firms to reduce corporate carbon emissions. The conjecture is motivated by Azar, Duro, Kadach and Ormazabal's (2021) findings that large institutional investors (the Big Three) engage with worldwide firms on environmental issues (i.e., carbon reduction). As an importance force in China, I expect QFIIs can exert their influences on firms' decarbonization for at least two reasons. First, as climate risk materializes, the values of firms within the portfolio managed by QFIIs are largely affected by the extent to which firms' business models are exposed to carbon risk. Being aware of the potential impact of this systematic risk, these foreign institutional investors have proactively incorporated climate-related factors into their decision making (Murfin and Spiegel, 2020; Choi et al., 2020; Ilhan et al., 2021; Krueger et al., 2020). Meanwhile, QFIIs may be willing to decarbonize their portfolios in order to minimize portfolios' economic losses arising from portfolio firms' exposure to cascading uncertainties induced by climate risk. In most cases,

[2] See https://www.bbc.co.uk/news/world-asia-57018837 and https://www.statista.com/statistics/239093/co2-emissions-in-china/.

[3] See https://www.bbc.co.uk/news/science-environment-54256826.

[4] See https://www.gbm.hsbc.com/insights/growth/qfiireform.

such exposure is geared towards carbon-intense firms (e.g., firms in the industries of gas, mining, transportation and construction) because these firms are more likely to encounter external pressures from regulators, business partners or clients pushing firms to align with the sustainability agenda (i.e., reducing carbon footprint). High-carbon firms may be challenged by coping with the policy uncertainties surrounding the period when carbon policies will be implemented. Also, they may be confronted with the transition risk driven by a shift to the low-carbon economy, which leads to a higher downside risk (Ilhan et al., 2021; Hoepner et al., 2016). Thus, the financial implication of climate risk motivates QFIIs to reduce investee firms' carbon emissions. Second, QFIIs have social incentives to drive investee firms' carbon reduction. This is because QFIIs, as fiduciary investors who work on behalf of their clients, not only consider the expected return of firms' stocks but also take into account the social norm in their decision making (Krueger et al., 2020). Since most of QFIIs come from countries with higher social awareness and sustainability commitments, they are more likely to transplant their social consciousness to firms they invest in. This in turn can strengthen their reputations and increase their investment quotas (Dyck et l., 2019; Li et al., 2020; Zhao et al., 2021; Riedl and Smeets, 2017).

Using a panel dataset of 1,977 Chinese publicly listed non-financial firms with 13,839 firm-year observations for the period 2012-2018, I find that firms with QFIIs experience a reduction in future carbon intensity, which is consistent with the main hypothesis. The size of the effect is substantial. A transition of a firm from having no QFIIs to having QFIIs produces a 51.1% (40.9% and 53.9%) reduction in firms' annual carbon emissions in the following year. This finding remains robust in a batch of robustness tests, including controlling for endogeneity and selection bias using the instrumental variable (IV) approach and the propensity-score-matching (PSM) approach, as well as using an alternative measure of foreign shareholding. To expand the understanding on the impact of QFIIs on carbon reduction, I further limit my attention on the differences in the social norm of QFIIs' home countries and find that QFIIs from countries with high social norm play a more important role in decarbonization relative to those investors from low social norm countries. I also uncover two plausible underlying economic mechanisms through which QFIIs promote decarbonization. The cross-sectional tests provide evidence that QFIIs as one of top ten largest shareholders with more voting power push harder for carbon reduction. Additionally, the effect of QFIIs' decarbonization is greater when QFIIs concurrently hold more than one firm in the same industry of investee firms, confirming the important role of common ownership. Lastly, I explore two regional heterogeneous effects by looking at firms' geographic location and by QFIIs' geographic location. The evidence shows that QFIIs have a more significant effect on decarbonization on firms operating in inland provinces and when QFIIs come from Asia and Australasia.

This paper contributes to the literature in at least two ways. First, it adds to a large growing body of literature on the economic outcomes of foreign institutional investors, particularly their influences on corporate governance practices. Specifically, the existing literature focuses on corporate innovation (Luong et al., 2017), long-term investment (Bena et al., 2017), corporate social responsibility (Dyck et al., 2019; Li et al.,2020; Zhao et al., 2021), global financial reporting convergence (Fang et al., 2015), earnings management (Lel, 2019), dividend policy (Baba, 2009; Kim et al., 2010; Jeon et al., 2011; Cao et al., 2017), internal control quality (Li et al., 2021), stock price crash risk (Kim et al., 2020), auditor choice (He et al., 2014), minority shareholder protection (Huang and Zhu, 2015), and stock market stability (Schuppli and Bohl, 2010). This study builds upon this literature by shedding light on a social dimension of governance that differs from those traditional governance matters: the reduction of corporate carbon emissions. This dimension is particularly important nowadays since climate risk has been priced by the market (Krueger et al., 2020), and that carbon premium in China's financial market is significant (Bolton and Kacperczyk, 2020).[5] I provide novel evidence about the effectiveness of foreign institutional investors' engagement in decarbonization and point to their roles in improving environmental performance of firms.

More generally, this paper also complements the recent burgeoning studies on the increasing focus of shareholders on corporate environmental behaviour in the context of climate change. Several papers find that hedge fund activism has a positive effect on targeted firms' environmental performance. Using plant-level data in US, Chu and Zhao (2019), Akey and Appel (2019) as well as Naaraayanan et al. (2021) find a significant decline in the releases of toxic chemical emissions when firms are targeted by hedge fund activism. Such environmental improvement may come through increased pollution abatement activities (Naaraayanan et al., 2021), polluting plants shut down (Chu and Zhao, 2019), and improved environmental efficiency (Akey and Appel, 2019). Moreover, Dasgupta et al. (2021) provide evidence that socially responsible mutual funds (SRMFs) complement environmental enforcement through which they pressure nearby investee's plant to take abatement measures to cut emissions once environmental enforcement penalties are imposed on the local violating

[5] Recent studies on climate risk document that climate risk, as a long-term risk factor, affects the prices of a wide range of assets, including residential real estates (Bernstein et al., 2018; Murfin and Spiegel, 2020), equities (Bolton and Kacperczyk, 2020; Bolton and Kacperczyk, 2021), options (Ilhan et al., 2021), as well as municipal bonds (Painter, 2020). Viewed broadly, people's beliefs about climate change risk are also important in the asset pricing (Baldauf et al., 2020; Chio et al., 2020).

peer plant. Yet, Heath et al. (2020) find no evidence that the presence of socially responsible investment (SRI) funds promotes pollution reduction. Kim et al. (2019) argue that among different types of local institutional investors, SRI funds and local public pension funds play a more important role in affecting facility toxic release. Hsu et al. (2020) use a wide international sample of firms and find a positive association between state ownership and sustainable practices. Despite these fast-growing studies on the environmental impact of financial institutions, the question of whether and how foreign institutional investors help address environmental issues has been largely ignored. This study contributes by showing that foreign institutions are one important determinant of corporate environmental behaviour. More related to my research question, Azar et al. (2021), based on a sample of 7,751 publicly firms across 24 countries from 2005 to 2018, provide the first causal evidence that the Big Three are effective in reducing corporate carbon emissions, particularly for large firms with high Big Three ownership and later years in the sample period when the Big Three pay more attention to tackle with environmental issues. Turning to studies in China, Li et al. (2020) posit a positive relationship between foreign ownership and corporate social responsibility, based on 752 Chinese listed firms with 4,145 firm-year observations from 2009 to 2017. They find that such a positive relationship is more pronounced among firms with foreign institutions from countries with high social awareness or from geographically distant countries. My work differs from theirs by looking at how all foreign investors, instead of only the Big Three, affect the carbon footprint, rather than a more general corporate social responsibility. To the best of my knowledge, this is the first study using a large panel dataset investigating the role of foreign institutions in corporate carbon reduction in China, where foreign investors have tightly restricted access to the local stock market and their involvement in environmental issues cannot be simply extrapolated from studies in western countries. The findings in this paper also imply that engagement in carbon emissions can be viewed as a positive signalling mechanism that reduces the information asymmetry arising from the geographical distance between QFIIs' home countries and investee firms' countries of origin.

The remainder of the paper proceeds as follows. The next section provides background information on China's QFII scheme, discusses the related literature, and develops hypotheses. Data sources, sample construction and research design are discussed in Section 3. Section 4 presents the summary statistics and empirical results regarding baseline regressions and motivation tests. Section 5 explores plausible underlying mechanisms. Section 6 provides results for additional tests and robustness check. Finally, section 7 concludes the paper.

2. Institutional background, literature review, and hypothesis development

2.1 Institutional background

In 2002, the QFII scheme was introduced by the China Securities Regulatory Commission (CSRC) to open up the domestic financial markets to global investors. The general purpose of the QFII program is to manage the potential risk, induced by the large-scale speculative capital flows ("hot money") to macroeconomic and financial market instability in the process of RMB internationalization (Huang and Zhu, 2015; Li et al., 2020). The other reason for promulgating this policy is the widely growing concern and demand for improving corporate governance. Compared with retail investors who dominate the stock market but lack the ability to exercise their rights as minority shareholders, foreign institutional investors with professional knowledge and relatively longer investment horizons are in a better position to play a corporate governance role (Jiang and Kim, 2020; Ge et al., 2022).

Foreign investors have unique access to China's financial market. Prior to 2002, the Chinese stock markets remained isolated and foreign investors were legally prohibited from buying domestic tradeable A-shares, though they can purchase offshore shares in the form of B-, H-, and N-shares in dollars or HKD issued by only about 10% of Chinese listed companies (Huang and Zhu, 2015). Under the QFII scheme, international investors who meet certain requirements (e.g., the minimum requirement on assets under management, investment quotas, etc.,) are allowed to directly invest in the domestic A-share market.[6] At the beginning, due to stringent regulations on QFIIs' investment quota and operational ability, most foreign investors are leading investment banks, such as HSBC, Citigroup and Goldman Sachs.[7] With an ongoing development of the QFII regime, a wide range of international institutions have been attracted, including global asset management companies, insurance companies, sizable securities, endowment funds and even sovereign wealth funds, conditional on gradually relaxed entry criteria, simplified application process and expanded investment scope in recent years. The participation of these stable and diversified foreign institutions (i.e., central banks, university endowments and non-profit organizations) as the supplement to traditional investment banks can largely broaden and deepen investor base of China's financial market. Since the implementation of the QFII scheme, the QFII market has evolved rapidly in terms of both

[6] For more detailed requirements, see https://www.safe.gov.cn/en/.

[7] In mid-2003, the UBS as the first QFII has been granted a 300 million US dollars investment quota. See www.chinadaily.com.cn/en/doc/2003-07/10/content_244331.htm.

investment quota and the number of approved QFII licences.[8] As of November 2019, a total number of 292 QFIIs have received licences with a total investment quota of $111.37 billion.[9]

2.2 Literature review and hypothesis development

Institutional investors have been viewed as the most important participants in capital markets (Chemmanur et al., 2021). A large and growing body of literature has investigated institutional investors' impact on corporate practices in general, such as corporate information and trading environment (Boone and White, 2015), financial reporting (Ramalingegowda and Yu, 2012), tax planning and avoidance (Khan et al., 2017; Chen et al., 2019; Li et al., 2021), dividend policy (Crane et al., 2016), insider trading (Hillegeist and Weng, 2021; Fu et al., 2020) and corporate innovation (Aghion et al., 2013). These studies primarily focus on the role of a whole group of institutions in firms' decisions by assuming these investors' objectives and behaviours are the same. Yet in practice, institutional investors themselves are not a homogeneous group. Based on the geographic origin, institutional investors can be classified into local institutional investors and foreign institutional investors (Ferreira and Matos, 2008).

As a subset of institutional investors, foreign institutional investors have unique characteristics allowing them to better resolve common issues regarding corporate governance and ultimately to improve firm value (Gillan and Starks, 2003).[10] First, compared with local institutional investors, foreign institutional investors are more independent and less likely to have business ties with a particular local firm, which enables them to reach a better position to monitor insiders and make appropriate investment decisions (Bena et al., 2017; Lin and Fu, 2017). Particularly in emerging economies, like China, where the government plays a predominant role in the economy, the advantage of foreign institutions over domestic institutions is salient. For instance, Huang and Zhu (2015) compare whether and how foreign and local institutional investors play different roles in reducing controlling shareholder

[8] The initial QFII quota was $4 billion in total in 2002 (with 12 QFII licenses in 2003). Then, it was increased to $10 billion in 2005, $30 billion in 2007, $80 billion in 2012, $150 billion in 2013 and $300 billion in 2019 (with 292 QFII licenses). In late 2019, the equity investment quota limits for QFIIs have been removed. See https://www.safe.gov.cn/en/.

[9] See https://www.safe.gov.cn/en/.

[10] Prior cross-country studies show that the presence of foreign institutional investors can be effective in restraining firms' earnings management activities (Lel, 2019), promoting corporate innovation (Luong et al., 2017) and driving CSR (Dyck et al., 2019). Dimson el al. (2015) examine the effect of foreign institutional investors on ESG issues, which are more closely related to this paper, and find that foreign institutions' involvement can improve social welfare to the extent that it increases stakeholder value when engagements are successful and does not destroy firm value even when engagements are unsuccessful.

expropriation. By taking advantage of a Chinese split-share reform which required investors' voting on the compensation proposals offered by non-tradable shareholders to tradable shareholders for the stock values' dilution, they find that QFIIs play a monitoring role in the negotiation process of this reform, which can be reflected on a quicker approval of the proposal and a higher compensation ratio to tradable shareholders. This is mainly because QFIIs are less subject to the political pressure from controlling state shareholders. Second, foreign institutional investors' superior performance can be attributed to their owned resources, knowledge and expertise in different areas (Huang and Shiu, 2009; Luong et al., 2017). These professional foreign investors may provide a valuable practical guidance on governance for the investee firms through their robust business networks, thus contributing to firms' long-term success.

Empirical studies on Chinese markets provide evidence for advantages of QFIIs over local peers in improving corporate governance. Relevant studies mainly focus on information production (Li et al., 2015), minority shareholder protection (Huang and Zhu, 2015), corporate social responsibility (Li et al., 2020), earnings smoothing (Wu et al., 2015), stock return volatility (Chen et al., 2013), internal control quality (Li et al., 2021), and stock price crash risk (Kim et al., 2020).[11] By using the Stock Connect scheme as an exogenous shock, some related studies show that opening the door to foreign investors helps mitigate the litigation risk (Xiong et al., 2021) and improve the market efficiency (Huo and Ahmed, 2017). Accordingly, considering these findings in conjunction with two distinct features of foreign institutional investors discussed above, it is plausible that QFIIs' role would not be limited to governance structure. Given the importance of environmental issues in corporate governance matters, it is natural to ask whether QFIIs affect carbon reduction.

One factor that potentially drives QFIIs to cut carbon footprint is financial motivation. That is, investee firms' exposure to carbon risk induced by the carbon emissions embedded into the climate risk may profoundly affect the value, return and risk of portfolios. This stems from the fact that an increasing number of institutional investors, considering the importance of climate risk for firms' economic activities and financial markets, have integrated climate-related factors into their investment decision frameworks (Murfin and Spiegel, 2020; Choi et al., 2020; Ilhan et al., 2021; Krueger et al., 2020). In terms of return, empirical evidence

[11] Research on the effects of institutional investors (both domestic and foreign investors), particularly domestic investors in the context of China, is relatively abundant. Most of the existing studies focus on the role of domestic mutual funds and find a positive relationship between mutual fund ownership and firm performance (Yuan et al., 2008), financial reporting quality (Chan et al., 2014), dividend payouts (Firth et al., 2016), and the profitability of insider trading (Li and Ji, 2021).

indicates that firms with good performance on sustainability are more attractive to investors, associated with higher firm values (Matsumura et al., 2013) and better long-term returns (Gibson et al., 2017; Hartzmark and Sussman, 2019).[12] Practically, an investment strategy of "long carbon-efficient firms and short carbon-inefficient firms" can bring a significant and positive abnormal return (In et al., 2019). Besides, QFIIs can also benefit from engaging in firms' carbon reduction in a way of attracting large volumes of capital from ESG-aligned investment clients (Azar et al., 2021). In terms of risk, QFIIs' effort to cut emissions of investee firms may help mitigate overall portfolios' exposure to climate and other environmental regulatory risks and thus limit potential losses of entire portfolios. This is particularly important when QFIIs invest in Chinese firms which often face higher level of policy uncertainty compared with firms in other countries. In the case of climate policy, such uncertainty caused by the global warming may hugely affect business models, which further presents difficulties for QFIIs to predict fundamental cash flow and estimate firm value (Jagannathan et al., 2017). Compared to low-carbon firms, carbon-intense firms have higher downside risks because their profits are more sensitive to a series of carbon-reduction policies (Ilhan et al., 2021; Hoepner et al., 2016). Thus, it is reasonable that QFIIs can push firms to curb emissions because they can reap financial benefits in the form of higher financial returns and/or lower risks.

Aside from financial incentives, QFIIs may commit to reducing carbon footprint because of social incentives. As professional institutions, QFIIs have fiduciary duties on their clients, which requires them to take account of moral or ethical factors in their investment processes (Krueger et al., 2020). Since most of QFIIs come from countries with a well-designed social norm and national strategy towards the ESG issues, conformity to these rules will be subject to huge pressures from the whole society. Thus, QFIIs may be socially motivated to introduce their advanced investment philosophies and social consciousness to the firms that they invest in (Dyck et al., 2019; Li et al., 2020; Zhao et al., 2021). By pushing firms in their portfolios to cut carbon emissions, QFIIs can also build a positive social image and signal a good social reputation to attract inflows of funds from their potential clients who are willing to pay a premium to invest in environmentally sustainable firms (Riedl and Smeets, 2017).

Despite these findings, whether QFIIs in China have a significant effect on addressing climate issues is uncertain (e.g., carbon reduction). For example, some QFIIs with short-term investment horizons may only strive for maximizing short-term spread returns, rather than

[12] A few studies on the effects of climate change on asset pricing have different findings. A recent study by Bolton and Kacperczyk (2021) finds a carbon premium for carbon intense firms. That is, greater emissions are associated with higher returns. This result is consistent with the evidence in Hsu et al. (2020).

waiting for a long-term payoff from tackling environmental issues, even if such payoff is significant (Bushee, 2001). Like domestic institutional investors, QFIIs as informed investors can also take advantage of their private information to carry on speculative trading. They gain the trading rents through frequently buying and selling stocks, but at the expense of minority shareholder interests. This is supported by Zhang et al. (2017), who document an inverted U-shape relationship between QFIIs trading turnover and tunnelling magnitude based on 1,006 firm-year observations in Chinese real estate industry. Moreover, QFIIs may lack channels to monitor their investee firms' environmental behaviours because of relatively low ownership in firms restricted by law.[13] In this case, these foreign institutional investors are inclined to remain silent even if their investee firms are associated with high potential risk to the environment, leading to an insignificant effect on firms' decarbonization.

In summary, motivated by Azar et al. (2021) who find that firms being a target of Big Three have lower carbon emissions, I make the following main hypothesis in the null form:

Hypothesis 1: The presence of QFIIs does not affect corporate carbon emissions.

3. Sample selection and research design

3.1 Data sources and sample construction

The data for this paper are compiled from various sources. I obtain firm characteristics and financial information from the China Stock Market and Accounting Research (CSMAR), which is developed by GTA, one of the leading data providers in China. Data on foreign institutional ownership also come from the CSMAR database. The Institutional Shareholder Services (ISS) database, covering about 25,000 firms around the world so far, provides data on corporate carbon emissions.[14]

Our initial sample includes the universe of Chinese public firms listed on the Main board, the SME board and the Sci-tech Innovation board of China's stock markets. I start with 18,445 firm-year observations (2,635 firms) with available data on corporate carbon emissions in ISS

[13] See https://www.law.ox.ac.uk/business-law-blog/blog/2021/07/instituional-investors-china-corporage-governance-and-policy.

[14] Firms' carbon footprint provided by the ISS is initially drawn from all publicly available sources, such as corporate sustainability reports, the Carbon Disclosure Project (CDP) and Bloomberg surveys, and then validated through a combination of quantitative and qualitative analysis to ensure the reliability of these self-reported data. For those non-reporting firms, according to the sector-relevant financial or operations metrics, the ISS provides the estimates of firms' annual carbon emissions based on a sophisticated method that draws on about 800 sub-sector specific models. For more details, see https://www.issgovernance.com/esg/.

database for the 2012-2018 period. After merging the ISS dataset with the CSMAR database, I further eliminate a handful of firms under financial distress or any other abnormal condition (ST stock) and those at the risk of termination (*ST stock) during the entire sample period. Firms listed or delisted after 2012 (including the year 2012) are also excluded to ensure all firms in the sample have observations over the full sample period. After restricting the sample to non-financial firms issued A shares, I have a total number of 1,977 firms with 13,839 firm-year observations from 2012 to 2018 as the final sample.

3.2 Model specification and variables definition

To examine the relation between QFIIs and corporate carbon emissions, I estimate the following model using pooled ordinary least squares (OLS) regressions:

$$
\begin{aligned}
Carbon\ Intensity_{i,t} = {} & \beta_0 + \beta_1 QFII_{i,t-1} + \beta_2 FirmSize_{i,t-1} + \beta_3 Leverage_{i,t-1} + \beta_4 PPE_{i,t-1} \\
& + \beta_5 ROA_{i,t-1} + \beta_6 BM_{i,t-1} + \beta_7 Growth_{i,t-1} + \beta_8 BoardSize_{i,t-1} \\
& + \beta_9 FCFF_{i,t-1} + \beta_{10} SOE_{i,t-1} + \beta_{11} GDP_{i,t-1} + \beta_{12} Fixed\ Effects + \varepsilon_{i,t} \qquad (1)
\end{aligned}
$$

The dependent variable, $Carbon\ Intensity_{i,t}$, is calculated as firms' annual carbon emissions ($Scope 1, 2\ and\ 3$), which is measured in equivalents of metric tons of carbon dioxide, divided by firms' total revenue (*CO_2/Revenue*), by firms' total assets (*CO_2/Assets*) and by firms' total market capitalization (*CO_2/MV*) at the end of the year, respectively.[15] I scale firms' emissions by the end-of-year total revenue, total assets and total market capitalization because the extent to which firms emit carbon dioxide is highly correlated with firm size and market value (Ilhan et al., 2021). $QFII_{i,t-1}$ is an indicator variable that equals one for firms with at least one QFII over four quarters within the year, and zero otherwise.

Following the prior literature (Ilhan et al., 2021; Azar et al., 2021), I control for a set of firm characteristics that can affect the intensity of carbon emissions, including firm size ($FirmSize$), financial leverage ($Leverage$), capital intensity (PPE), firm profitability (ROA),

[15] Corporate carbon emission data in ISS database contain the information on three kinds of emissions, capturing both direct emissions ($Scope1$) and indirect emissions ($Scope2$ and $Scope3$) that firms create in their operations and wider value chains. $Scope1$ emissions originate from sources which are owned or controlled by firms, such as emissions from combustion in owned or controlled boilers and vehicles, emissions from chemical production in owned or controlled process equipment and so on. $Scope2$ emissions occur from the generation of the electricity, steam, heating and cooling purchased and consumed by firms. $Scope3$ emissions refer to all indirect emissions not covered in $Scope2$, mainly from upstream and downstream supply chains.

book-to-market value (BM), sales growth ($Growth$), and free cash flow to the firm ($FCFF$). State ownership (SOE) is also included because a large number of major emitters (e.g., fossil fuel firms) in China are owned by the government. In addition, the inclusion of the $BoardSize$ controls for corporate governance characteristics, given that good corporate governance tends to facilitate discussions about firms' responsibilities (e.g., climate actions) to all stakeholders and thus promotes carbon performance (Luo and Tang, 2021). Considering that the regional economic development is a contributing factor to the local greenhouse effects and can further influence corporate behaviours toward carbon reduction, I also control for the GDP per capita of provinces where firms located in (GDP) in the estimation.[16] To account for the positive time trend in corporate carbon emissions over the sample period, I include year dummies in each regression. Industry (or firm) and region fixed effects are also included in various specifications to control for the corresponding heterogeneity. I correct standard errors for firm-level clustering because observations are assumed to be independent across firms. All continuous variables are winsorized at the levels of 1% and 99% to reduce the influence of outliers. Appendix B presents definitions for all variables in detail.

4. Empirical results

4.1 Descriptive statistics

Table 1 shows summary statistics for the sample of 13,839 firm-year observations from 2012 to 2018. Panel A of Table 1 reports a breakdown of sample firms across 17 CSRC industry groups.[17] Obviously, the most represented group is "Manufacturing industry (CSRC code: C)" which accounts for 60.85% of the sample. Apart from this sector, the sample firms are widely dispersed among the rest of the 16 industries. In addition, of all the industries in the sample, the leasing and business services industry seems to have the highest carbon intensity (2.38), followed by the wholesale and retail trade industry (0.45) as well as the real estate industry (0.37).[18] Given the essential use of fossil fuels in the industrial processes, the manufacturing industry, as another big culprit of carbon emissions with a value of 0.36 in terms of the sector's carbon intensity, also includes a large number of carbon-intensive firms. Other notable

[16] I use the data from the National Bureau of Statistics of China to compute the provincial GDP per capita.
[17] The CSRC stands for the China Securities Regulatory Commission.
[18] The measure of "carbon intensity" in Panel A of Table 1 is calculated at the industry level. Following Ilhan et al. (2021), I separately aggregate the total emissions ($Scope 1, 2\ and\ 3$) and the total market capitalization of all firms within the same industry. The industry's carbon intensity is computed as the aggregated total emissions (in CO_2 equivalent CO_2e tonnes) scaled by the aggregated market capitalization (in ¥).

differences across industries are that QFIIs appear somewhat more prevalent in the industry of lodging and catering services (H), in which roughly 34% of the firms have QFIIs during our sample period, whereas these investors are less likely to be involved in the education industry (only 4% of the firms).[19]

Panel B of Table 1 provides descriptive statistics of main variables. I find that the average value of $CO2/Revnue$, $CO2/Assets$ and $CO2/MV$ is 2.77, 2.20 and 8.28, respectively. The mean value for $QFII$ is 0.17, indicating that around 17% of the sample firms have qualified foreign institutional investors during the sample period. In terms of other firm characteristics, on average, firms in the sample have a long-term debt ratio of 8%, a ratio of PPE to assets of 22%, a ROA of 4%, and a sales growth rate of 19%. Besides, 41% of the sample firms are ultimately owned by the government. These patterns are broadly similar to what has been documented in the prior literature (Li et al., 2020).

4.2 Baseline regression results

Table 2 presents estimates of the main regression model regarding the impact of QFIIs on corporate carbon emissions. Specifically, columns (1)-(3) report estimates from pooled OLS regressions where the dependent variables are three measures of corporate carbon emissions over the calendar year. Controlling for year, industry and region fixed effects, I find that coefficients on $QFII$ are negative and significant at a 1% level across all specifications, suggesting that the presence of QFIIs has a positive effect on limiting firms' carbon intensity. A coefficient of −0.511 (−0.409 and −0.539) in model 1 (model 2 and model 3) indicates that a firm's transition from having no QFII to having QFII(s) produces a 51.1% (40.9% and 53.9%) reduction in firms' annual carbon emissions in the following year.

Although the pooled OLS results show a negative relationship between QFIIs and corporate carbon emissions, these findings may be driven by some omitted variables that could affect both the likelihood of QFIIs entry and firms' carbon output. To address this concern, I re-estimate the main regression models with year and firm fixed effects included. As shown in columns (4)-(6), the results are both statistically and economically comparable to those in columns (1)-(3), which implies that our main findings are robust when controlling for time-invariant unobserved firm heterogeneity.

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[19] The measure of "QFII likelihood" in Panel A of Table 1 captures the probability of QFIIs presence across industries on average, which is calculated as the mean value of the variable $QFII$ of all firms within the same industry.

Turning to control variables, I find that larger firms ($FirmSize$), firms with better financial performance (ROA and $Growth$) and value firms (BM) tend to have a lower level of carbon intensity.[20] Although the coefficient signs and statistical significance of $Leverage$ and PPE are inconsistent across different model specifications, it is similar to findings of the earlier work (e.g., see Azar et al., (2021) for the U.S. firms). Moreover, as expected, firms with state ownership are associated with higher carbon intensity, though the evidence is relatively weak. However, there is no clear evidence for the effect of cash flow ($FCFF$) and corporate governance ($BoardSize$) on firms' carbon intensity.

Taken together, a negative association between QFIIs and corporate carbon emissions observed in columns (1) to (6) of Table 2 highlights the role of QFIIs in driving down corporate carbon emissions.

4.3 Instrumental variable estimation results

So far, I provide evidence that the presence of QFIIs as shareholders is beneficial to curbing corporate carbon emissions. These results may be biased due to some omitted time-varying unobserved factors, as well as the reverse causality, which indicates that firms with lower carbon intensity might be more attractive to QFIIs in the context of the low-carbon transition. Thus, to further support a causal interpretation of the main results, I first adopt an instrumental variable (IV) approach.

Ideally, the instrument constructed in this paper should satisfy the condition that its association with QFIIs ownership is exogenous to corporate carbon emissions. In other words, this variable should not directly affect corporate carbon emissions but only through its impact on QFIIs ownership. Similar in spirit to Aggarwal et al. (2011), I use the inclusion of firms in the Stock Connect scheme ($Stock\ Connect$) as an IV, which is a dummy variable that equals one if the firm is eligible for trading under either the Shanghai-Hong Kong Stock Connect scheme or the Shenzhen-Hong Kong Stock Connect scheme in a given year, and zero otherwise. As a milestone of the Chinese stock market development, the Stock Connect scheme launched in 2014 aims to establish the mutual stock market access between Mainland China and Hong Kong. Following this program, foreign investors are allowed to trade in certain amounts of

[20] Since firm size is highly correlated with the independent variable ($QFII$), which affects the estimates and the magnitude of the standard errors, I orthogonalize firm size with respect to $QFII$ before running the main regression model. The way of orthogonalizing the firm size is similar to several studies on bank performance (e.g., see Beck and De Jonghe, 2016).

pilot stocks listed on the Chinese domestic stock market.[21] Given that the selection and adjustment for a pilot stock depend on whether this stock is a part of capital market indices in conjunction with the market capitalization of this stock, the variation in foreign institutional ownership induced by this rule seems to be exogenous. Additionally, I provide further support for the validity of the exclusion restriction based on the economic intuition because this condition is fundamentally untestable (Roberts and Whited, 2012). The rationale is that a firm is included in the pilot program because of its good representation as a constituent of an index, which is less likely to be directly related to the carbon output particularly after controlling for factors that determine the likelihood of being the pilot stock.[22] Thus, the $Stock\ Connect$ should be a valid instrument that meets both the relevance and exclusion criteria.

To check the relevance of the instrument, in the first stage, I use logistic regressions to estimate the likelihood of the presence of QFIIs as a function of the likelihood of being a pilot stock (IV).[23] Other explanatory variables used in the baseline regression models, as well as year, industry and region fixed effects, are controlled across all specifications.[24] As shown in columns (1)-(3) of Table 3, regardless of which dependent variable I use, coefficients on $Stock\ Connect$ are statistically positive at a 1% level with the p-value of the F-test of the instrument close to 0, indicating that the $Stock\ Connect$ is an instrument variable strong and highly correlated with $QFII$.

In columns (4)-(6) of Table 3, I present the second-stage regressions using the predicted value from the first-stage regressions as the independent variable. The coefficients on the fitted values of $QFII$ are negative and statistically significant at a 1% level, which suggests that a higher likelihood of QFIIs presence is associated with the subsequent decline in carbon intensity. These results persist when using various dependent variables. Notably, the IV

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[21] Under the Stock Connect scheme, the securities eligible for trading by QFIIs comprise only of the constituents of the SSE 180 Index and the SSE 380 Index, the constituents of the SEZSE Component Index and the SZSE small/Mid Cap Innovation Index which have a market capitalization of no less than RMB six billion, and all the other SSE/SZSE-listed A shares which have corresponding H shares listed on Hong Kong Stock Exchange.

[22] There are several studies investigating the implication of the stock market liberalization by using the China's Stock Connect scheme as a quasi-natural experiment. For example, Zhang et al. (2021) show that firms whose stocks are eligible for trading by QFIIs have more green innovation output after the implementation of the stock market liberalization. Based on their findings, it is possible that the launch of the Stock Connect scheme helps reduce environmental pollution through increasing firms' engagement in green innovation. However, given that there is no clear evidence so far for the effect of the Stock Connect scheme on firms' carbon footprint, it is unclear why stock market liberalization would directly affect corporate carbon emissions.

[23] Given the fact that the Stock Connect scheme launched in 2014, the data covers only the period from 2014 to 2018. For the firm-year observations before 2014, I replace them with zero to ensure the sample period for all variables is consistent. Alternatively, I perform the IV analysis again for a limited sample period from 2014 to 2018. The untabulated results are similar to those exhibited in the paper for the full sample.

[24] In the IV regression, I orthogonalize firm size with respect to both $QFII$ and $Stock\ Connect$ because firm size is highly correlated with these two variables, which affects the estimates and the magnitude of the standard errors.

approach yields coefficients remarkably larger than the OLS regressions, implying that the OLS regressions may underestimate the positive effect of QFIIs presence on corporate carbon emissions.

4.4 Propensity-score-matching results

Considering the documented association between QFIIs and corporate carbon emissions may result from fundamental differences in firms' characteristics between firms with QFIIs and firms without QFIIs, I employ a matched sample design based on the propensity-score-matching (PSM) approach to alleviate this concern.[25] In terms of the PSM procedure, I begin the empirical analysis by obtaining the estimation for the likelihood of the presence of QFIIs (i.e., firms with QFIIs) based on the logistic regression model.[26] As shown in Appendix A, before employing the PSM, I find important differences in firm characteristics between treated observations and untreated observations. For example, the treated group includes relatively large firms with stable growth rates. It is also characterized by relatively high return on assets and unlevered free cash flow. While after adopting the PSM, differences in firm attributes between two groups seems to disappear statistically, suggesting that two groups of the matched observations are similar. Besides, I demonstrate that the PSM is effectively performed in adjusting for the balance of covariates across treated and untreated observations. The balancing test results show that the mean bias drops remarkably from 8.4 percent (before PSM) to 1.6 percent (after PSM).

Table 4 presents results for the OLS (with firm-fixed effects) estimations in a matched sample. The estimates for all specifications are comparable with the baseline regression results. As expected, for all three carbon intensity measures, coefficients of $QFII$ are similar to those in the main models as shown in Table 2 in terms of both economic and statistical significance.

In summary, two identification tests discussed above based on both the IV approach and PSM approach help gauge the causal effect of QFIIs presence on corporate carbon emissions, supporting the main finding in section 4.2.

[25] In particular, I match each treated observation for firms with QFII ownership with an untreated observation for firms without QFII ownership that has the closest propensity scores by using the nearest neighbour matching technique (with replacement). The propensity scores are calculated using all control variables included in the baseline regressions and fixed effects (year, industry and region). In the PSM procedure, the way of orthogonalizing the firm size is the same as in the baseline regressions.

[26] For brevity, the estimation results from the logit regression model are untabulated but are available upon request.

4.5 Tests of the importance of social motivation

To examine the social motivation behind the effect of QFIIs on carbon emissions reduction, I focus on the pressure that QFIIs face from social norm of their home countries, as a society's attitudes and beliefs toward environmental issues typically have significant impacts on QFIIs' behaviours (Dyck et al., 2019). I posit that QFIIs from high social norm countries are more likely to pressure investee firms on decarbonization because of the increasing demands for environmental improvement from their countries of origin. To measure the social norm of QFIIs' countries, I follow Dyck et al. (2019) and use the Environmental Performance Index (EPI), which captures a country's aggregate environmental performance.[27] I sort QFIIs into high social norm group ($QFII\_High$) and low social norm group ($QFII\_Low$) based on the median country rankings of EPI score for each year.[28] High ranking group indicates the countries with better environmental performance. Based on the results of columns (1)-(3) of Table 5, I find that coefficients on $QFII\_High$ and $QFII\_Low$ are both negative and significant at a 1% level, and the coefficient in the high social norm group ($QFII\_High$) is significantly more negative than that in the low group ($QFII\_Low$) for all dependent variables. When it comes to economic significance, if QFIIs from low social norm economies were to push investee firms to reduce carbon emissions in the same manner as QFIIs from high social norm economies, corporate carbon intensity measured by $CO_2/Revenue$ ($CO_2/Assets$ and CO_2/MV) would decline by 8.9% (7.6% and 12.1%).[29]

For robustness tests, I also consider using an alternative measure to reflect QFIIs' social awareness. Since the extent to which a country's citizens abide by the rules of society is heavily affected by the country's regulatory quality, it is plausible that QFIIs from countries with stricter environmental regulations and enforcement policies are more inclined to push harder for carbon emissions reduction, because they prefer requiring investee firms to act in accordance with high social standards as what they behave in their countries of origin. Following Li et al. (2020), I use the country's regulatory quality scores underlying the Worldwide Governance Indicators (WGI) obtained from the World Bank to test the prediction.[30] I split QFIIs into two groups according to the median value of countries'

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[27] For more details, see https://epi.yale.edu.

[28] Since data on EPI scores of Hong Kong and Macao is unavailable to retrieve, to avoid the biased result, firms with QFIIs from either Hong Kong or Macao are temporarily not considered as the sample of firms at this stage.

[29] For example, in column (1), the coefficient on ($QFII\_High - QFII\_Low$) is −0.092. The average foreign institutional ownership for the low social norm group is 0.969 (untabulated). The economic impact of social norm is calculated as −0.092* 0.969 for $CO_2/Revenue$.

[30] High regulatory quality score group indicates the countries with high levels of regulatory quality. For more details, see info.worldbank.org/governance/wgi/.

regulatory quality scores for each year and conduct subsample tests. The results, reported in columns (4)-(6) of Table 5, are similar to those exhibited in columns (1)-(3) of Table 5, although statistical and economic magnitudes here are both larger.

Overall, these results suggest that QFIIs can be socially motivated to decarbonise in a way that the negative relation between the presence of QFIIs and corporate carbon intensity is stronger for firms whose QFIIs are domiciled in the countries with higher social norm.

5. Possible economic mechanisms

In this section, I explore two possible underlying economic mechanisms through which QFIIs affect corporate carbon emissions from investee firms.

5.1 Voting power

Generally, prior literature documents that professional and sophisticated institutional investors can perform monitoring roles through either direct intervention in firms' operations (e.g., the so-called "voice" via shareholder proposals and proxy voting, or private engagement with management) or selling shares to exit (the so-called "voting with their feet") (Gillan and Starks, 2000; Edmans, 2009; McCahery et al., 2016). In line with this stream of literature, it is plausible that foreign institutions can influence firms' attitudes and behaviours towards carbon reduction through shareholder activism, which can be finally reflected in the changes in corresponding corporate policies. One important reason why these foreign institutions have such engagement incentives might be the large stakes they own in their portfolio firms, which allow them to benefit more from successful engagements (Edmans, 2009). According to Azar et al. (2021), the Big Three's engagement in carbon reduction is stronger among investee firms with more shares held by the Big Three, implicitly in conjunction with more voting power. Foreign institutional investors with considerable voting power can vote in favour of climate-aligned proposals to support firms' climate commitments, while they can also vote against management and file resolutions to ask for specific changes to corporate environmental policies (Dimson et al., 2015). Through these ways, foreign investors can proactively manage investee firms' adverse risks arising from potential impacts of climate change. Thus, following this logic stream, it is natural to posit that the effectiveness of QFIIs' decarbonization is supposed to be greater when QFIIs have larger shareholdings in their portfolio firms because they are entitled to "voice" in public attributed to their voting power.

Motivated by Li et al. (2020) and Li et al. (2021), I consider using the proportion of ownership held by QFIIs to represent QFIIs' influence and voting power on a particular firm.[31] Specifically, I split the full sample into two according to whether firms have QFIIs as one of the top ten largest shareholders ($QFII\_Top10$ and $QFII\_NonTop10$) and expect a stronger result for the group of $QFII\_Top10$. I present the results in columns (1)-(3) of Table 6. I rerun the baseline regression models but focus on the differences in the coefficients on $QFII\_Top10$ and $QFII\_NonTop10$.[32] Consistent with the expectation, the coefficient estimates on $QFII\_Top10$ and $QFII\_NonTop10$ are both negative and significant at a 1% level in all columns, while the magnitudes of this negative relation are significantly larger when QFIIs are among the top ten largest shareholders. This provides support for the voting power mechanism as more active engagement of QFIIs in corporate carbon reduction would be expected if QFIIs increase their holding stakes of firms they invest in.

5.2 Common ownership

In addition to the voting power mechanism, foreign institutional investors may also facilitate corporate carbon reduction through common institutional ownership, that is, holding multiple investee firms in the same industry in their portfolios. This mechanism is unique in the Chinese context as QFIIs in China typically face significant investment barriers legally in terms of the percentage of eligible equity holdings in single firm, which makes it difficult to explicitly clarify the role of these intervened investors play in governance practices.[33] The burgeoning literature on cross-ownership documents various outcomes of institutions' holdings in peer firms, mainly with respect to product market competition (He and Huang, 2017; Koch et al., 2021), internalizing corporate governance externalities (He et al., 2019) and financial reporting (Ramalingegowda et al., 2021). Compared with QFIIs holding smaller stakes across numerous unrelated firms, QFIIs holding more same-industry peers have at least two advantages. First, firms in the same industry tend to have similar business activities, operating environments, product scopes and even customer bases. This makes the generalization of similar

[31] To test the voting power mechanism, one would ideally use a dataset that are available to observe QFIIs' voting behaviour as the confirmation of QFIIs' use of this instrument. Unfortunately, such dataset does not exist as the voting process of specific shareholder proposals is unobservable for Chinese publicly listed firms.

[32] Specifically, $QFII\_Top10$ is an indicator that takes the value of one for firms with at least one QFII as one of the top ten largest shareholders in a calendar year, and zero otherwise. Similarly, $QFII\_NonTop10$ is an indicator that takes the value of one for firms with QFIIs but without any QFII as one of the top ten largest shareholders in a calendar year, and zero otherwise. Firms without QFIIs are always assigned to zero.

[33] For more detailed requirements, see https://www.safe.gov.cn/en/.

decarbonization patterns across peer firms possible, because the sources and even the amount of carbon emissions from these same-industry peers may be similar. Through simultaneously holding multiple firms within the same industry, QFIIs are able to gain some knowledge and experiences related to a specific industry. This can further be used to facilitate investment decision-making not only for the investee firm itself but also for other focal firms, thus resulting in the more effective aggregate carbon reduction. Besides, it is asserted that common ownership is helpful for improving monitoring efficiency due to the economy of scale mechanism (Ramalingegowda et al., 2021). In other words, the common features among the same-industry peers mentioned above are likely to incur lower costs of information acquisition and process during decarbonization. This therefore can increase QFIIs' incentives to monitor firms' transition to a low-carbon future. Based on these discussions, I thus postulate that QFIIs with common ownership, compared to those without common ownership, can better push investee firms' decarbonization.

Empirically, I divide firms into two subsamples according to whether firms have QFIIs holding multiple investee firms within the same industry. To measure common ownership, following He and Huang (2017), I define a dummy variable that equals one for firms with at least one QFII concurrently holding more than one firm in the same industry of investee firms in any of the four quarters in a calendar year, and zero otherwise. I use 17 categories of industries (except for financial industry) based on the CSRC industry classification to identify peer firms. Corresponding results are reported in columns (4)-(6) of Table 6. Again, I reestimate the main regressions with the same controls

as in Table 2 but replace $QFII$ with $QFII\_Common$ and $QFII\_NonCommon$. In all models, coefficients on $QFII\_Common$ and $QFII\_NonCommon$ are negative and significant at a 1% level, while in two out of three models, the magnitudes of this negative relation are significantly larger among QFIIs with common ownership. The findings provide evidence consistent with the argument that common ownership plays an important role in how QFIIs reduce firms' carbon intensity.

6. Additional tests and results

In this section, I perform two robustness tests. First, I examine regional heterogeneity in the relation between the presence of QFIIs and corporate carbon emissions by comparing the differences in the effect of QFIIs' decarbonization between firms operating in provinces with high air pollution and low air pollution, given that carbon emissions and air quality are closely related. I hypothesize that QFIIs are expected to be more important for areas where air quality is relatively low normally as a result of inappropriate policy interventions relating to environmental management. I distinguish high air-polluted regions and low air-polluted regions based on firms' geographical location (i.e., whether firms operate in coastal provinces or not) and run a subsample analysis.[34] This is due to the fact that coastal areas are often exposed to consistent coastal breezes enabling to disperse air pollutant to a large extent, and hence provinces in coastal zones generally have better air quality compared to inland provinces. Panel A of Table 7 reports the corresponding subsample analysis results. The evidence shows that across all models, coefficients on $QFII$ are negative and significant at a 1% level for both groups, while the magnitudes of the negative coefficients on $QFII$ are larger for the inland group. The difference in the coefficient between the coastal group and inland group is statistically significant at a 10% level (with the exception of Models 3 and 4). These findings suggest that the marginal effect of QFIIs' decarbonization is stronger among firms operating in the inland provinces with more severe air pollution.

Next, I explore whether QFIIs' geographic location can affect the influence of QFIIs. Specifically, I group QFIIs by three geographic regions: Europe, Americas, as well as Asia and Australasia based on QFIIs' countries of origin. As can be seen from Panel B of Table 7, for all measures of carbon intensity, firms with QFIIs from either the Europe, Americas, or Asia and Australasia are associated with lower carbon intensity relative to firms without QFIIs in a given year. More importantly, among three groups of QFIIs, Asian and Australian investors push firms' carbon reduction more, as the coefficients on $QFII$ from Asia and Australasia group are significantly larger (more negative) than the corresponding ones for other two groups. These results imply that geographical distance between QFIIs' countries of origin and target firms' countries does matter through which QFIIs from near-distance countries (i.e., Asian) tend to exert more influences on firms' decarbonization possibly due to less information asymmetry they face.

The final set of test examines the robustness of the main results to an alternative measure of $QFII$. I replace the $QFII$ dummy with a continuous variable, defined as the fraction of a firm's shares owned by QFIIs, to capture the magnitude of foreign shareholding. Panel C of Table 7 shows patterns similar to those in the main regression models (as shown in Table 2), although the magnitudes and statistical significance for the coefficients on QFII ownership are

[34] Following Jiang et al. (2014), I define a firm as "coastal" if the firm operate in one of the eleven coastal provinces, which are Liaoning, Hebei, Shandong, Jiangsu, Zhejiang, Fujian, Guangdong, Guangxi, Hainan, Tianjin, and Shanghai.

relatively smaller and lower. In general, the evidence in Table 7 confirms that the main results are not sensitive to an alternative measure of $QFII$.

7. Conclusion

In this paper, I explore the impact of foreign institutional investors on corporate carbon reduction. Using a large sample of Chinese publicly listed firms from 2012 to 2018, I find that firms with QFIIs experience lower carbon intensity. To address endogeneity issues, I use both an IV approach and a PSM approach to ensure the main results are causal. I further explore the social motivation behind QFIIs' push for carbon reduction. That is, QFIIs domiciled in high social norm countries play a more significant role in cutting carbon footprint. Then, I explore two mechanisms through which QFIIs' engagement affects firms' carbon reduction, which are voting power and common ownership. Specifically, I find the negative relation between the presence of QFIIs and carbon intensity reduction is stronger among firms with QFIIs as one of the top ten largest shareholders and among firms with QFIIs holding peer firms within the same industry. Cross-sectional tests also show that the effect of QFIIs' decarbonization is stronger when firms operate in the inland provinces where air pollution is severe and when QFIIs come from Asia and Australasia with shorter physical distances to China.

Collectively, this paper highlights the importance of introducing foreign institutional investors in tackling with climate issues, particularly carbon reduction. In addition, it expands the understanding on why and how these sophisticated investors are willing to engage with firms on environmental issues. Lastly, this study may also be helpful for policy makers in other emerging markets where engagement efforts to cut carbon emissions have been prioritized.

References

Aggarwal, R., Erel, I., Ferreira, M., and Matos, P. (2011) Does governance travel around the world? Evidence from institutional investors. *Journal of Financial Economics* 100(1), 154-181.

Aghion, P., Reenen, J.V., and Zingales, L. (2013) Innovation and institutional ownership. *The American Economic Review* 103(1), 277-304.

Akey, P. and Appel, I. (2019) Environmental externalities of activism. *Working Paper*, available at SSRN: https://ssrn.com/abstract=3508808.

Azar, J., Duro, M., Kadach, I., and Ormazabal, G. (2020) The big three and corporate carbon emissions around the world. *Journal of Financial Economics* 142(2), 674-696.

Baba, N. (2009) Increased presence of foreign investors and dividend policy of Japanese firms. *Pacific-Basin Finance Journal* 17(2), 163-174.

Baldauf, M., Garlappi, L., and Yannelis, C. (2020) Does climate change affect real estate prices? Only if you believe in it. *The Review of Financial Studies* 33(3), 1256-1295.

Beck, T. and De Jonghe, O. (2016) Lending concentration, bank performance and systemic risk: Exploring cross-country variation. *Working Paper*, available at SSRN: https://ssrn.com/abstract=2326780.

Bena, J., Ferrieira, M.A., Matos, P., and Pires, P. (2017) Are foreign investors locusts? The long-term effects of foreign institutional ownership. *Journal of Financial Economics* 126(1), 122-146.

Bernstein, A., Gustafson, M.T., and Lewis, R. (2019) Disaster on the horizon: The price effect of sea level rise. *Journal of Financial Economics* 134(2), 253-272.

Bolton, P. and Kacperczyk, M. (2020) Global pricing of carbon-transition risk. *Working Paper*, available at SSRN: https://ssrn.com/abstract=3550233.

Bolton, P. and Kacperczyk, M. (2021) Do investors care about carbon risk? *Journal of Financial Economics* 142(2), 517-549.

Boone, A.L. and White, J.T. (2015) The effect of institutional ownership on firm transparency and information production. *Journal of Financial Economics* 117(3), 508-533.

Bushee, B.J. (2001) Do institutional investors prefer near-term earnings over long-run value? *Contemporary Accounting Research* 18(2), 207-246.

Cao, L., Du, Y., and Hansen, J. Ø. Foreign institutional investors and dividend policy: Evidence from China. *International Business Review* 26(5), 816-827.

Chan, A.L., Ding, R., and Hou, W. (2014) Does mutual fund ownership affect financial reporting quality for Chinese privately-owned enterprises? *International Review of Financial Analysis* 36, 131-140.

Chen, S., Huang, Y., Li, N., and Shevlin, T. (2019) How does quasi-indexer ownership affect corporate tax planning? *Journal of Accounting and Economics* 67(2-3), 278-296.

Chen, T., Dong, H., and Lin, C. (2020) Institutional shareholders and corporate social responsibility. *Journal of Financial Economics* 135(2), 483-504.

Chen, Z., Du, J., Li, D., and Ouyang, R. (2013) Does foreign institutional ownership increase return volatility? Evidence from China. *Journal of Banking and Finance* 37(2), 660-669.

Chemmanur, T.J., Hu, G., and Wei, K.C.J. (2021) The role of institutional investors in corporate and entrepreneurial finance. *Journal of Corporate Finance* 66, 101833.

Choi, D., Gao, Z., and Jiang, W. (2020) Attention to global warming. *The Review of Financial Studies* 33(3), 1112-1145.

Chu, Y. and Zhao, D. (2019) Green hedge fund activists. *Working Paper*, available at SSRN:

https://ssrn.com/abstract=3499373.
Crane, A.D., Michenaud, S., and Weston, J.P. (2016) The effect of institutional ownership on payout policy: Evidence from index thresholds. *The Review of Financial Studies* 29(6), 1377-1408.
Dehejia, R. and S. Wahba. (2002) Propensity score-matching methods for nonexperimental causal studies. *Review of Economics and Statistics* 84(1), 151-161.
Dimson, E., Karakas, O., and Li, X. (2015) Active ownership. *The Review of Financial Studies* 28(12), 3225-3268.
Dyck, A., Lin, K.V., Roth, L., and Wagner, H.F. (2019) Do institutional investors drive corporate social responsibility? International evidence. *Journal of Financial Economics* 131(3), 693-714.
Edmans, A. (2009) Blockholder trading, market efficiency, and managerial myopia. *The Journal of Finance* 64(6), 2481-2513.
Fang, V.W., Maffett, M.G., and Zhang, B. (2015) Foreign institutional ownership and the global convergence of financial reporting practices. *Journal of Accounting Research* 53(3), 593-631.
Ferreira, M.A. and Matos, P. (2008) The colors of investors' money: The role of institutional investors around the world. *Journal of Financial Economics* 88(3), 499-533.
Firth, M., Gao, J., Shen, J., and Zhang, Y. (2016) Institutional stock ownership and firms' cash dividend policies: Evidence from China. *Journal of Banking and Finance* 65, 91-107.
Fu, X., Kong, L., Tang, T., and Yan, X. (2020) Insider trading and shareholder investment horizons. *Journal of Corporate Finance* 62, 101508.
Ge, W., Ouyang, C., Shi, Z., and Chen, Z. (2022) Can a not-for-profit minority institutional shareholder make a big difference in corporate governance? A quasi-natural experiment. *Journal of Corporate Finance* 72, 102125.
Gibson, R., Krueger, P., and Mitali, S.F. (2017) The sustainability footprint of institutional investors: ESG driven price pressure and performance. *Working Paper*, available at SSRN: https://ssrn.com/abstract=2918926.
Gillan, S.L. and Starks, L.T. (2000) Corporate governance proposals and shareholder activism: the role of institutional investors. *Journal of Financial Economics* 57(2), 275-305.
Gillan, S.L. and Starks, L.T. (2003) Corporate governance, corporate ownership, and the role of institutional investors: A global perspective. *Journal of Applied Finance* 13, 4-22.
Hartzmark, S.M. and Sussman, A.B. (2019) Do Investors Value Sustainability? A Natural Experiment Examining Ranking and Fund Flows. *The Journal of Finance* 74(6), 2789-2837.
He, J. and Huang, J. (2017) Product market competition in a world of cross-ownership: Evidence from institutional blockholdings. *The Review of Financial Studies* 30(8), 2674-2718.
He, J., Huang, J., and Zhao, S. (2019) Internalizing governance externalities: The role of institutional cross-ownership. *Journal of Financial Economics* 134(2), 400-418.
He, X., Rui, O., Zheng, L., and Zhu, H. (2014) Foreign ownership and auditor choice. *Journal of Accounting and Public Policy* 33(4), 401-418.
Heath, D., Macciocchi, D., Michaely, R., and Ringgenberg, M.C. (2021) Does socially responsible investing change firm behavior? Working Paper, available at SSRN: https://ssrn.com/abstract=3837706.
Hillegeist, S.A. and Weng, L. (2021) Quasi-indexer ownership and insider trading: Evidence from Russell index reconstitutions. *Contemporary Accounting Research* 38(3), 2192-2223.
Hoepner, A.G.F., Oikonomou, I., Sautner, Z., Starks, L.T., and Zhou, X. (2016) ESG shareholder engagement and downside risk. *Working Paper*, available at SSRN:

https://ssrn.com/abstract=2874252.
Hsu, P.H., Li, K., and Tsou, C.Y. (2020) The pollution premium. *Working Paper*, available at SSRN: https://ssrn.com/abstract=3578215.
Hsu, P.H., Liang, H., and Matos, P. (2021) Leviathan Inc. and corporate environmental engagement. *Management Science forthcoming.*
Huang, R.D. and Shiu, C.Y. (2009) Local effects of foreign ownership in an emerging financial market: Evidence from qualified foreign institutional investors in Taiwan. *Financial Management* 38(3), 567-602.
Huang, W. and Zhu, T. (2015) Foreign institutional investors and corporate governance in emerging markets: Evidence of a split-share structure reform in China. *Journal of Corporate Finance* 32, 312-326.
Huo, R. and Ahmed, A.D. (2017) Return and volatility spillovers effects: Evaluating the impact of Shanghai-Hong Kong Stock Connect. *Economic Modelling* 61, 260-272.
Ilhan, E., Sautner, Z., and Vilkov, G. (2021) Carbon tail risk. *The Review of Financial Studies* 34(3), 1540-1571.
In, S.Y., Park, K.Y., and Monk, A. (2019) Is 'being green' rewarded in the market? An empirical investigation of decarbonization and stock returns. *Working Paper*, available at SSRN: https://ssrn.com/abstract=3020304.
Jagannathan, R., Ravikumar, A., and Sammon, M. (2017) Environmental, social, and governance criteria: Why investors are paying attention. *Working Paper*, available at SSRN: https://ssrn.com/abstract=3082225.
Jeon, J.Q., Lee, C., and Moffett, C.M. (2011) Effects of foreign ownership on payout policy: Evidence from the Korean market. *Journal of Financial Markets* 14(2), 344-375.
Jiang, F. and Kim, K.A. (2020) Corporate governance in China: A Survey. *Review of Finance* 24(4), 733-722.
Jiang, L., Lin, C., and Lin, P. (2014) The determinants of pollution levels: Firm-level evidence from Chinese manufacturing. *Journal of Comparative Economics* 42(1), 118-142.
Khan, M., Srinivasan, S., and Tan, L. (2017) Institutional ownership and corporate tax avoidance: New evidence. *The Accounting Review* 92(2), 101-122.
Kim, I., Wan, H., Wang, B., and Yang, T. (2019) Institutional investors and corporate environmental, social, and governance policies: Evidence from toxics release data. *Management Science* 65(10), 4901-4926.
Kim, J.B., Li, X., Luo, Y., and Wang, K. (2020) Foreign investors, external monitoring, and stock price crash risk. *Journal of Accounting, Auditing & Finance* 35(4), 829-853.
Kim, S., Sul, W., and Kang, S.A. (2010) Impact of foreign institutional investors on dividend policy in Korea: A stock market perspective. *Journal of Financial Management and Analysis*, 23, 10-26.
Koch, A., Panayides, M., and Thomas, S. (2021) Common ownership and competition in product markets. *Journal of Financial Economics* 139(1), 109-137.
Krueger, P., Sautner, Z., and Starks, L.T. (2020) The importance of climate risks for institutional investors. *The Review of Financial Studies* 33(3), 1067-1111.
Lel, U. (2019) The role of foreign institutional investors in restraining earnings management activities across countries. *Journal of International Business Studies* 50, 895-922.
Li, B., Liu, Z., and Wang, R. (2021) When dedicated investors are distracted: The effect of institutional monitoring on corporate tax avoidance. *Journal of Accounting and Public Policy* 40(6), 106873.
Li, S., Brockman, P., and Zurbruegg, R. (2015) Cross-listing, firm-specific information, and corporate governance: Evidence from Chinese A-shares and H-shares. *Journal of Corporate Finance* 32, 347-362.

Li, T. and Ji, Y. (2021) Institutional ownership and insider trading profitability: Evidence from an emerging market. *Pacific-Basin Finance Journal* 70, 101668.

Li, Z., Wang, B., Wu, T., and Zhou, D. (2021) The influence of qualified foreign institutional investors on internal control quality: Evidence from China. *International Review of Financial Analysis* 78, 101916.

Li, Z., Wang, P., and Wu, T. (2020) Do foreign institutional investors drive corporate social responsibility? Evidence from listed firms in China. *Journal of Business Finance and Accounting* 48(1-2), 338-373.

Lin, Y.R. and Fu, X.M. (2017) Does institutional ownership influence firm performance? Evidence from China. *International Review of Economics & Finance* 49, 17-57.

Luo, L. and Tang, Q. (2021) Corporate governance and carbon performance: role of carbon strategy and awareness of climate risk. *Accounting and Finance* 61, 2891-2934.

Luong, H., Moshirian, F., Nguyen, L., Tian, X., and Zhang, B. (2017) How do foreign institutional investors enhance firm innovation? *Journal of Financial and Quantitative Analysis* 52(4), 1449-1490.

Matsumura, E. M., Prakash, R., and Vera-Muñoz, S.C. (2013) Firm-value effects of carbon emissions and carbon disclosures. *The Accounting Review* 89(2), 695-724.

McCahery, J.A., Sautner, Z., and Starks, L.T. (2016) Behind the scenes: The corporate governance preferences of institutional investors. *The Journal of Finance* 71(6), 2905-2932.

Murfin, J. and Spiegel, M. (2020) Is the risk of sea level rise capitalized in residential real estate? *The Review of Financial Studies* 33(3), 1217-1255.

Naaraayanan, S.L., Sachdeva, K., and Sharma, V. (2019) The real effects of environmental activist investing. *Working Paper,* available at SSRN: https://ssrn.com/abstract=3483692.

Painter, M. (2020) An inconvenient cost: The effects of climate change on municipal bonds. *Journal of Financial Economics* 135(2), 468-482.

Ramalingegowda, S., Utke, S., and Yu, Y. (2021) Common institutional ownership and earnings management. *Contemporary Accounting Research* 38(1), 208-241.

Ramalingegowda, S. and Yu, Y. (2012) Institutional ownership and conservatism. *Journal of Accounting and Economics* 53(1-2), 98-114.

Riedl, A. and Smeets, P. (2017) Why do investors hold socially responsible mutual funds? *The Journal of Finance* 72(6), 2505-2550.

Roberts, M.R. and Whited, T. (2012) 'Endogeneity in empirical corporate finance', in Constantinides, G., Harris, M., and Stulz, R. (eds.) *Handbook of the Economics of Finance,* Elsevier, 2, 493-572.

Schuppli, M. and Bohl, M.T. (2010) Do foreign institutional investors destabilize China's A-share markets? *Journal of International Financial Markets, Institutions and Money* 20(1), 36-50.

Stern, N. (2008) The economics of climate change. *The American Economic Review* 98(2), 1-37.

Wu, M.W., Shen, C.H., and Lu, C.H. (2015) Do more foreign strategic investors and more directors improve the earnings smoothing? The case of China. *International Review of Economics and Finance* 36, 3-16.

Xiong, L., Deng, H., and Xiao, L. (2021) Does stock market liberalization mitigate litigation risk? Evidence from Stock Connect in China. *Economic Modelling* 102, 105581.

Yuan, R., Xiao, J.Z., and Zou, H. (2008) Mutual funds' ownership and firm performance: Evidence from China. *Journal of Banking and Finance* 32(8), 1552-1565.

Zhang, X., Yang, X., Strange, R., and Zhang, Q. (2017) Informed trading by foreign institutional investors as a constraint on tunneling: Evidence from China. *Corporate Governance: An International Review* 25(4), 222-235.

Zhang, Y., Zhang, J., and Cheng, Z. (2021) Stock Market Liberalization and Corporate Green Innovation: Evidence from China. *International Journal of Environmental Research and Public Health* 18(7), 3412.

Zhao, X., Fang, L., and Zhang, K. (2021) How foreign institutional shareholders' religious beliefs affect corporate social performance? *Journal of Business Ethics*, 1-25.

Appendix A. Procedure to construct the propensity-score-matched (PSM) sample

The propensity-score-matching (PSM) technique aims to pair treated units and control units to make two groups more alike conditional on certain observable characteristics (Dehejia and Wahba, 2002). The first step in this procedure is to obtain the estimation for the likelihood of the presence of QFIIs (i.e., firms with QFIIs) by running a logistic regression model based on the entire sample of firms. Next, I use the predicted probability from the first step to estimate the propensity score of each firm-year. Then, I match each treated observation with an untreated (control) observation using the nearest neighbour matching technique with replacement. Panel A shows the estimation results from the logit regression model. Panel B reports the effectiveness of PSM approach. All variables are defined in Appendix B. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 level, respectively.

Panel A: Results of the logit regression

	Dependent variable = Presence of QFIIs	
Variables	Coefficient	Z-stat.
$FirmSize$ (orthogonalized)	0.127***	5.71
$Leverage$	−1.353***	−5.94
PPE	0.851***	6.62
ROA	7.222***	15.48
BM	0.221***	4.02
$Growth$	−0.138***	−3.20
$BoardSize$	0.243**	2.47
$FCFF$	−0.117	−1.03
SOE	0.432***	10.40
GDP	0.236***	5.01

Panel B: Descriptive statistics of treated and untreated observations before and after matching

Variables		Mean value, treated firms (1)	Mean value, control firms (2)	% Bias	Diff. (1)−(2)
$FirmSize$	Pre-match	0.194	−0.079	21.7	0.273***
(orthogonalized)	*Post-match*	0.192	0.183	0.7	0.009
$Leverage$	Pre-match	0.077	0.076	1.1	0.001
	Post-match	0.077	0.078	−1.0	−0.001
PPE	Pre-match	0.234	0.211	13.7	0.023***
	Post-match	0.234	0.237	−2.1	−0.004
ROA	Pre-match	0.044	0.032	25.5	0.012***
	Post-match	0.044	0.043	0.5	0.000
BM	Pre-match	−0.568	−0.626	12.0	0.058***
	Post-match	−0.568	−0.581	2.7	0.013

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(Continued)

Panel B: Descriptive statistics of treated and untreated observations before and after matching

Variables		Mean value, treated firms (1)	Mean value, control firms (2)	% Bias	Diff. (1)−(2)
$Growth$	Pre-match	0.182	0.199	−3.7	−0.017*
	Post-match	0.182	0.178	0.8	0.004
$BoardSize$	Pre-match	2.167	2.136	15.6	0.031***
	Post-match	2.167	2.168	−0.6	−0.001
$FCFF$	Pre-match	0.037	0.021	9.1	0.016***
	Post-match	0.037	0.038	−0.4	−0.001
SOE	Pre-match	0.481	0.361	24.4	0.120***
	Post-match	0.480	0.486	−1.3	−0.006
GDP	Pre-match	10.990	10.948	9.8	0.042***
	Post-match	10.990	10.995	−1.3	-0.005

Appendix B. Variable Definitions

This table provides definitions for the key variables used in the analysis.

Variable	Definition
BM	Natural logarithm of the book-to-market ratio, which is calculated as the book value of assets scaled by the market value of assets. Market value of assets is book value of total assets minus book value of equity plus market value of equity.
BoardSize	Natural logarithm of the number of directors on the board.
CO2/Assets	Natural logarithm of *CO2/Assets*. Corporate carbon intensity (*CO2/Assets*) is computed as firms' annual total carbon emissions (metric tons of CO_2) divided by firms' total assets at the end of the year. Firms' annual carbon emissions include *Scope1, Scope2 and Scope3* emissions.
CO2/MV	Natural logarithm of *CO2/MV*. Corporate carbon intensity (*CO2/MV*) is computed as firms' annual total carbon emissions (metric tons of CO_2) divided by firms' total market capitalization at the end of the year. Firms' annual carbon emissions include *Scope1, Scope2 and Scope3* emissions.
CO2/Revenue	Natural logarithm of *CO2/Revenue*. Corporate carbon intensity (*CO2/Revenue*) is computed as firms' annual total carbon emissions (metric tons of CO_2) divided by firms' total revenue at the end of the year. Firms' annual carbon emissions include *Scope1, Scope2 and Scope3* emissions.
FCFF	Free cash flow to firms divided by total assets.
FirmSize	Natural logarithm of total assets.
GDP	Provincial GDP per capita.
Growth	Annual sales growth rate, calculated as sales in year t minus sales in year t-1, divided by sales in year t-1.
Leverage	Long-term debt divided by total assets.
PPE	Fixed assets, calculated as property, plant and equity divided by total assets.
QFII	(1) Indicator variable that equals one for firms with at least one qualified foreign institutional investor over four quarters within the year. (2) The fraction of a firm's shares owned by QFIIs in a given year (robustness test).
QFII_Americas	Indicator variable that takes the value of one for firms with QFIIs domiciled in Americas, and zero otherwise.

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(Continued)

Variable	Definition
QFII_Asia and Australasia	Indicator variable that takes the value of one for firms with QFIIs domiciled in Asia and Australasia, and zero otherwise.
QFII_Common	Indicator variable that equals one for firms with at least one QFII concurrently holding more than one firm in the same industry of investee firms in any of the four quarters in a given year, and zero otherwise. Peer firms are identified based on 17 categories of CSRC industry classification (except financial industry).
QFII_Europe	Indicator variable that takes the value of one for firms with QFIIs domiciled in Europe, and zero otherwise.
QFII_High	(1) Indicator variable that equals one for firms with QFIIs from the country with better environmental performance (equals to or above median country rankings of EPI score) in a given year, and zero otherwise. (2) Indicator variable that equals one for firms with QFIIs from the country with higher regulatory quality (equals to or above median value of countries' regulatory quality scores underlying the Worldwide Governance Indicators) in a given year, and zero otherwise.
QFII_Low	(1) Indicator variable that equals one for firms with QFIIs from the country with worse environmental performance (below median country rankings of EPI score) in a given year, and zero otherwise. (2) Indicator variable that equals one for firms with QFIIs from the country with lower regulatory quality (below median value of countries' regulatory quality scores underlying the Worldwide Governance Indicators) in a given year, and zero otherwise.
QFII_NonCommon	Indicator variable that equals one for firms with QFIIs but without any QFII concurrently holding more than one firm in the same industry of investee firms in any of the four quarters in a given year, and zero otherwise. Peer firms are identified based on 17 categories of CSRC industry classification (except financial industry).
QFII_NonTop10	Indicator variable that takes the value of one for firms with QFIIs but without any QFII as one of the top ten largest shareholders in a given year, and zero otherwise.
QFII_Top10	Indicator variable that takes the value of one for firms with at least one QFII as one of the top ten largest shareholders in a given year, and zero otherwise.

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(Continued)

Variable	Definition
ROA	Return on assets, calculated as net income divided by total assets.
SOE	Indicator variable that equals one if the firm is ultimately controlled by the government, zero otherwise.
Stock Connect	Indicator variable that equals one if the firm is eligible for trading under either the Shanghai-Hong Kong Stock Connect scheme or the Shenzhen-Hong Kong Stock Connect scheme in a given year, and zero otherwise.

Table 1
Descriptive statistics

This table presents summary statistics for the observations and main variables used in the empirical estimations over the period of 2012-2018. Panel A reports the distribution of the sample firms by industries based on the CSRC (China Securities Regulatory Commission) classification. Panel B reports the number of observations, mean, standard deviation, 25^{th} percentile, median and 75^{th} percentile for each variable. All explanatory variables are lagged by one year. All continuous variables are winsorized at the levels of 1% and 99%. All variables are defined in Appendix B.

Panel A: Sample distribution by industry group

Industry	CSRC Code	No. of obs.	No. of firms	Fraction (%)	Carbon intensity	QFII likelihood
Farming, forestry, animal husbandry and fishery	A	168	24	1.21	0.08	0.17
Mining industry	B	364	52	2.63	0.01	0.18
Manufacturing industry	C	8,421	1,203	60.85	0.36	0.17
Production and supply of electric power, gas and water	D	539	77	3.89	0.06	0.15
Construction industry	E	350	50	2.53	0.07	0.22
Wholesale and retail trade	F	847	121	6.12	0.45	0.17
Transport, storage and post	G	497	71	3.59	0.08	0.24
Lodging and catering services	H	56	8	0.40	0.03	0.34
Information transmission, computer services and software	I	994	142	7.18	0.04	0.14
Real estate	K	742	106	5.36	0.37	0.14
Leasing and business services	L	217	31	1.57	2.38	0.15
Scientific research and technical service	M	56	8	0.40	0.02	0.11
Water conservancy, environment and public facilities management	N	217	31	1.57	0.15	0.20
Education	P	28	4	0.20	0.00	0.04
Health and social work	Q	63	9	0.46	0.05	0.14
Culture, sports and entertainment	R	182	26	1.32	0.04	0.20
Conglomerates	S	98	14	0.71	0.32	0.08
Total		13,839	1,977	100		

(Continued)

Panel B: Descriptive statistics of main variables						
Variables	No. of obs.	Mean	SD	P25	Median	P75
$CO2/Revenue$	12,231	2.77	2.14	1.12	2.34	3.90
$CO2/Assets$	12,232	2.20	1.91	0.73	1.71	3.13
$CO2/MV$	12,219	8.28	2.34	6.77	8.05	9.58
$QFII$	13,839	0.17	0.37	0.00	0.00	0.00
$FirmSize$	13,839	22.20	1.28	21.29	22.04	22.95
$Leverage$	13,351	0.08	0.10	0.00	0.03	0.12
PPE	13,839	0.22	0.17	0.09	0.18	0.31
ROA	13,839	0.04	0.05	0.01	0.03	0.06
BM	13,360	−0.60	0.48	−0.87	−0.49	−0.23
$Growth$	13,621	0.19	0.45	−0.02	0.11	0.27
$BoardSize$	13,823	2.15	0.20	2.08	2.20	2.20
$FCFF$	13,624	0.03	0.18	−0.03	0.06	0.13
SOE	13,832	0.41	0.49	0.00	0.00	1.00
GDP	13,839	10.97	0.44	10.61	10.99	11.32

Table 2
Baseline regressions

This table displays the regression results for the impact of qualified foreign institutional investors on corporate carbon emissions based on a sample of 1,977 firms over the 2012-2018 period. Columns (1)-(3) control for year, industry and region fixed effects, while columns (4)-(6) control for year and firm fixed effects. All explanatory variables are lagged by one year. All continuous variables are winsorized at the levels of 1% and 99%. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively. All variables are defined in Appendix B.

	$CO2/Revenue$	$CO2/Assets$	$CO2/MV$	$CO2/Revenue$	$CO2/Assets$	$CO2/MV$
	(1)	(2)	(3)	(4)	(5)	(6)
$QFII$	**−0.511***	**−0.409***	**−0.539***	**−0.510***	**−0.413***	**−0.549***
	(0.07)	(0.07)	(0.09)	(0.07)	(0.07)	(0.09)
$FirmSize$	**−0.721***	**−0.580***	**−0.717***	**−0.723***	**−0.587***	**−0.727***
(orthogonalized)	(0.04)	(0.03)	(0.05)	(0.04)	(0.04)	(0.05)
$Leverage$	**1.719***	**−0.063**	**0.886***	**1.018**	**−0.137**	**0.825**
	(0.42)	(0.36)	(0.50)	(0.46)	(0.40)	(0.54)
PPE	**−0.599**	**−0.119**	**−0.411**	**−0.734***	**−0.084**	**−0.252**
	(0.26)	(0.23)	(0.30)	(0.28)	(0.25)	(0.32)
ROA	**−3.153***	**−2.033***	**−3.690***	**−3.496***	**−2.070***	**−3.698***
	(0.82)	(0.74)	(0.90)	(0.82)	(0.74)	(0.90)
BM	**−0.213**	**−0.176***	**0.859***	**−0.252**	**−0.208**	**0.792***
	(0.10)	(0.09)	(0.11)	(0.10)	(0.09)	(0.11)
$Growth$	**−0.122**	**−0.029**	**−0.062**	**−0.119**	**−0.026**	**−0.053**
	(0.05)	(0.04)	(0.05)	(0.05)	(0.04)	(0.05)
$BoardSize$	**0.229**	**0.210**	**0.308**	**0.215**	**0.220**	**0.345**
	(0.19)	(0.17)	(0.22)	(0.19)	(0.16)	(0.22)
$FCFF$	**−0.059**	**−0.006**	**0.123**	**−0.103**	**−0.022**	**0.104**
	(0.12)	(0.11)	(0.14)	(0.12)	(0.11)	(0.14)
SOE	**0.086**	**0.182****	**0.367*****	**0.067**	**0.171***	**0.358*****
	(0.10)	(0.09)	(0.11)	(0.10)	(0.09)	(0.11)
GDP	**−0.151**	**−0.082**	**−0.236****	**−0.152**	**−0.066**	**−0.240****
	(0.11)	(0.09)	(0.12)	(0.10)	(0.09)	(0.12)
Constant	**3.694*****	**2.613****	**10.805*****	**3.973*****	**2.372****	**10.691*****
	(1.22)	(1.09)	(1.39)	(1.19)	(1.08)	(1.37)
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	NO	YES	YES	YES
Industry FE	YES	YES	YES	NO	NO	NO
Region FE	YES	YES	YES	NO	NO	NO
No. of obs.	11,162	11,163	11,161	11,162	11,163	11,161
R-squared	0.184	0.161	0.110	0.192	0.165	0.116

Table 3
Instrumental variable approach

This table reports the two-stage least squares (2SLS) regressions of corporate carbon emissions on qualified foreign institutional investors based on a sample of 1,977 firms over the 2012-2018 period. All models include year, industry and region fixed effects. All explanatory variables are lagged by one year. All continuous variables are winsorized at the levels of 1% and 99%. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively. All variables are defined in Appendix B.

	First Stage			Second Stage		
	$QFII\_Revenue$	$QFII\_Assets$	$QFII\_MV$	$CO2/Revenue$	$CO2/Assets$	$CO2/MV$
	(1)	(2)	(3)	(4)	(5)	(6)
$Stock\ Connect$	**0.208*****	**0.208*****	**0.208*****			
	(0.07)	(0.07)	(0.07)			
$QFII$				**−4.075*****	**−3.277*****	**−4.351*****
				(0.27)	(0.24)	(0.30)
$FirmSize$	**−0.280*****	**−0.280*****	**−0.280*****	**−1.850*****	**−1.488*****	**−1.914*****
(orthogonalized)	(0.03)	(0.03)	(0.03)	(0.08)	(0.07)	(0.09)
$Leverage$	**0.274**	**0.274**	**0.274**	**2.824*****	**0.825*****	**2.058*****
	(0.30)	(0.30)	(0.30)	(0.25)	(0.23)	(0.29)
PPE	**0.369****	**0.369****	**0.369****	**0.882*****	**1.072*****	**1.167*****
	(0.16)	(0.16)	(0.16)	(0.15)	(0.14)	(0.18)
ROA	**11.034*****	**11.034*****	**11.034*****	**41.200*****	**33.630*****	**43.715*****
	(0.66)	(0.66)	(0.66)	(3.04)	(2.75)	(3.48)
BM	**0.826*****	**0.826*****	**0.826*****	**3.116*****	**2.501*****	**4.409*****
	(0.08)	(0.08)	(0.08)	(0.24)	(0.21)	(0.27)
$Growth$	**−0.083**	**−0.083**	**−0.083**	**−0.455*****	**−0.297*****	**−0.421*****
	(0.06)	(0.06)	(0.06)	(0.05)	(0.04)	(0.06)
$BoardSize$	**0.223***	**0.223***	**0.223***	**1.126*****	**0.932*****	**1.269*****
	(0.13)	(0.13)	(0.13)	(0.12)	(0.11)	(0.14)
$FCFF$	**0.076**	**0.076**	**0.076**	**0.239****	**0.234****	**0.441*****
	(0.15)	(0.15)	(0.15)	(0.12)	(0.10)	(0.13)
SOE	**0.673*****	**0.673*****	**0.673*****	**2.787*****	**2.354*****	**3.250*****
	(0.05)	(0.05)	(0.05)	(0.19)	(0.17)	(0.21)
GDP	**0.299*****	**0.299*****	**0.299*****	**1.049*****	**0.883*****	**1.047*****
	(0.06)	(0.06)	(0.06)	(0.10)	(0.09)	(0.11)
Constant	**−5.922*****	**−5.922*****	**−5.922*****	**−20.037*****	**−16.467*****	**−14.582*****
	(0.75)	(0.75)	(0.75)	(1.73)	(1.56)	(1.98)

Table Continued Overleaf

(Continued)

	First Stage			Second Stage		
	$QFII\_Revenue$	$QFII\_Assets$	$QFII\_MV$	$CO2/Revenue$	$CO2/Assets$	$CO2/MV$
	(1)	(2)	(3)	(4)	(5)	(6)
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES
F-test	**144.49**	**115.78**	**127.73**			
(*p*-value)	(0.00)	(0.00)	(0.00)			
No. of obs.	12,672	12,672	12,672	11,162	11,163	11,161
Pseudo/ R-squared	0.057	0.057	0.057	0.178	0.157	0.105

Table 4

Propensity-score-matching approach

This table repeats the analysis in Table 2 using a reduced sample of firms with 2,907 observations in the treated group and 2,927 observations in the control group from 2012 to 2018. Columns (1)-(3) control for year, industry and region fixed effects, while columns (4)-(6) control for year and firm fixed effects. All explanatory variables are lagged by one year. All continuous variables are winsorized at the levels of 1% and 99%. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively. All variables are defined in Appendix B.

	$CO2/Revenue$	$CO2/Assets$	$CO2/MV$	$CO2/Revenue$	$CO2/Assets$	$CO2/MV$
	(1)	(2)	(3)	(4)	(5)	(6)
$QFII$	**−0.551*****	**−0.443*****	**−0.513*****	**−0.543*****	**−0.449*****	**−0.525*****
	(0.08)	(0.08)	(0.10)	(0.08)	(0.08)	(0.10)
$FirmSize$	**−0.711*****	**−0.574*****	**−0.664*****	**−0.715*****	**−0.581*****	**−0.677*****
(orthogonalized)	(0.05)	(0.04)	(0.06)	(0.05)	(0.04)	(0.06)
$Leverage$	**1.569*****	**−0.092**	**0.777**	**0.936***	**−0.122**	**0.775**
	(0.47)	(0.40)	(0.56)	(0.53)	(0.45)	(0.62)
PPE	**−0.707****	**−0.199**	**−0.362**	**−0.789****	**−0.157**	**−0.182**
	(0.29)	(0.26)	(0.34)	(0.32)	(0.28)	(0.36)
ROA	**−3.656*****	**−2.374*****	**−3.971*****	**−3.831*****	**−2.351*****	**−3.863*****
	(0.92)	(0.83)	(0.99)	(0.92)	(0.83)	(0.98)
BM	**−0.208***	**−0.170**	**0.794*****	**−0.222***	**−0.181***	**0.754*****
	(0.12)	(0.10)	(0.12)	(0.12)	(0.11)	(0.13)
$Growth$	**−0.129****	**−0.026**	**−0.037**	**−0.126****	**−0.023**	**−0.024**
	(0.06)	(0.05)	(0.07)	(0.06)	(0.05)	(0.07)
$BoardSize$	**0.129**	**0.143**	**0.265**	**0.116**	**0.161**	**0.312**
	(0.22)	(0.19)	(0.25)	(0.22)	(0.19)	(0.25)
$FCFF$	**−0.134**	**−0.066**	**0.096**	**−0.173**	**−0.078**	**0.080**
	(0.17)	(0.16)	(0.19)	(0.17)	(0.16)	(0.19)
SOE	**0.064**	**0.176***	**0.358*****	**0.054**	**0.172***	**0.352*****
	(0.11)	(0.10)	(0.12)	(0.11)	(0.10)	(0.13)
GDP	**−0.192**	**−0.109**	**−0.241***	**−0.192**	**−0.091**	**−0.225***
	(0.13)	(0.11)	(0.14)	(0.12)	(0.11)	(0.14)
Constant	**4.418*****	**3.094****	**10.990*****	**4.663*****	**2.801****	**10.596*****
	(1.46)	(1.32)	(1.63)	(1.42)	(1.29)	(1.59)
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	NO	YES	YES	YES
Industry FE	YES	YES	YES	NO	NO	NO
Region FE	YES	YES	YES	NO	NO	NO
No. of obs.	5,793	5,793	5,793	5,793	5,793	5,793
R-squared	0.170	0.151	0.097	0.178	0.154	0.103

Table 5

QFIIs' social norm and corporate carbon emissions

This table presents the regression estimates for the relation between the presence of qualified foreign institutional investors grouped by social norm of foreign institutional investors' home countries and corporate carbon emissions over the 2012-2018 period. The analyses in columns (1)-(3) are based on a restricted sample that excludes firms with QFIIs domiciled in either Hong Kong or Macao, whereas the analyses in columns (4)-(6) are based on the full sample. The social norm of QFIIs' home countries is measured using the rankings of Environmental Performance Index (EPI) in columns (1)-(3) and the regulatory quality scores underlying the Worldwide Governance Indicators (WGI) in columns (4)-(6), respectively. All models control for year, industry and region fixed effects. All explanatory variables are lagged by one year. All continuous variables are winsorized at the levels of 1% and 99%. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively. All variables are defined in Appendix B.

	Environmental Performance Index (EPI)			Regulatory Quality Score (RQS)		
	$CO2/Revenue$	$CO2/Assets$	$CO2/MV$	$CO2/Revenue$	$CO2/Assets$	$CO2/MV$
	(1)	(2)	(3)	(4)	(5)	(6)
$QFII\_High$	**−0.457*****	**−0.366*****	**−0.465*****	**−0.627*****	**−0.481*****	**−0.636*****
	(0.10)	(0.09)	(0.12)	(0.09)	(0.09)	(0.11)
$QFII\_Low$	**−0.365*****	**−0.288*****	**−0.340*****	**−0.370*****	**−0.321*****	**−0.421*****
	(0.11)	(0.10)	(0.13)	(0.08)	(0.08)	(0.10)
Other controls	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES
No. of obs.	9,635	9,636	9,634	11,162	11,163	11,161
R-squared	0.163	0.144	0.092	0.184	0.161	0.110

Table 6

Economic mechanisms: Voting power and Common ownership

This table reports the results on how voting power channel (Models 1-3) and common ownership channel (Models 4-6) separately explain the effect of QFIIs' presence on corporate carbon emissions based on a sample of 1,977 firms over the 2012-2018 period. All models control for year, industry and region fixed effects. All explanatory variables are lagged by one year. All continuous variables are winsorized at the levels of 1% and 99%. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively. All variables are defined in Appendix B.

	Voting power			Common ownership		
	$CO2/Revenue$	$CO2/Assets$	$CO2/MV$	$CO2/Revenue$	$CO2/Assets$	$CO2/MV$
	(1)	(2)	(3)	(4)	(5)	(6)
$QFII\_Top10$	**−0.556***** (0.09)	**−0.427***** (0.08)	**−0.561***** (0.12)			
$QFII\_NonTop10$	**−0.377***** (0.08)	**−0.357***** (0.07)	**−0.477***** (0.10)			
$QFII\_Common$				**−0.507***** (0.07)	**−0.415***** (0.07)	**−0.551***** (0.09)
$QFII\_NonCommon$				**−0.520***** (0.13)	**−0.394***** (0.12)	**−0.508***** (0.15)
Other controls	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES
No. of obs.	11,162	11,163	11,161	11,162	11,163	11,161
R-squared	0.184	0.162	0.111	0.184	0.161	0.110

Table 7
Robustness tests

This table presents the results of additional tests and robustness checks based on a sample of 1,977 firms over the 2012-2018 period. Panel A reports potential differential effects of QFIIs' decarbonization on firms operating in coastal provinces and firms operating in inland provinces. Panel B shows potential differential effects of QFIIs' decarbonization on firms with QFIIs separately domiciled in Europe, Americas, as well as Asia and Australasia. Panel C repeats the analysis in Table 2 using an alternative linear measure of $QFII$, which is defined as the fraction of a firm's shares owned by QFIIs in a given year. All models control for year, industry and region fixed effects. All explanatory variables are lagged by one year. All continuous variables are winsorized at the levels of 1% and 99%. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote significance at 10%, 5% and 1% levels, respectively. All variables are defined in Appendix B.

Panel A: Heterogeneous effects by firms' geographic location

	Coastal province	Inland province	Coastal province	Inland province	Coastal province	Inland province
	(1)	(2)	(3)	(4)	(5)	(6)
	$CO2/Revenue$		$CO2/Assets$		$CO2/MV$	
$QFII$	**−0.407*****	**−0.640*****	**−0.314*****	**−0.514*****	**−0.408*****	**−0.694*****
	(0.07)	(0.07)	(0.06)	(0.07)	(0.07)	(0.09)
Difference:	**0.233***		**0.20**		**0.286***	
Coastal – Inland	***Z-statistic = 2.77***		***Z-statistic = 2.42***		***Z-statistic = 2.83***	
Other controls	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES
No. of obs.	6,728	4,434	6,729	4,434	6,729	4,432
R-squared	0.166	0.223	0.148	0.196	0.085	0.164

Table Continued Overleaf

(Continued)

Panel B: Heterogeneous effects by QFIIs' geographic location

	$CO2/Revenue$	$CO2/Assets$	$CO2/MV$
	(1)	(2)	(3)
$QFII\_Europe$	**−0.391*****	**−0.300*****	**−0.386*****
	(0.10)	(0.09)	(0.11)
$QFII\_Americas$	**−0.574*****	**−0.446*****	**−0.580*****
	(0.16)	(0.14)	(0.19)
$QFII\_Asia\ and\ Australasia$	**−0.602*****	**−0.499*****	**−0.670*****
	(0.09)	(0.08)	(0.11)
Other controls	YES	YES	YES
Year FE	YES	YES	YES
Industry FE	YES	YES	YES
Region FE	YES	YES	YES
No. of obs.	11,162	11,163	11,161
R-squared	0.184	0.161	0.110

Table Continued Overleaf

(Continued)

Panel C: Alternative measure of foreign shareholding

	$CO2/Revenue$	$CO2/Assets$	$CO2/MV$	$CO2/Revenue$	$CO2/Assets$	$CO2/MV$
	(1)	(2)	(3)	(4)	(5)	(6)
$QFII$	**−0.163****	**−0.110***	**−0.147****	**−0.157****	**−0.112***	**−0.157****
	(0.07)	(0.06)	(0.07)	(0.07)	(0.06)	(0.07)
$FirmSize$ (orthogonalized)	**−0.728*****	**−0.587*****	**−0.728*****	**−0.731*****	**−0.595*****	**−0.738*****
	(0.04)	(0.03)	(0.05)	(0.04)	(0.04)	(0.05)
$Leverage$	**1.760*****	**−0.018**	**0.947***	**1.058****	**−0.097**	**0.877**
	(0.42)	(0.36)	(0.50)	(0.46)	(0.40)	(0.54)
PPE	**−0.612****	**−0.132**	**−0.430**	**−0.747*****	**−0.097**	**−0.269**
	(0.26)	(0.23)	(0.30)	(0.28)	(0.25)	(0.32)
ROA	**−3.258*****	**−2.145*****	**−3.846*****	**−3.608*****	**−2.182*****	**−3.848*****
	(0.82)	(0.73)	(0.89)	(0.82)	(0.74)	(0.89)
BM	**−0.207****	**−0.169***	**0.867*****	**−0.246****	**−0.201****	**0.800*****
	(0.10)	(0.09)	(0.11)	(0.10)	(0.09)	(0.11)
$Growth$	**−0.119****	**−0.027**	**−0.058**	**−0.117****	**−0.023**	**−0.050**
	(0.05)	(0.04)	(0.05)	(0.05)	(0.04)	(0.05)
$BoardSize$	**0.233**	**0.215**	**0.314**	**0.220**	**0.225**	**0.351**
	(0.19)	(0.17)	(0.22)	(0.19)	(0.16)	(0.22)
$FCFF$	**−0.061**	**−0.008**	**0.120**	**−0.105**	**−0.024**	**0.101**
	(0.12)	(0.11)	(0.14)	(0.12)	(0.11)	(0.14)

Table Continued Overleaf

(Continued)

Panel C: Alternative measure of foreign shareholding

	$CO2/Revenue$	$CO2/Assets$	$CO2/MV$	$CO2/Revenue$	$CO2/Assets$	$CO2/MV$
	(1)	(2)	(3)	(4)	(5)	(6)
SOE	**0.081**	**0.177****	**0.359*****	**0.062**	**0.166***	**0.350*****
	(0.10)	(0.09)	(0.11)	(0.10)	(0.09)	(0.11)
GDP	**−0.153**	**−0.084**	**−0.239****	**−0.154**	**−0.069**	**−0.243****
	(0.11)	(0.09)	(0.12)	(0.10)	(0.09)	(0.12)
Constant	**3.653*****	**2.578****	**10.766*****	**3.935*****	**2.341****	**10.657*****
	(1.22)	(1.09)	(1.39)	(1.19)	(1.08)	(1.37)
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	NO	YES	YES	YES
Industry FE	YES	YES	YES	NO	NO	NO
Region FE	YES	YES	YES	NO	NO	NO
No. of obs.	11,162	11,163	11,161	11,162	11,163	11,161
R-squared	0.184	0.161	0.110	0.192	0.165	0.116