The China Trade Shock and the ESG Performances of US Firms

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Abstract

This paper links China trade shock and US firms' ESG engagement. Increased Chinese import competition could in theory either increase or reduce the ESG engagement by US corporates. Exploiting a change in US trade policy that reduced the expected tariff rates on Chinese imports, we find that greater import competition from China leads to better ESG performance of US companies. The improvement primarily stems from "doing more positives" and from more involvement on environmental and social initiatives. Evidence shows that the improvement is not driven by the change in production process or outsourcing, but is consistent with product differentiation.

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Abstract

This paper links China trade shock and US firms' ESG engagement. Increased Chinese import competition could in theory either increase or reduce the ESG engagement by US corporates. Exploiting a change in US trade policy that reduced the expected tariff rates on Chinese imports, we find that greater import competition from China leads to better ESG performance of US companies. The improvement primarily stems from "doing more positives" and from more involvement on environmental and social initiatives. Evidence shows that the improvement is not driven by the change in production process or outsourcing, but is consistent with product differentiation.

Corporates and investors increasingly play up environmental, social and governance (ESG) initiatives. A survey by U.S. Chamber of Commerce in 2021 finds that over half of the U.S. companies publish voluntary sustainability and ESG reports outside of their SEC filings. Investors are also concerned about the companies' ESG engagement and performance. The assets under management of global ESG ETFs are around $225 billion in 2020 and, according to Bloomberg Intelligence, are expected to grow at 35 percent per annum, reaching $1 trillion by 2025.[1] The investor's growing attention to ESG and corporate social responsibility (CSR) is also reflected in Google search volume index (see Figure 1).[2] In this paper, we study the firm's ESG performances through the lens of international trade. Specifically, we study the effects of trade shock from China on ESG performance of domestic US firms.

As China transited towards a market-oriented economy and reduced barriers to foreign trade during 1990s and 2000s, its share of world manufacturing exports grew from 2.3% in 1991 to 18.8% in 2013 (Autor, Dorn, and Hanson (2016)). Increasing import competition from China has profound impacts on the US economy, including survival of US manufacturing plants (Bernard, Jensen, and Schott (2006)), industry labor employment (Acemoglu et al. (2016)), labor incomes (Autor et al. (2014)), R&D expenditure and innovations of US firms (Autor et al. (2020)) and even political ideology (Autor, Dorn, and Hanson (2020)). However, it is not clear how import competition from China affects ESG engagement by local US firms. In fact, the theory and current evidence often leads to ambiguous and even contradictory conjectures.

On the one hand, facing greater competition from Chinese exporters who lagged behind on ESG performance, US firms may have less incentive to place resources into ESG initiatives. Furthermore, reduced profitability and tighter cash flow due to the competition can force firms to scale back on a series of activities, including capital expenditure, R&D and ESG engagements. On the other hand, there are also reasons to believe that the ESG performance of US firms may improve as a response to the competition. For one, in light of the import competition from China, US firms increasingly shift to capital-and-technology intensive production segment and outsource manufacturing production operations overseas. The change

[1] According to the Global Sustainable Investment Association, global ESG assets surpass $35 trillion in 2020, up from $30.6 trillion in 2018 and $22.8 trillion in 2016.

[2] The term of ESG is more expansive and explicitly includes governance whereas CSR puts more emphasis on the corporate's environmental and social activities (Gillan, Koch, and Starks (2021)). The difference is usually inconsequential. In this paper, similar to Gillan, Koch, and Starks (2021), we treat the terms ESG and CSR as interchangeable.

in production process, therefore, can result in better ESG performance. For another, given that Chinese exporters enjoy low cost of labor but lag behind on commitment to ESG initiatives, US firms may find it effective to engage more on ESG initiatives and differentiate themselves from Chinese competitors. Therefore, the effect of import competition on corporate ESG engagement is an empirical question that remains to be answered.

In this paper, we shed light on this question by exploiting the change in expected tariff rates on Chinese imports across industries as US congress granted Permanent Normal Trade Relations (PNTR) to China in 2001. US imports from nonmarket economies such as China are subject to non-Normal Trade Relations tariff (non-NTR) originally set under the Smooth-Hawley Tariff Act of 1930. Since 1980, imports from China to US were granted a waiver and enjoyed low NTR tariff rates. Such a waiver, nevertheless, was granted on an annual basis and had to be reviewed and re-approved by the US congress, causing an uncertainty of "*the sword of Damocles*". The PNTR permanently reduces the expected tariff rates and removes the uncertainty. Pierce and Schott (2016) shows that following PNTR, US producers experience increased import competition from China.

Following Pierce and Schott (2016), we exploit the variation in reduction of expected tariff rates across industries and adopt a difference-in-differences (DiD) approach. We find a strong *positive* relationship between reduction in expected tariff rates and ESG engagement by US firms. A standard deviation decrease in expected tariff rates raises a firm's ESG score by 0.36, approximately 16% of a standard deviation of the ESG score. The result suggests that firms in industries facing greater competition from China following PNTR substantially improve their ESG performance. In addition, our analysis shows that the improvement primarily stems from "doing more positives" and from more involvement on environmental initiatives. Our baseline analysis is robust to the inclusion of firm-level fixed effects, year fixed effects, and, more importantly, industry-year fixed effects.[3]

We proceed to study if the improved ESG performance is driven by changes in the production process. The literature in international trade, e.g., Mion and Zhu (2013), Autor, Dorn, and Hanson (2016) and Bloom, Draca, and Van Reenen (2016), shows that increased

[3] As Gillan, Koch, and Starks (2021) point out, ESG scores have a strong industry component. Industry-year fixed effects therefore can control for the unobservable industry factors that might be correlated with ESG. For instance, high pollution-producing and carbon-emitting industries may have more incentives over time to increase their ESG engagement due to pressure from regulators and investors.

import competition from China has driven domestic producers to reduce employment, deepen capital intensity and outsource some manufacturing production. The change in production process can therefore affect a firm's ESG performance. For instance, if firms hire less employees than before, then they may afford to offer higher salary and more benefits on a per capita basis, potentially leading to better employer-employee relations. To control for this, we further include variables related to the production process, both at the firm level and at the industry level, in our specification. The results show that these variables account for little variation in firms' ESG performance, and have no explanatory power on the positive relation between reduction in expected tariff rates and ESG engagement by US firms, suggesting that the improvement in ESG performance is unlikely driven by changes in the production process.

Instead, we find both indirect and direct evidence supporting that US firms strategize ESG engagement to differentiate their products. Our indirect evidence explores the relationship between the firm's market power and their ESG engagement. The market power of a US firm may rise due to technical barrier, unique assets and regulations, and even Chinese producers that enjoy the low cost of labor can hardly pose a threat to the firm. Using two different measures of market power (Hoberg and Phillips (2010); Hoberg and Phillips (2016)), we find that firms with less market power are more incentivized to improve their ESG performance upon trade shock from China, and the evidence is consistent with the differentiation hypothesis.

If US firms indeed attempt to differentiate themselves from Chinese imports by actively engaging in ESG initiatives, firms producing standardized goods should have more incentives to do so. Our direct evidence therefore takes advantage of the product similarity measures from Hoberg and Phillips (2016) and from Rauch (1999) respectively, and investigates this insight. Indeed, the results from our empirical tests suggest that firms in standardized industries improve their ESG performance to a greater extent. Moreover, it also suggests that most of the improvement on ESG performance documented in the baseline analysis comes from companies operating in standardized industries. To our knowledge, our paper is the first one to present direct evidence of ESG engagement as a firm's differentiation strategy.

To further study the differentiation effort of US producers by increasing ESG engagement, we also exploit the imports to US from other low wage countries. These countries, similar to China, have comparative advantage in the cost of labor, but fall behind on ESG performance metrics. The import penetration from the low wage countries to US was steadily increasing over 1990s from less than 2% in 1991 to nearly 6% in 2000, and we show that the

passage of PNTR significantly *accelerates* such a trend. Interestingly, our analysis suggests that prior exposure to the import competition from the low wage countries may have prompted the US companies to improve their ESG performance long before, and as a result, the prior exposure moderates the effects of PNTR on the firm's ESG engagement. Still, we show that the PNTR strongly increases the ESG engagement by US firms, even after we control for the prior exposure of the US firms to the competition from other low wage countries.

Before concluding our study, we shed light on the real effects of the increasing import competition and improvement in ESG engagement following PNTR. Our baseline analysis leverages the ESG ratings, and suggests that the improved ESG performances of US firms primarily stems from more engagement on environmental initiatives. Nevertheless, it is not clear whether the environmental engagements yield any *real* impacts. We therefore focus on pollution emission and waste release by a firm, a critical integrant of a firm's environment performance. By studying the real impacts and searching for real environmental performance improvement, we also validate our ESG rating measures. Given that ESG ratings typically involve multiple performance metrics and there is a lack of consensus on the critical ESG performance indicators, a firm sometimes ends up with different ESG scores by different ESG ratings agencies, casting doubt on the accuracy of ESG rating measures. Using the data of Toxics Release Inventory (TRI) by U.S. Environmental Protection Agency, we show that greater import competition following PNTR reduces the toxics release by US firms overall. To our knowledge, the present paper connects the ESG ratings to real environmental performance for the first time.

Our paper contributes to an emerging literature that studies the impacts of rising import competition from China on domestic US firms and markets. Much of the literature (Autor, Dorn, and Hanson (2013), Autor et al. (2014), Acemoglu et al. (2016) and Autor, Dorn, and Hanson (2019)) focus on the impacts of the trade shock on US labor markets. Autor et al. (2020) shows that US patent production declines in sectors facing greater import competition, while Autor, Dorn, and Hanson (2020) suggest that import competition from China may have contributed to the polarization of US politics. This paper contributes to the literature by studying the impacts of trade shock from China on the ESG engagement of local US firms and analyzing the reasons behind.

Consequently, our paper also connects the literature of trade to a thriving literature exploring the firm and market characteristics that could explain the firms' ESG decisions. Cai,

Pan, and Statman (2016) and Liang and Renneboog (2017) provide evidence that country characteristics are important in explaining the firm's ESG activities. Di Giuli and Kostovetsky (2014) and Jha and Cox (2015) show that political leaning and social capital of the region in which a firm is headquartered also affect its ESG engagement. Studies also observe that a firm's ESG engagements are heavily influenced by personal traits of its CEO and board of directors, including their genders, the genders of their children, and their marital status (Iliev and Roth (2021); Borghesi, Houston, and Naranjo (2014); Cronqvist and Yu (2017); Hegde and Mishra (2019)). In addition, Dimson, Karakaş, and Li (2015), Dyck et al. (2019), and Chen, Dong, and Lin (2020) among others, find that institutional investors can also exert significant influence on a firm's ESG engagement. Starks, Venkat, and Zhu (2017), however, argue that long-term institutional investors are in fact attracted to firms with higher ESG/CSR profiles instead of influencing the firm's choices directly. We extend this strand of literature by examining the effects of increased import competition from China and other developing countries on firms' ESG performance. We provide novel evidence, both direct and indirect, showing the enhanced ESG engagement as a differentiation strategy for US producers upon greater import competition.

The paper proceeds as follows. Section I elaborates two competing hypotheses regarding the relationship between import competition from China and the ESG performance of local US firms. Section II introduces the background of US granting PNTR to China, and describes the data and our baseline identification strategy. Section III presents the main results and a battery of robustness tests, including an alternative identification approach similar to Autor et al. (2020). Section IV studies the mechanisms underlying the improvement in ESG performance, and shows that the improvement is not driven by the change in production process, but is consistent with ESG engagement being a differentiation strategy. Section V studies the prior exposure of US producers to import competition from low wage countries before PNTR. Section VI leverages the data of TRI and investigates the real effect of greater import competition from China on the toxics release by US firms. Section VII concludes.

I. US Firm's ESG Performance and Trade Shock from China

The import competition from China has been shown to have profound impacts on US firms, markets, community and even political ideology. However, it is not clear how the exposure to trade shock from China shapes ESG engagement and performance by domestic US

firms.[4] Competing theories suggest that it can either increase or decrease the local firm's ESG engagement, leaving it for empirical studies to ascertain.

Import competition from China can decrease a US firm's engagement on ESG issues. The decrease can be ascribed to two effects: peer effect and cash flow effect.

Corporates pay close attention to their competitors, and thus the peers can affect an individual firm's decision-making.[5] This also includes a firm's ESG engagement. Cao, Liang, and Zhan (2019) finds that the adoption of ESG proposal by a firm is followed by the adoption of similar ESG practices by peer firms. At the onset of China's transition towards a market-oriented economy and integration into world trade in 1990s and 2000s, Chinese producers enjoyed very low cost of labor, but did not prioritize ESG engagement, falling behind US firms during the same period. Anecdotal evidence suggests that the difference on ESG performance between Chinese firms and US firms may be significant.[6] Therefore, when competing with Chinese firms, US firms of which the ESG performance already stood out may choose to spend more resources on other value-creating activities, e.g., R&D, instead of into ESG engagement.

The peer effect can occur independent of a firm's cash flow level. However, import competition can also squeeze a firm's profitability and tighten its cash flow (Esposito and Esposito (1971), Pugel (1980)), further reducing a firm's ESG engagement on top of the peer effect. The tighter cash flow, in principle, is expected to downsize both a firm's value-creating projects, e.g., R&D and investment (Autor et al. (2020)), and other activities, e.g., charity and

[4] In this paper, we use ESG engagement and ESG performance interchangeably.

[5] Peer effects in corporate finance and governance are prevalent: Leary and Roberts (2014) argue that peer effect is a crucial determinant in firm's capital structure. Similarly, Grieser et al. (2022) find strategic complementarity in capital structure decisions. Kaustia and Rantala (2015) examine the effect of social learning and claim that firms are more likely to split their stock following their peers' actions. A number of studies show that peer effect plays an important role in chief executive officer (CEO) compensation, where corporations use their peer companies as benchmarks in determining the compensation packages (Faulkender and Yang (2010); Bizjak, Lemmon, and Nguyen (2011); Albuquerque, De Franco, and Verdi (2013)). Kelchtermans, Neicu, and Teirlinck (2020) and Peng, Lian, and Forson (2021) present evidence on imitation of firms in their R&D decisions and the usage of R&D tax exemptions. Foucault and Fresard (2014) and Dessaint et al. (2019) also find significant association between peer evaluation and corporate investment decisions.

[6] Hasanbeigi et al. (2014) compare the energy use and intensity between U.S. and China, and find that Chinese steel industry has much higher energy intensity than the U.S. in 2006, which has a direct impact on energy consumption and related carbon dioxide (CO2) emissions. The Carbon Disclosure Project (CDP5) in 2007 highlights the overall lack of data from Chinese corporates. In addition to environmental issues, there are also concerns about the labor right protection in China. China Labor Watch, an independent not-for-profit organization, conducts assessments of factories in China on their labor conditions. Their reports over the years have shown that many Chinese factories experience problems such as employment of underaged workers, high work hours, gender discrimination and so on. In one of their 2007 reports that receives media attention, they investigate toy suppliers in China and claim that workers are suffering brutal conditions and illegal practices. (China Labor Watch, 2007 Aug 21, retrieved from https://chinalaborwatch.org/investigations-on-toy-suppliers-in-china-workers-are-still-suffering/)

donations (Gregory, Tharyan, and Whittaker (2014)). ESG engagement is no exception: Hong, Kubik, and Scheinkman (2012) show that financial constraint adversely affects a firm's engagement on ESG initiatives.

While peer effect and cash flow effect may lead to lower ESG performance in the presence of trade shock from China, other factors can incentivize a firm to engage more on ESG initiatives, either passively or actively.

The first factor is the change in production process caused by the trade shock. Pierce and Schott (2016) show that US producers reduce the employment and deepen capital intensity when facing greater competition from China following the grant of PNTR. Such changes in the production process may inadvertently improve a firm's ESG performance. For instance, if a firm hire less employees than before, then they may afford to offer higher salary and more benefits on a *per capita* basis, leading to better labor relations.[7] In fact, despite the significant unemployment related to trade shock from China (Acemoglu et al. (2016), Pierce and Schott (2016)), multiple surveys suggest that the job satisfaction in the US stayed steady or even ticked up in the 2000s after the PNTR was passed, suggesting potential differential welfare impacts of the change in production process on people staying in the job and people out of the job.[8] Accompanying the change in production process is the increased production outsourcing by US firms to China. Recent evidence shows that corporates in the developed economies where environmental policies are rigorous outsource production with high pollution and high CO_2 emission to regions where environmental protection is weak, engaging regulatory arbitrage. [9] Therefore, one cannot rule out *a priori* that the improvement in US firms' ESG performance stems from outsourcing part of their production process to China.

Secondly, a firm may improve its ESG performance to differentiate itself from the Chinese competitors. Management and marketing literature have argued that firms use better

[7] Most of the ESG rating agencies leave out in their rating methodology a firm's decision on the termination of employment, and only focus on the welfare policies of employees that are currently on the job.
[8] Figure A.1 in the appendix presents job satisfaction related surveys from the Conference Board and Gallup from 2003 to 2016.
[9] Ben-David et al. (2021) find that firms allocate their pollutions internationally driven by environmental policies in the home country. Moran, Hasanbeigi, and Springer (2018) investigate global carbon trade and estimate that 25% of the global carbon emissions can be account for by production outsourced or offshored abroad. Hasanbeigi, Morrow, and Shehabi (2021) take a closer look at U.S. manufacturing and trade, and detect high level of global carbon footprint embodied in traded goods in the U.S. Various news articles make similar claims and bring attention to pollution outsourcing to developing countries in the global supply chain. See, for example, the Guardian (https://www.theguardian.com/environment/2014/jan/19/co2-emissions-outsourced-rich-nations-rising-economies) ; the New York Times (https://www.nytimes.com/2018/09/04/climate/outsourcing-carbon-emissions.html).

ESG performance to differentiate themselves and to foster customer loyalty (Navarro (1988); Bagnoli and Watts (2003); Siegel and Vitaliano (2007); Hull and Rothenberg (2008); Flammer (2015)). Creyer and Ross (1997) show that consumers care about firms' ESG performance and take it into account when making purchasing decisions. Auger et al. (2003) and De Pelsmacker, Driesen, and Rayp (2005) indicate that consumers are willing to pay for better ESG feature of a product. Domestic US companies, therefore, may have more incentive to improve ESG performance facing greater competition from Chinese producers who enjoy lower cost of labor but lag behind on ESG engagement. The incentive to improve, however, might differ depending on the firm's market power and the characteristics of the industry in which the firm operates, which we will detail in Section IV.

In summary, theoretic analysis offers opposite propositions on how import competition from China affects US firms' engagement on ESG initiatives. Even within the same proposition, theories have suggested different possible channels at work. We therefore turn to empirical analysis to shed light on the impacts of the trade shock and the potential mechanisms.

II. Data

This section describes the data of our empirical analysis. The data consists of three parts. To gauge the competition from China across industries, we use the expected tariff rates from Pierce and Schott (2016). To measure the ESG performances of US firms, we leverage the KLD ESG ratings. Finally, we use Compustat and CRSP to control for firm-level covariates, e.g., total assets and financial leverage.

Uncertainty and Expected Tariff Rates on Imports from China:

Our primary identification strategy follows Pierce and Schott (2016) and exploits a US trade policy granting Permanent Normal Trade Relations (PNTR) to China in 2001.[10] Imports from China to the US had been subject to the relatively low NTR tariff rates reserved for WTO members since 1980. These low rates, however, required annual reviews and approval by Congress. Had Congress not renewed China's NTR status, the tariff rates on imports from China would have become non-NTR rates originally set under the Smoot-Hawley Tariff Act of 1930 and significantly hiked. To see the difference between NTR and non-NTR rates, the

[10] The legislation was passed by the House of Representatives on May 24, 2000 and by the Senate on September 19, 2000. The President signed on Oct 10, 2000. It officially became effective when China joined the WTO in December, 2001. See Pierce and Schott (2016) for more detail of the legislation.

average tariff rates on Chinese imports is 3.4% in 1999, and this figure would have jumped by 10 times to 37% without NTR status.

The renewal process by the US congress was not a bureaucratic formality. In fact, every year between 1990 and 2001, the US House of Representatives brought and voted on the bill attempting to revoke the China's temporary NTR status. The *uncertainty* and *potential increase* in expected tariff rates were finally removed by PNTR.

To gauge the import competition from China across industries, we use the *NTR gap* calculated by Pierce and Schott (2016). Specifically, *NTR gap* for industry *j* is the difference between the non-NTR rates that would have applied to imports in industry *j* from China had the annual reauthorization failed, and the NTR tariff rates set by PNTR,

$$NTR\ Gap_j = Non\ NTR\ Rate_j - NTR\ Rate_j$$

Higher *NTR gap* in industry *j* indicates more intense competition from Chinese imports following PNTR. Pierce and Schott (2016) find that US industries with higher *NTR gaps* experience acceleration in Chinese imports. They also show that 79% of the variation in *NTR gap* comes from the variation in non-NTR rates that were set in the 1930s. This feature renders *NTR gap* plausibly exogenous to ESG engagement by US firms after 2001.[11]

The *NTR gaps* from Pierce and Schott (2016) are set at eight-digit Harmonized System (HS) level. To concord these data to four-digit SIC level, we use the crosswalk provided by Autor, Dorn, and Hanson (2013) who slightly aggregate the four-digit SIC industries so that each of the resulting manufacturing industries matches to at least one HS code. We then take the simple average of *NTR gaps* at four-digit SIC level. Similar to Pierce and Schott (2016), we use the *NTR Gaps* from 1999, but will demonstrate the robustness of our results to *NTR Gaps* from other years.

ESG Engagement:

Our data on ESG engagement by US firms come from Kinder, Lydenberg and Domini (KLD) Research & Analytics, Inc. KLD started to collect the scores of ESG engagement in 1991 for 488 firms, and the coverage grew over the years to include 2894 firms in 2009.[12] After

[11] The NTR gap is likely exogenous also because the first-order consideration concerning the legislation in the tariff and trade agreement is comparative advantage in cost of production of domestic firms and local labor employment (Gros (1987); Elhanan and Krugman (1989)), not the ESG performance of the local firms.
[12] The fact that KLD started to collect data on the firm's performance on various environmental and social issues suggests that CSR and ESG began to receive attentions from corporate managers and/or investors in 1990s.

2009, the calculations of ESG scores changed (Hong et al. (2019)). Given the 2008 global financial crisis and its potential impacts on firms' ESG commitment, our analysis leverages the KLD information from 1991 to 2007.[13] The time span of our analysis also coincides with those studying the impacts of rising Chinese import on US labor markets and firm innovations, e.g., Acemoglu et al. (2016).

The KLD ratings are built on a point-by-point assessment of companies along a number of dimensions. Firms are graded on roughly 60 indicators. Each indicator represents a strength or a concern in one of six major areas: environment, community, diversity, employee relations, product, and corporate governance. A firm gets a score of 1 for a strength (concern) indicator if it performs well (poorly) in a particular criterion, and zero otherwise. For instance, Table 1 shows two indicators of strengths and two indicators of concerns associated with the area of diversity. If a firm has strong gender diversity on board of directors and among executive management team, the firm would score 2 on the strength of diversity, and at most score 1 on the concerns of diversity.

We measure a firm *i*'s overall ESG performance in year *t* as the difference between the total strengths and the total concerns during year *t*. Similarly, we take the difference between the number of strengths and concerns of each constituent environmental, social, and governance factor as measures for a firm's performance on E, S, and G initiatives, respectively. KLD also includes a set of indicators regarding human rights, a rated area that contributes to a firm's performance on "S" initiative. However, as noted in Hong, Kubik, and Scheinkman (2012), the area went through a major overhaul in 2002 and is therefore not consistent throughout our sample period. In addition, KLD tracks controversial business involvement related to alcohol, firearms, gambling, military, nuclear power, and tobacco. These indicators, nevertheless, are very specific to some line of business, do not apply to most of the firms in our sample, and, hence, are also excluded from our ESG performance measures. More detailed categories and indicators included in our ESG measures are tabulated in Section A.2 of the appendix.

Firm-level controls:

Following Di Giuli and Kostovetsky (2014), we collect a number of time-varying firm-level controls from Compustat and CRSP, and include them in all of our empirical analysis.

[13] As far as we are aware, KLD is the only data that started to record a firm's ESG/CSR activities in 1990s. Other data, e.g., Thomas Eikon (2001), Sustainlytics (2008), MSCI ESG (2007) and RepRisk (2008), started in 2000s.

We match KLD ESG data to Compustat by six-digit CUSIPs and stock tickers, respectively, and the two approaches can cross-validate each other. We link a firm in Compustat to the ESG scores in KLD if the two approaches yield the same matching. For a small number of cases where the two approaches yield different matchings, we manually check to make sure the accuracy of the linking. For each firm-year observation, we control for the firm's size measured by (log) total assets, return to assets (ROA), book-to-market ratio, cash, dividends, and total debt outstanding (leverage ratio). All control variables are lagged by one year. In addition to the time-varying firm-level controls, we also include firm fixed effects to control for time-invariant heterogeneity across firms that might affect its ESG performance, and include year fixed effects to control for time-varying common shocks to ESG engagement of all firms in the sample. Detailed definitions and construction of the control variables are in Section A.3 of the appendix.

Gillan, Koch, and Starks (2021) highlight a strong industry component of ESG scores. While the firm and year fixed effects mitigate the heterogeneity across industries to some extent, they might not be enough. In particular, year fixed effects do not absorb industry factors that are likely correlated with ESG, and firm fixed effects presume no temporal variation in industry-specific unobservable characteristics that may bias the results. If, for instance, "brown" industries have more incentives over time to increase their ESG engagement due to regulators' pressure or investors' preferences, failing to account for the heterogeneity across industries would skew the results. For this reason, we also include industry-by-year fixed effects to account for different trends in ESG engagement across industries.

Table 2 displays the summary statistics of ESG scores, individual constituent scores, and other controls for the sample firms from 1991 to 2007. The final sample consists of 6736 firm-year observations with ESG scores. The mean ESG score is slightly negative at -0.10, indicating that the number of concerns exceeds the number of strengths. But it displays a large variation with a standard deviation of 2.32. Among individual constituent scores, US firms stand out on social initiatives with the mean S score being 0.3. Nevertheless, S score also has a greater standard deviation relative to E and G scores, suggesting performances on social initiatives across years and firms contribute to a great proportion of the variations in overall ESG scores.

III. Results

We study the impacts of import competition from China on US firms' ESG engagement by adopting a difference-in-differences (DiD) approach. The first difference in our DiD strategy is between *NTR gaps* across four-digit SIC industries. The second difference is between the period before the passage of PNTR by the US congress in 2001 and the period after. We estimate the following equation:

$$ESG_{i,j,t} = \alpha Post\_PNTR_t \times NTR\ Gap_j + \beta X_{i,t} + \eta_t + \delta_j \times \eta_t + \nu_i + \epsilon_{i,t} \quad (1)$$

where the dependent variable $ESG_{i,j,t}$ is the ESG score of firm *i* in industry *j* during year *t*. *Post_PNTR*$_t$ is an indicator variable equal to 1 if year *t* is after 2001 and 0 otherwise. $NTR\ Gap_j$ is the difference between *non-NTR* and *NTR* tariff rates observed in 1999 for industry *j*. $X_{i,t}$ is the vector of firm-level covariates; η_t represents year fixed effects; δ_j is industry fixed effects, and thus $\delta_j \times \eta_t$ controls for different trends in ESG performance across industries; ν_i indicates firm fixed effects. The coefficient α of the interaction term thus captures the impacts of greater import competition, following China being granted with PNTR, on the ESG performances of US firms. Robust standard errors are two-way clustered at the four-digit SIC industry and year levels.[14]

Table 3 shows the results of our baseline regression. Through all different specifications, we find evidence that greater import competition from China *increases* the ESG engagement of US firms. Column 1, 2 and 3 of Table 3 include full set of covariates, firm fixed effects and/or year fixed effects, and show significant coefficients between 1.3 and 3.1. Based on the result in Column 3, a standard deviation increase in *NTR Gap* (0.15) approximately raises a firm's ESG score by 0.47. This is about 20% of a standard deviation (2.32) of ESG scores, and 38% of a standard deviation (1.25) of the yearly change in ESG scores. Moreover, consistent with the intuition, Table 3 also shows positive coefficients for ROA across specifications, suggesting that better performing firms have greater ESG performances.

As discussed, ESG scores have strong industry-specific components. Given that Chinese imports primarily concentrate in the manufacturing industries, including the firm and year fixed effects alone can alleviate the concern to some extent. To further control for the

[14] A standard difference-in-differences specification should also include the individual term of $Post\_PNTR_t$ and $NTR\ Gap_j$. However, as $Post\_PNTR_t$ does not vary across firms and $NTR\ Gap_j$ does not vary over time, they will be superseded by the fixed effects. We follow Pierce and Schott (2016) and leave them out of the specification.

heterogeneity in ESG engagement across industries over time, we include industry (two-digit SIC level)-by-year fixed effects in Column (4). Relative to Column (3), the coefficient of interest in Column (4) falls by 22%, highlighting the importance of accounting for heterogeneity across industries. Nevertheless, the coefficient is still statistically significant at 1% level, suggesting a standard deviation rise in *NTR gap* increases a firm' ESG score by 0.36, roughly 16% of a standard deviation of ESG scores.[15]

There are many ways for firms to improve their ESG scores. They can increase the scores on strengths by doing more positives. Alternatively, they can reduce the scores on concerns by amending the negatives. Moreover, firms can also select among environmental, social or governance-related initiatives to engage, and enhance performance on one or multiple constituents of ESG scores, all resulting in better ESG performance overall.

Table 4 studies the probable source of the ESG improvement documented in Table 3. Column (1) and (2) study the impacts of PNRT passage on scores of strengths and concerns using the most saturated specification of equation (1). The results show that the scores on strengths significantly increase after the passage of PNRT while the scores on concerns barely change, suggesting that the ESG improvement in Table 3 is primarily from "doing more positives" by the firms. Column (3) to (5) study scores of each E, S and G component. The coefficients of the interaction term for environmental and social issues are 0.73 and 1.52, respectively, both of which are significant at 1% level and roughly account for 12% of their standard deviations. In contrast, the corresponding coefficient for governance scores is much smaller and not significant at any conventional level. This suggests that the better ESG performance in Table 3 may be driven by more engagement on environment-related activities, e.g., reducing toxic emissions and waste, and on social issues.

Identifying Assumptions

The underlying assumption of our DiD strategy is that industries exposed to different *NTR gaps* after 2001 should have similar trends in ESG performance beforehand. In order to test the parallel-trend assumption prior to the passage of PNTR and ensure the validity of our

[15] We also estimate a specification only including firm, year and industry-year fixed effects, but without firm-level controls. The estimated coefficient is 2.53 and significant at 1% level. The fact that the coefficient is smaller than Column (3) and is close to Column (4) with full firm controls suggests that the variation in ESG engagement mostly clusters at industry level.

estimation strategy, we repeat the specification in (1) but replace the *Post_PNTR* indicator with a series of year indicator variables:

$$ESG_{i,j,t} = \sum_{n=1991}^{2007} \alpha_n \times Year_{n,t} \times NTR\,Gap_j + \beta X_{i,t} + \eta_t + \delta_j \times \eta_t + \nu_i + \epsilon_{i,t} \quad (2)$$

where $Year_{n,t}$ is a dummy variable equal to 1 if $n=t$, and 0 otherwise. To satisfy the underlying assumption, the coefficients α_n for n before 2001 should not be significantly different from zeros. In addition to validating our empirical strategies, the series of coefficients $\{\alpha_n\}$ also capture the dynamic effects of granting PNTR to China on US firms' ESG engagement. As it takes time to deploy resources to improve ESG performance, we hypothesize that the change on ESG engagement is gradual rather than instant, and becomes more evident over time.

Figure 2 plots the coefficients and their 95% confidence intervals for the specifications without industry-by-year fixed effects (solid line) and with industry-by-year fixed effects (dashed line). For both specifications, the coefficients prior to 2001 are not statistically significant at conventional levels, supporting the parallel trend assumption of our DiD analysis. The coefficients only become significantly positive starting from 2003, two years after the passage of PNTR, suggesting that the improvement of ESG performance is a gradual process and grows more evident over time.

In Section A.4 of the appendix, we conduct a battery of robustness tests. First, we show our results stand if we control for industry-by-year fixed effects at three-digit SIC level, if we weight the regressions with the number of firms in the industry or total industry sales, or if we require a firm to appear in the sample both before and after 2001. Second, we further control for other major events concurrent with the passage of PNTR in 2001, including China joining the WTO and the following reduction in import tariffs (and barriers to foreign investment), the termination of Multi-Fiber Agreement Quotas on products from the textile, apparel and leather sectors in 2002 and 2005, the decline of unionization in the US manufacturing sector, and the burst of the Dot-com bubble in the US. Third, we follow Pierce and Schott (2016) and instrument the constructed *NTR Gap* with two separate instruments: non-NTR tariff rates set by Smoot–Hawley Tariff Act, and the *NTR gap* observed in *1990*. Both of the instruments are distantly ahead of PNTR and the subsequent increase in US firms' ESG engagement, and thus, are plausibly exogenous. Finally, we present an alternative identification strategy and identify

the effect of trade shock from China with import penetration, similar to Autor et al. (2014). Throughout all the robustness tests, we find both quantitatively and qualitatively similar results.

IV. Mechanisms

Having established that trade shock from China increases the US firm's ESG engagement, this section sheds light on the possible channels. As discussed in Section I, two possible channels are at play: ESG performance can improve as a consequence of adjusting production process and outsourcing some production operation to China; alternatively, US firms may seek to differentiate themselves from Chinese imports by more actively engaging in ESG initiatives. We find no evidence to support the first mechanism, but discover both indirect and direct evidence supporting the hypothesis of product differentiation.

A. ESG Improvement: A Consequence of Change in Production Process?

Prior literatures studying the impacts of Chinese import competition have found change in the production process or product mix among US firms (Autor et al. (2014); Pierce and Schott (2016); Bloom, Draca, and Van Reenen (2016); Autor et al. (2020)). When faced with import competition from China, US firms typically downsize employment, reduce R&D expenditure, deepen capital intensity or shift to technology-intensive sectors. Do such changes in production process result in better ESG performance? In other words, firms may not actively pursue more ESG engagement, but their ESG performances improve *de facto.*

To study whether the increase in ESG engagement of US firms is driven by the change in production process, we further include four variables related to production process in our baseline regression (1). The first variable is staff expense scaled by sales, and it captures the change of labor share in the production process. The second variable is capital intensity measured as the capital expenditure scaled by the total number of employees. The third and fourth variables are expenditure on R&D and advertising scaled by sales, and they measure firms' investment in brand name and intellectual capital. In addition, we also include the interaction terms between the four variables and *post_PNTR* indicator to account for potential change in the relationship between ESG scores and these characteristics in the post PNTR periods. If the ESG improvement we find in Table 3 is indeed a result of change in production process, these variables should capture a significant proportion of variations in ESG scores, both cross-sectionally and temporally. Consequently, the coefficient of the DiD term should decrease and even become statistically insignificant.

Table 5 presents the explanatory power of these additional variables. To save the space, the coefficient estimates of other variables, i.e., total assets and ROA, are omitted from the table. Some of the additional controls show explanatory power for the variations in ESG scores. For instance, more expenses on R&D and advertising are associated with higher ESG scores after PNTR. With the inclusion of all four variables in Column (5), however, the coefficient of the DiD term is still 2.3 and significant at 1% level, suggesting one standard deviation increase in *NTR Gap* raises the ESG score by 0.35 points, equivalent to 15% of one standard deviation of ESG scores. This number is very close to the baseline estimate from Table 3, and suggests that the change associated with production process is unlikely to account for higher ESG scores of US firms after the passage of PNTR.

It is well known that a significant proportion of firms in Compustat have missing values in staff expense, R&D expenditure and advertising expenditure (Donangelo et al. (2019)). Our sample is no exception. Only 16% of the firm-year observations have firm-level R&D, staff and advertising expense in the Compustat. Following a large literature (e.g., Fee, Hadlock, and Pierce (2009) and Masulis, Wang, and Xie (2009)), we set the missing values to zeros. This might affect our estimations in Table 5. To mitigate the impacts from missing values, we compute the average R&D, staff, advertising expenditure and capital intensity at the four-digit SIC industry level each year and re-run the regression.

For the industry-level analysis, we are also able to control for production outsourcing to China by US companies. Decreased trade barrier means that firms can have access to low-cost intermediate inputs from China, and outsource part of their production process to China. If the firm primarily keeps more technologically-advanced and eco-friendly production at home, this could lead to increase in ESG performance. We study this mechanism by controlling for the industry's outsourcing to China following Bloom, Draca, and Van Reenen (2016). For each industry *j*, we compute an outsourcing measure adapted from Feenstra and Hanson (1999):

$$Outsourcing_{j,t} = \sum_{k} w_{j,k} IP_{k,t} \tag{3}$$

where the input-output weight $w_{j,k}$ measures the weight of inputs in industry *k* needed to produce one unit of final good in industry *j*. $IP_{k,t}$ is import penetration from China in US industry *k* and defined as:

$$IP_{k,t} = \frac{M_{k,t}^{UC}}{Y_{k,91} + M_{k,91} - E_{k,91}} \tag{4}$$

$M_{k,t}^{UC}$ is the imports from China in industry *k* during year *t*; $Y_{k,91} + M_{k,91} - E_{k,91}$ is the initial absorption level at the start of the sample period in year 1991, with $Y_{k,91}$, $M_{k,91}$, and $E_{k,91}$ representing shipments, aggregate imports, and aggregate exports in industry *k*, respectively. We collect the input-output weights from US Bureau of Economic Analysis (BEA), and the import penetration variable from Acemoglu et al. (2016).[16] We further account for the heterogeneity in production outsourcing across industries and include Nunn (2007)'s measure of the proportion of intermediate inputs that require relationship-specific investments.

Table 6 shows the industry-level result. Notably, Column (1) - (5) show that staff expense, capital intensity and advertising can account for some variation in ESG scores. After 2001, increases in staff expense, capital intensity and advertising are positively associated with better ESG performance. Nevertheless, controlling for variables related to production process at the industry level only slightly decreases the coefficient of interest. Column (6) include all five variables together, and the coefficient of interest is 2.16 and significant at 1% level, suggesting one standard deviation increase in *NTR gap* raises the ESG scores by 0.32 post PNTR. This translates to 14% of one standard deviation of ESG scores, and still very close to the baseline estimate in Table 3. The results in Table 6, therefore, further suggest that better ESG performance of US firms is unlikely driven by the change in production process.

B. ESG Improvement: An Effort to Differentiate? Indirect & Direct Evidence

In this section, we present indirect and direct evidence suggesting US firms actively pursue better ESG performance and differentiate themselves from Chinese exporters.

Market Power and ESG Engagement

Firms with great market power are less vulnerable to competition. In a competitive economy like the US, market power is likely to arise due to technical barrier, unique assets, and regulatory reason. Although Chinese producers enjoy low cost of labor, even they can hardly pose threat to a local firm with high market power. Some studies (e.g., Li, Lo, and Thakor (2021)) show that firms with market power are less motivated to innovate. In the same

[16] Note that the input-output weights at the most detailed industry level are not available every year. We use the weight data from 1997. The input-out matrix is defined in BEA industry classification. We first match it to NAICS using concordance table provided by BEA, and then further match it to SIC with the crosswalk table from Autor, Dorn, and Hanson (2013). For each BEA industry matched to multiple SICs, we divide the weight by the number of SICs it is matched to. For multiple BEA industries matched to one SIC, we sum over the weights of the BEA industries for the SIC.

vein, firms with great market power might have less incentives to differentiate by resorting to more ESG engagement.

We gauge market power with two measures of Herfindahl–Hirschman index (HHI). The first measure is collected from Hoberg and Phillips (2010). Using Compustat data and actual industry HHI from the Commerce Department, Hoberg and Phillips (2010) estimate HHI for all three-digit SIC industries. Our second measure is derived from Hoberg and Phillips (2016). Drew on text-based analysis of product descriptions from 10-K filings, Hoberg and Phillips (2016) identify a group of competitors for each firm in each year, and compute HHI for the firm based on the group. The grouping methodology is not required to be transitive and, as Hoberg and Phillips (2016) argue, "further benefit from information about the degree to which specific firms are similar to their competitors." We then take the average of firm-level HHI across three-digit SIC industries. [17]

We take each industry HHI measure in 1999, and label industries of which the HHI are above the median with an indicator variable $High\_HHI$. We then consider a triple-difference specification, including the triple interaction between $Post\_PNTR$, $NTR\ Gap$, and $High\_HHI$, the simple interactions, non-interacted terms and the same set of control variables as in equation (1).[18]

$$\begin{aligned} ESG_{i,j,t} = {} & \alpha_1 Post\_PNTR_t \times NTR\ Gap_j \times High\_HHI_j + \\ & \alpha_2 Post\_PNTR_t \times NTR\ Gap_j + \alpha_3 Post\_PNTR_t \times High\_HHI_j + \\ & \beta X_{i,t} + \eta_t + \delta_j \times \eta_t + \nu_i + \epsilon_{i,t} \end{aligned} \quad (5)$$

Table 7 reports the results of the triple-difference regression. To save the space, we leave out the coefficient estimates of other variables. Column (1) and (2) use the measure of Hoberg and Phillips (2010). When including industry-by-year fixed effects, Column (2) shows a negative coefficient significant at 1% level, indicating that firms with greater market power are less likely to increase their ESG engagement in light of greater import competition from China. Column (3) and (4) employ the textual measure from Hoberg and Phillips (2016), and

[17] Both measures of HHI are directly downloadable from Hoberg-Phillips Data Library: https://hobergphillips.tuck.dartmouth.edu/

[18] We leave out from equation (5) all industry-invariant and time-invariant terms that are superseded by fixed effects.

the results are similar. Therefore, both sets of results confirm that a US firm with great market power is less likely to be threatened by the import competition from China, and does not respond by substantial improvement in ESG performance.

Product Differentiation and ESG Engagement

The evidence in Table 7 is consistent with the conjecture that firms with less market power make greater efforts to improve ESG performance to contrast themselves from Chinese imports. Nonetheless, such evidence is circumstantial and merely suggestive. To provide direct evidence on the channel of differentiation, we employ two measures of product differentiation.

Our first measure is derived from Hoberg and Phillips (2016). Similar to the HHI measure, Hoberg and Phillips (2016) also compute a similarity measure within a group of close peers by textual analysis using the product descriptions in 10-K filings. We take the average of firm-level product similarity measures in 1999 across three-digit SIC industries, and designate industries with similarity measures above the median as standardized.

Our second measure follows Rauch (1999) and Giannetti, Burkart, and Ellingsen (2011) to define standardized and differentiated products. Commodities like unwrought lead which are traded on organized exchanges, and commodities like polymerization and copolymerization products that have reference prices in trade publications, can be regarded as standardized goods, as traders can solely base their profit estimates and import decisions on the reference prices without knowing the names of the manufacturers. On the contrary, goods like shoes, do not have reference prices. Instead, their local prices need to vary, for example, according to the varieties of local shoes and preferences of local consumers, and they therefore fall under the definition of differentiated goods. We use data on standardized and differentiated products from Rauch (1999) which classify the products at the four-digit Standard International Trade Classification (SITC) level, and match the four-digit SITC to four-digit SIC.[19]

If US firms indeed attempt to differentiate from Chinese imports by actively engaging in ESG initiatives, firms producing standardized commodities should have more incentives to do so. To test the hypothesis, we consider the following regression

[19] The data is available from James Rauch's website: https://econweb.ucsd.edu/~jrauch/rauch_classification.html. We first match four-digit SITC to six-digit HS using the concordance table from the World Bank, and then match to four-digit SIC code using the concordance table from Autor, Dorn, and Hanson (2013). One SITC code may correspond to multiple SICs, and vice versa. As most of Chinese imports are differentiated goods, we classify a four-digit SIC industry as standardized if one of the corresponding SITC belongs to the "standardized" group in Rauch (1999). In the end, around 25% of the observations belong to standardized industries.

$$ESG_{i,j,t} = \alpha_1 Post\_PNTR_t \times NTR\,Gap_j \times Standardized_j + \alpha_2 Post\_PNTR_t \times NTR\,Gap_j + \alpha_3 Post\_PNTR_t \times Standardized_j + \beta X_{i,t} + \eta_t + \delta_j \times \eta_t + \nu_i + \epsilon_{i,t} \quad (6)$$

where $Standardized_j$ is a dummy variable that equals 1 if a firm is operating a standardized industry *j*. α_1 captures the relative ESG engagement between standardized and differentiated industries upon greater trade shock from China. As before, we report results both with and without industry-by-year fixed effects.

Table 8 shows that it is indeed the case. Throughout both measures and all specifications, the results yield significant positive estimates for α_1. Column (1) and (2) use the similarity measure from Hoberg and Phillips (2016). The coefficient of the triple-difference term is most significant when the industry-year fixed effects are not included, with a magnitude of 3.9. Column (3) and (4) of Table 8 instead use the standardized industry classification from Rauch (1999).[20] When industry-year fixed effects are (not) included, Column (4) shows a positive coefficient with a p-value of 0.02 (0.003), suggesting that firms in standardized industries increase their ESG engagement to a greater extent than those in differentiated industries, as the theory suggests.

More interestingly, comparing the first two columns of Table 8 to the last two columns of Table 7 also reveals some insights. All these columns leverage the text-based similarity measures computed by Hoberg and Phillips (2016) using product descriptions from 10-K filings, and present results from triple-difference regressions. Yet, in Table 7, all the coefficients of the simple difference term, $Post\,PNTR \times NTR\,Gap$, are significant at 1% level, and their magnitudes are even greater comparable to the baseline results in Table 3, suggesting that a substantial proportion of the variation in ESG engagement following PNTR remains unaccounted for. In contrast, in the first two columns of Table 8, the coefficients of the simple difference terms are substantially smaller than Table 3, and, in particular, the coefficient without industry-year fixed effects is not significant at the conventional levels. Hence, this further suggests that most of the increase in ESG engagement we document stems from firms in standardized industries, supporting the proposition that firms dedicate resources to ESG improvement in order to differentiate themselves.

[20] Rauch (1999) includes two ways to classify the products at the four-digit SITC level: "conservative" and "liberal". The conservative classification minimizes the number of commodities being classified as standardized, while the liberal one maximizes the number. Table 8 reports the conservative classification. In an unreported table, we also show that the result is robust if we adopt the liberal classification.

In summary, we look at both indirect evidence (market power and ESG engagement) and direct evidence (product differentiability and ESG engagement), all of which are consistent with the differentiation hypothesis of the ESG engagement.[21]

V. Prior Trade Shock from Low Wage Countries

We identify the effects of trade shock from China on the ESG performance of local US companies by exploiting the removal of uncertainty associated with normal trade status of Chinese imports and the reduction in expected tariff after the passage of PNTR. The identification does not use any information on actual imports or import penetration from China. As noted by Pierce and Schott (2016), Chinese imports to US have been subject to low tariff rates since 1980s. Meanwhile, imports to US from other low wage countries also steadily increase over time. The producers in these countries also enjoy low cost of labor and typically fall behind on ESG performances relative to US manufacturers. The early exposure to import competition from the low wage countries may have prompted the US companies to increase their ESG engagement and differentiation effort long before. Consequently, prior trade shock from low wage countries could attenuate the effect of PNTR on ESG engagement.

To measure the prior trade shock from low wage countries, we collect import penetration from low wage countries calculated by Bernard, Jensen, and Schott (2006).[22] Bernard, Jensen, and Schott (2006) defines a low wage country in a year if the country's per capita GDP is less than 5% of US per capita GDP during the year. Under such classification, the set of low wage countries includes China, India and most of the African nations. Figure 3 plots the import penetration of all low wage countries and of China from 1991 to 2007. Both measures increase over time, but the increase starts to accelerate since 2001, corresponding to China's accession to WTO and the passage of PNTR.

[21] Another suggestive evidence is the positive association between more ESG engagement and the increased advertising expenditure in the post-PNTR periods, as documented in Table 5 and Table 6. While we use increased advertising expenditure to proxy more investment in brand name and intellectual capital, Servaes and Tamayo (2013) interpret it as higher customer awareness. Under such interpretation, Table 5 and 6 suggest that firms with better ESG performance advertise more to promote their profile and ESG actions after PNTR, consistent with the differentiation hypothesis.

[22] The data can be downloaded from Peter Schott's website https://faculty.som.yale.edu/peterschott/international-trade-data/. The original data did not calculate the import penetration measures for 2006 and 2007 for missing total industry shipment. We update the total industry shipment with NBER-CES Manufacturing Industry Database.

To test the potential moderation from the early exposure to import competition from all low wage countries, we estimate the following empirical model:

$$ESG_{i,j,t} = \alpha_1 Post\_PNTR_t \times NTRGap_j \times IMPL1999_j + \alpha_2 Post\_PNTR_t \times NTRGap_j + \alpha_3 Post\_PNTR_t \times IMPL1999_j + \beta X_{i,t} + \eta_t + \delta_j \times \eta_t + \nu_i + \epsilon_{i,t} \quad (7)$$

where $IMPL1999_j$ is the import penetration to industry *j* from low wage countries in 1999. We choose the import penetration of 1999 because it captures the latest import competition from low wage countries just before PNTR was introduced in the US congress. As before, we report results with and without the industry-by-year fixed effects $\delta_j \times \eta_t$.

Table 9 presents the empirical results of equation (7). Column (1) shows the coefficient of $Post\_PNTR \times NTRGap$ is large and significant at 1% level, confirming that the ESG performances of US companies improve following PNTR. The estimation also yields a coefficient of -0.26 for the triple-difference term. The coefficient is also significant at 1% level, and suggests that earlier exposure to import competition from low wage countries indeed attenuate the impacts of PNTR.

Similar results emerge when Column (2) further includes industry-by-year fixed effects. The magnitudes of the coefficients are roughly close to Column (1), and all are significant at 1% level. Industries that experienced stronger import competition in 1999 continue to improve their ESG performance after 2000, as evidenced by the positive and significant coefficient of $Post\_PNTR \times IMPL1999$. As we include import penetration measure during 1999, the coefficient of $Post\_PNTR \times NTRGap$ shows that *conditional on* the import competition in 1999, the escalated competition from Chinese competitors following PNTR prompts US producers to deepen their engagement on ESG initiatives. Finally, the negative coefficient of the triple-difference term confirms our conjecture that prior exposure to competition from low wage countries has driven some US sectors to improve their ESG performances, and thus they are less affected by PNTR compared to other sectors.

VI. The Real Effect: Evidence from Toxics Release Inventory

So far, our focus is on the relationship between the trade shock from China and ESG ratings of local US companies. Like most of studies on the firm's ESG performances, we use ESG ratings from a rating agency. We choose KLD ESG ratings because it is the oldest agency that studies the US firm's performance and commitment to social responsibility and because

its coverage coincides with the periods that the trade literatures focus when investigating the China trade shock. As ESG rating typically involves a company's multiple performance metrics and there is a lack of consensus on the critical ESG performance indicators, however, a firm sometimes ends up with different ESG scores and rankings by different ESG rating agencies. More importantly, although our analysis suggests that the improved ESG performances of US firms primarily stem from more engagement on environmental initiatives, it is not clear whether the environmental engagement yields any *real* impacts.

We hereby provide evidence, showing the relationship we document holds even if we use a firm's actual environmental performance measure instead of the ESG ratings. The consistency between the two sets of results will also corroborate our baseline findings using the ESG ratings. Our investigation focuses on pollution emission and waste release, a critical measure of the environmental performance that directly affects the health risk and welfare in the neighborhood of the firm's plants (Currie et al. (2015)). Our data on pollution and chemical release by companies comes from Toxics Release Inventory (TRI). TRI is public database established and maintained by U.S. Environmental Protection Agency (EPA). Under Emergence Planning and Community Right to Know Act (EPCRA) of 1986, plants and facilities with more than ten employees manufacturing or using a regulated substance in excess of the threshold amount are required to report to EPA their emission of pollutants and release of toxic chemicals into air, water, and ground.

Similar to our prior analysis, we consider TRI data covering from 1991 to 2007. The TRI data provides the release amount of a chemical by a facility (of a parent company) in a calendar year, and its basic observation is year-facility-chemical. As EPA updated the list of regulated chemicals over time, we follow Cherniwchan (2017) and only focus on pollutants and toxic chemicals reported throughout the entire sample periods (except those labeled as trade secrets). We also exclude all observations with zero release amount as they likely represent missing values in the original report forms to EPA.[23] As quantities of dioxin and dioxin-like compound are reported in grams and all other chemicals are in pounds, we standardize all reported release to pounds. Finally, we winsorize the top and bottom 0.5 percent of the release amount for each chemical reported to EPA, in order to eliminate the influence of extreme values on the results.

[23] The zero release may also indicate that the facility is exempt from reporting the exact amount of release of the chemical if the annual release is less than 500 pounds and the total amount manufactured or used is less than 1 million pounds (Cherniwchan (2017)).

We begin our investigation by fitting the following econometric specification:

$$r_{m,n,l,i,j,t} = \alpha Post\_PNTR_t \times NTR\ Gap_j + \eta_t + v_i \times \tau_m + \gamma_l \times \eta_t + v_i \times \eta_t + \delta_j \times \tau_m \times \eta_t + \epsilon_{m,n,l,i,j,t} \quad (8)$$

where $r_{m,n,l,i,j,t}$ denotes the release amount (in million pounds) of chemical *m* during year *t* from plant *n* located in *l*. The plant *n* is owned by firm *i* and operates in industry *j*. The variables of *Post_PNTR* and *NTR Gap* are defined the same as in previous econometric models. Equation (8) includes time fixed effects η_t to control for the common trends in different chemicals and pollutants across facilities. Including time fixed effects and firm-by-chemical fixed effects $v_i \times \tau_m$ make sure the variation that identifies the parameter of interest α comes from a certain chemical usage within a firm. The coefficient α captures the effect of import competition from China on the toxics release by local US firms.

As Shapiro and Walker (2018) note that there are numerous and overlapping federal, state and local environmental regulations over years, we include the granular zip code-by-year fixed effects $\gamma_l \times \eta_t$ to capture the change in environmental regulations. We include firm-by-year fixed effects $v_i \times \eta_t$ other than facility-by-year fixed effects, because the production is more likely organized at the parent company level and can transfer among facilities due to local environmental regulations. Including firm-by-year fixed effects also helps control for time-varying firm characteristics, since not all firms in TRI can be linked to Compustat. Finally, we report results with and without the industry (two-digit SIC)-by-chemical-by-year fixed effects $\delta_j \times \tau_m \times \eta_t$.

Table 10 presents the estimation results. Column (1) shows a point estimate of -0.026 statistically significant at 1% level, suggesting a standard deviation increase in the *NTR gap* reduces a factory's release of a pollutant by 3900 pounds per annum. The reduction is approximately equivalent to 1.5% standard deviation of toxics release over years. Column (2) controls for unobserved firm characteristics by including firm-by-year fixed effects, and the magnitude of the effect almost doubles. Overall, the results indicate that the US companies emit less pollution with the trade liberalization following PNTR.

Column (3) of Table 10 further includes industry-by-chemical-by-year fixed effects. The fixed effects account for the trends in emission of a certain chemical within each two-digit SIC industry. Including the industry trends helps control the industry-wide production technology upgrade or potential outsourcing to overseas. Still, after controlling the industry-

level trends, we find that the granular sectors that experience more import competition from China decrease the toxics emission to a greater extent. This suggests that the companies may attempt to differentiate from the Chinese producers by improving their environmental performances, probably through better and more advanced pollution abatement technology. Column (4) adds firm-by-year fixed effects, and the coefficient slightly increases and is still significant at 1% level.

The results from TRI confirm that upon greater competition from Chinese import, the environmental performance of US companies did improve. This echoes Shapiro and Walker (2018) who show in a quantitative model that trade liberalization can lead to lower pollution. Not only our analysis provides supportive empirical evidence, but also highlights the differentiation incentives by US local producers that is different from Shapiro and Walker (2018). Moreover, by using a measure of real environmental performances of US companies, we cross-validate our previous results using ESG ratings. In doing so, we also provide evidence showing that our ESG rating measure captures the real performance of US companies on ESG initiatives. To our knowledge, the present paper is the first one to connect the ESG ratings to the real environmental performance.

VII. Conclusion

ESG performance starts to receive more attention from corporates, investors and governments. In this paper, we exploit US congress granting Permanent Normal Trade Relations to the imports from China, and find a causal relationship between greater import competition from China and rising ESG engagement by US firms. The better ESG performance mainly stems from firms "doing more positives" and from more involvement on environmental and social initiatives. We show that our results stand after we control for firm, year, industry-by-year fixed effects, and other contemporaneous notable events, and that our conclusion is robust to the alternative identification strategy.

We analyze two competing hypotheses for the positive link between the trade shock and better ESG performance of US firms. The evidence suggests that the change in production process and outsourcing by US companies unlikely drives the improvement in ESG performances. Instead, we find both indirect and direct evidence showing that US firms strategically become more involved in ESG initiatives in order to differentiate themselves from Chinese producers. Further evidence indicates that prior exposure to the competition pressure from low wage countries may have prompted the US companies to invest on ESG initiatives

long before, though the greater competition following PNTR augments the improvement on ESG performance.

The improved ESG performance has real effects. Using the Toxics Release Inventory data, we find that import competition from China leads to a decrease in the emission of toxic chemicals and pollutants by US producers. The overall reduction in the emission of toxics corroborates our analysis using ESG scores from the rating agency. More importantly, it shows that improved ESG performance is more than higher ESG scores on paper, but also has profound social welfare implications.

The efficacy of such a differentiation strategy, nevertheless, is not clear. More generally, little is known about the effects, especially the long-term effect, of the engagement on ESG initiatives on a firm's financial performance. Figure 1 shows that our sample covers the nascent period of "ESG"/ "CSR" notion. Several recent studies (Fornell et al. (2006); Hong and Kacperczyk (2009); Edmans (2011); Bolton and Kacperczyk (2021)) find a negative relationship between ESG and stock returns, while others (Derwall et al. (2005); Kempf and Osthoff (2007); Statman and Glushkov (2009); Khan, Serafeim, and Yoon (2016)) find a positive relationship. We leave this question to future research.

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Figures

Figure 1: ESG Related Google Search Volume Indices

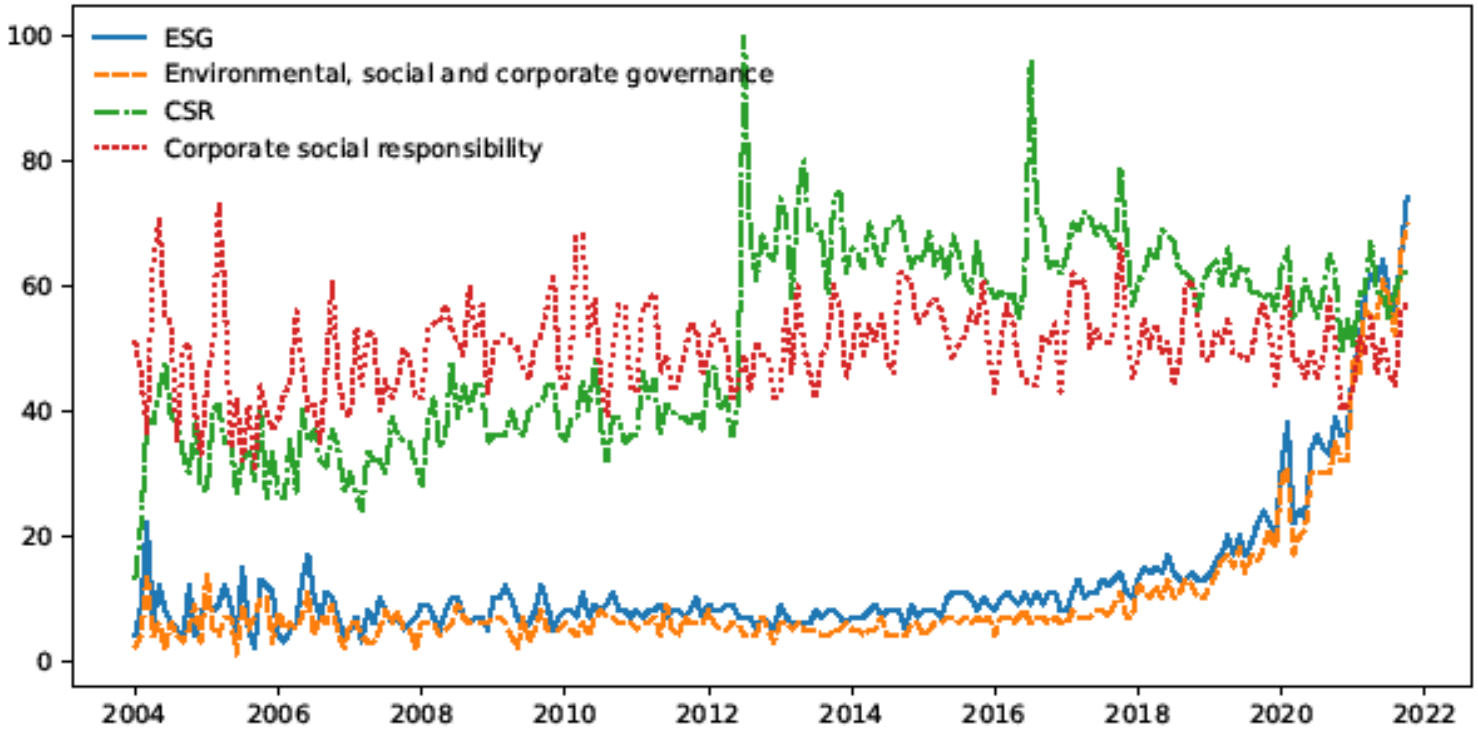

Figure 1 displays the search volume indices of ESG key words collected from Google Trend: ESG, Environmental, Social and corporate governance, CSR and Corporate Social Responsibility

Figure 2: Estimated 95% Confidence Interval for DID Coefficients

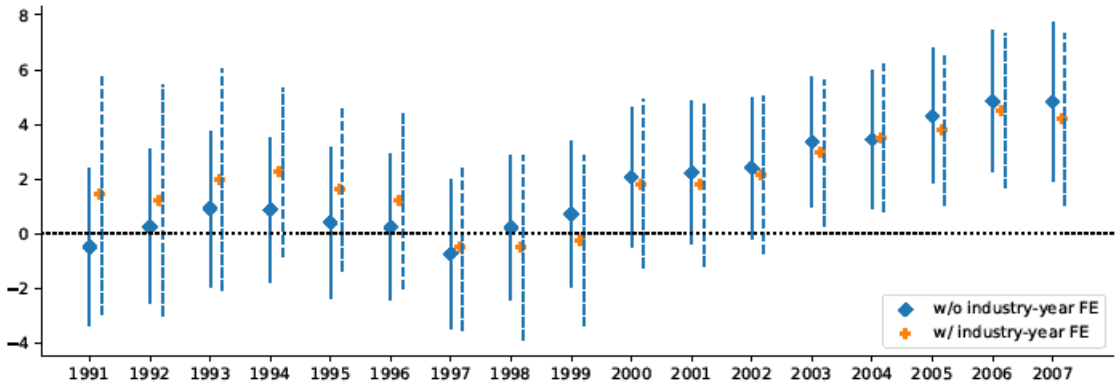

Figure 2 displays the 95 percent confidence intervals of estimated DiD coefficients for interactions of year dummies with the NTR gap from equation (2). Solid lines represent the specification without industry-by-year fixed effects. Dashed lines represent the specification with industry-by-year fixed effects. Firm-level covariates include (log) assets, return of assets (ROA), book to market ratio, cash, dividend and debt.

Figure 3: Import Penetration to US from Low Wage Countries

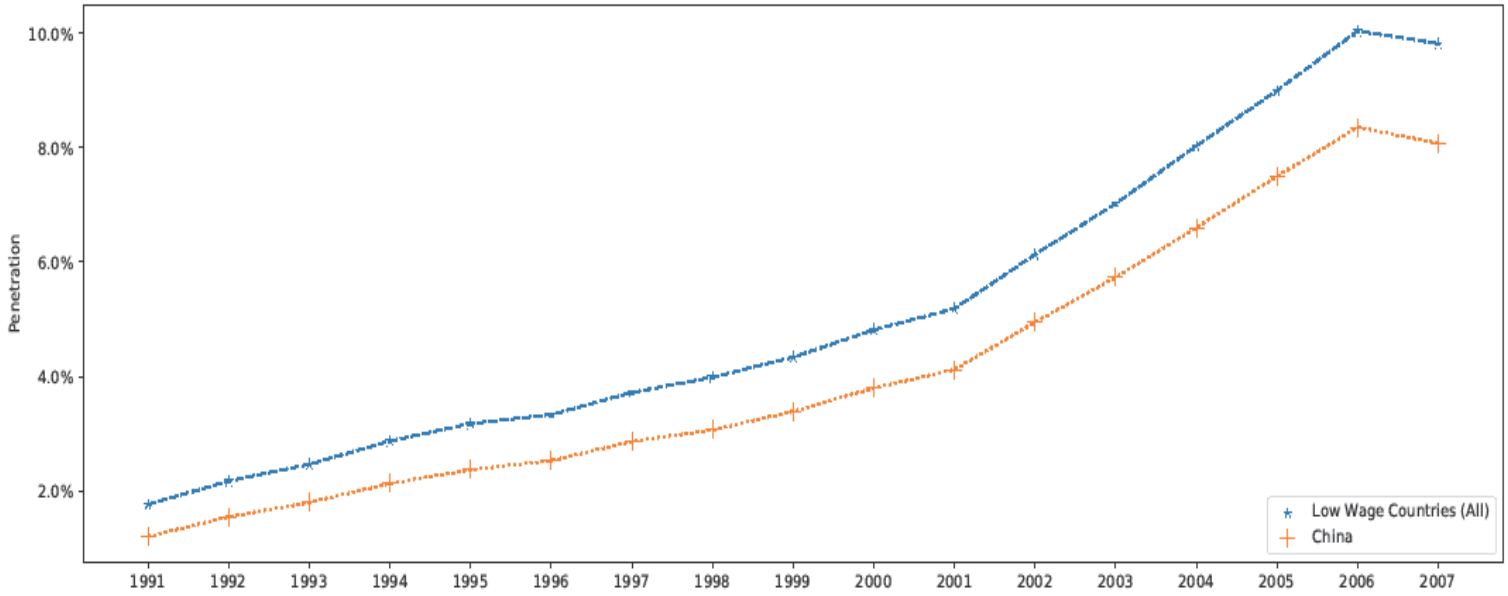

Figure 3 displays the import penetration to US from low wage countries from 1991 to 2007. Data is collected from Bernard, Jensen, and Schott (2006).

Tables

Table 1: Strengths and Concerns of Diversity in KLD

Table 1 shows indicators of strengths and concerns in KLD to evaluate a firm's performance on diversity. A firm obtains a score of 1 for a strength (concern) indicator if it performs well (poorly) in a particular criterion.

Indicator	Description
Strength: Representation	at least one woman among the executive management team
Strength: Gender	with strong gender diversity on their board of directors
Concern: Discrimination & Workface Diversity	measures the severity of controversies related to a firm's workforce diversity, including its own employees as well as temporary employees, contractors, and franchisee employees.
Concern: Board Diversity - Gender	with no women on their board of directors

Table 2: Summary Statistics

Table 2 presents the summary statistics of ESG scores, individual constituent scores, and other firm-level covariates used in the baseline DiD regressions. *NTR Gaps* are the differences between Non-NTR rates and NTR rates on imports from China and are collected from Pierce and Schott (2016). Ln(Assets) is the natural log of a firm's total assets (in $mil). ROA is return to assets. Book to Market is the ratio of book value of equity to market capitalization. Cash is the ratio of cash and short-term investments to total assets. Dividend is the ratio of dividend to total assets. Debt is total debt (short term and long term) scaled by total assets.

	Obs	Mean	Std Dev	P25	P50	P75
ESG Score	6,736	-0.096	2.317	-1	0	1
Strength	6,736	1.723	2.224	0	1	2
Concern	6,736	1.819	1.936	1	1	2
E Score	6,736	-0.160	0.878	0	0	0
S Score	6,736	0.299	1.935	-1	0	1
G Score	6,736	-0.234	0.670	-1	0	0
NTR Gap	6,731	0.282	0.149	0.193	0.325	0.377
Log(Asset)	6,576	7.140	1.733	5.906	7.098	8.315
ROA	6,575	0.013	0.194	0.004	0.048	0.090
Book to Market	6,567	0.411	0.535	0.194	0.328	0.530
Cash	6,576	0.204	0.234	0.027	0.105	0.303
Dividend	6,563	0.014	0.044	0	0.004	0.019
Debt	6,555	0.206	0.204	0.044	0.186	0.311

Table 3: The Effects of Chinese Import Competition on Firms' ESG Performance

Table 3 reports results of DiD regressions of ESG scores on the interaction of *NTR gaps* with an indicator for the post PNTR periods. Ln(Assets) is the natural log of a firm's total assets (in $mil). ROA is the return to assets. Book to Market is the ratio of book value of equity to total market capitalization. Cash is the ratio of cash and short-term investments to total assets. Dividend is the ratio of dividend to total assets. Debt is the ratio of total debt (short term and long term) to total assets. Standard errors are two-way clustered at four-digit SIC and year levels.

	ESG Scores			
	(1)	(2)	(3)	(4)
Post_PNTR× NTR Gap	1.316***	1.790***	3.104***	2.429***
	(0.283)	(0.321)	(0.507)	(0.625)
Ln(Assets)	-0.203**	-0.030	-0.119	-0.078
	(0.081)	(0.037)	(0.089)	(0.088)
ROA	0.422***	0.813***	0.442***	0.441***
	(0.129)	(0.181)	(0.131)	(0.146)
Book to Market	-0.022	-0.236***	-0.058	-0.093
	(0.072)	(0.088)	(0.076)	(0.075)
Cash	0.112	0.521***	0.212	0.153
	(0.215)	(0.136)	(0.210)	(0.229)
Dividend	-0.436	1.880***	-0.523	-0.822
	(0.583)	(0.660)	(0.614)	(0.638)
Debt	0.404**	-0.501***	0.283	0.002
	(0.182)	(0.182)	(0.181)	(0.201)
Firm FE	Yes	No	Yes	Yes
Year FE	No	Yes	Yes	Yes
Industry×Year FE	No	No	No	Yes
Observations	6,528	6,528	6,528	6,528
R^2	0.709	0.06	0.714	0.745

Table 4: The Effects of Chinese Import Competition on Firms' ESG Performance: Constituents

Table 4 reports results of DiD regressions of ESG constituent scores on the interaction of *NTR gaps* with an indicator for the post PNTR periods. Ln(Assets) is the natural log of a firm's total assets (in $mil). ROA is the return to assets. Book to Market is the ratio of book value of equity to total market capitalization. Cash is the ratio of cash and short-term investments to total assets. Dividend is the ratio of dividend to total assets. Debt is the ratio of total debt (short term and long term) to total assets. Standard errors are two-way clustered at four-digit SIC and year levels.

	Strengths	Concerns	E-scores	S-scores	G-scores
	(1)	(2)	(3)	(4)	(5)
Post_PNTR×NTR Gap	1.798***	-0.631	0.728***	1.519***	0.183
	(0.646)	(0.441)	(0.225)	(0.545)	(0.224)
Ln(Assets)	0.127*	0.205***	-0.084***	0.218***	-0.212***
	(0.070)	(0.054)	(0.027)	(0.072)	(0.026)
ROA	0.053	-0.387***	-0.026	0.409***	0.058
	(0.096)	(0.114)	(0.031)	(0.116)	(0.057)
Book to Market	-0.067	0.026	0.003	-0.090	-0.006
	(0.052)	(0.042)	(0.020)	(0.069)	(0.017)
Cash	0.199	0.045	0.182***	-0.029	-0.000
	(0.208)	(0.148)	(0.063)	(0.188)	(0.095)
Dividend	-0.927	-0.104	-0.288	-0.055	-0.479**
	(0.592)	(0.380)	(0.195)	(0.491)	(0.194)
Debt	0.019	0.017	-0.007	-0.019	0.028
	(0.165)	(0.135)	(0.064)	(0.171)	(0.064)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Industry×Year FE	Yes	Yes	Yes	Yes	Yes
Observations	6,528	6,528	6,528	6,528	6,528
R^2	0.817	0.824	0.764	0.764	0.595

Table 5: The Effects of Chinese Import Competition on Firms' ESG Performance Change in Production Process: Firm Level

Table 5 reports results of DiD regressions of ESG scores on the interaction of *NTR gaps* with an indicator for the post PNTR periods, when including *firm-level* variables reflecting the production process. Ln(Assets) is the natural log of a firm's total assets (in $mil). ROA is the return to assets. Book to Market is the ratio of book value of equity to total market capitalization. Cash is the ratio of cash and short-term investments to total assets. Dividend is the ratio of dividend to total assets. Debt is the ratio of total debt (short term and long term) to total assets. Staff expense is the ratio of staff expense to total sales. Capital intensity is the ratio of capital expenditure to total number of employees. R&D expense is R&D expenditure in Compustat scaled by total sales. Advertising is the ratio of advertising expenditure to total sales. Missing values of staff expense, R&D expense and advertising expenditure are replaced with zeros. All specifications control for firm, year, and industry-year fixed effects. Standard errors are two-way clustered at four-digit SIC and year levels.

	ESG Scores				
	(1)	(2)	(3)	(4)	(5)
Post_PNTR×NTR Gap	2.498***	2.282***	2.597***	2.321***	2.303***
	(0.634)	(0.627)	(0.624)	(0.631)	(0.638)
Staff Expense	-1.227*				-1.344*
	(0.721)				(0.710)
Post_PNTR×Staff Expense	0.938				0.958
	(1.135)				(1.120)
Capital Intensity		0.001			0.001
		(0.001)			(0.001)
Post_PNTR×Capital Intensity		-0.001			-0.001
		(0.001)			(0.001)
R&D Expense			-4.451*		-4.240*
			(2.458)		(2.282)
Post_PNTR×R&D			4.451*		4.240*
			(2.458)		(2.282)
Advertising				-2.982	-1.958
				(2.478)	(2.761)
Post_PNTR×Advertising				3.390	6.953***
				(2.305)	(2.566)
Full Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Industry×Year FE	Yes	Yes	Yes	Yes	Yes
Observations	6,528	6,450	6,528	6,528	6,450
R^2	0.745	0.747	0.746	0.745	0.749

Table 6: The Effects of Chinese Import Competition on Firms' ESG Performance
Change in Production Process: Industry Level

Table 6 reports results of DiD regressions of ESG scores on the interaction of *NTR gaps* with an indicator for the post PNTR periods, when including *industry-level* variables reflecting the production process. Outsourcing is the sum product of the input weights and import penetration of the input industries. Contract intensity is the proportion of intermediate inputs of the industry that require relationship-specific investments and is collected from Nunn (2007). Other variables are defined in the same way as Table 5 except staff expense, capital intensity, R&D expense, and advertising expense are averages of firms in the same four-digit SIC industries. All specifications control for firm, year, and industry-year fixed effects. Standard errors are two-way clustered at four-digit SIC level and year levels.

	ESG Scores					
	(1)	(2)	(3)	(4)	(5)	(6)
Post_PNTR×NTR Gap	1.787**	2.597***	2.661***	1.984***	2.456***	2.164**
	(0.753)	(0.637)	(0.688)	(0.619)	(0.653)	(0.898)
Staff Expense	-0.024***					-0.024***
	(0.006)					(0.007)
Post_PNTR×Staff Expense	0.022***					0.020***
	(0.007)					(0.007)
Capital Intensity		-0.007***				-0.053***
		(0.003)				(0.018)
Post_PNTR×Capital Intensity		0.012**				0.066***
		(0.006)				(0.020)
R&D Expense			-0.003			0.010
			(0.014)			(0.016)
Post_PNTR×R&D			0.005			-0.009
			(0.014)			(0.016)
Advertising				-0.029		-0.581**
				(0.028)		(0.287)
Post_PNTR×Advertising				0.300**		0.660*
				(0.138)		(0.366)
Outsourcing					0.002	0.018
					(0.010)	(0.015)
Post_PNTR×Outsourcing					-0.002	-0.020
					(0.009)	(0.014)
Post_PNTR×Contract					0.981*	1.534**
					(0.580)	(0.763)
Full Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Industry×Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,940	6,528	6,270	6,195	5,917	4,157
R^2	0.753	0.745	0.746	0.75	0.742	0.757

Table 7: China Trade Shock, Market Power and ESG Engagement

Table 7 reports results of triple-difference regression of ESG scores on the interaction of *NTR gaps*, an indicator for the post PNTR periods, and an indicator for industries with high Herfindahl-Hirschman Index (HHI). Other (not shown) controls include: Ln(Assets) is the natural log of a firm's total assets (in $mil). ROA is the return to assets. Book to Market is the ratio of book value of equity to total market capitalization. Cash is the ratio of cash and short-term investments to total assets. Dividend is the ratio of dividend to total assets. Debt is the ratio of total debt (short term and long term) to total assets. All specifications control for firm, year, and/or industry-year fixed effects. Standard errors are two-way clustered at four-digit SIC and year levels.

	ESG Scores			
	(1)	(2)	(3)	(4)
Post_PNTR×NTR Gap×High_HHI (Hoberg &Phillips (2010))	-0.609	-3.037**		
	(1.253)	(1.371)		
Post_PNTR×NTR Gap×High_HHI (Hoberg &Phillips (2016))			-3.987***	-2.437**
			(1.001)	(1.203)
Post_PNTR×NTR Gap	3.132***	3.096***	5.328***	4.277***
	(0.533)	(0.682)	(0.781)	(1.124)
Full Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry×Year FE	No	Yes	No	Yes
Observations	6,249	6,249	6,343	6,343
R^2	0.711	0.742	0.71	0.74

Table 8: Trade Shock, Differentiability and ESG Engagement

Table 8 reports the results of the triple-difference regression of ESG scores on the interaction of *NTR gaps*, an indicator for the post PNTR periods, and an indicator for standardized industries. We follow Hoberg and Phillips (2016) and Rauch (1999) to define standardized industries, respectively. Other (not shown) controls include: Ln(Assets) is the natural log of a firm's total assets (in $mil). ROA is the return to assets. Book to Market is the ratio of book value of equity to total market capitalization. Cash is the ratio of cash and short-term investments to total assets. Dividend is the ratio of dividend to total assets. Debt is the ratio of total debt (short term and long term) to total assets. All specifications control for firm, year, and/or industry-year fixed effects. Standard errors are two-way clustered at four-digit SIC and year levels.

	ESG Scores			
	(1)	(2)	(3)	(4)
Post_PNTR×NTR Gap×Standardized (Hoberg &Phillips (2016))	3.897***	2.522**		
	(1.045)	(1.182)		
Post_PNTR×NTR Gap×Standardized (Rauch (1999))			2.758***	3.311**
			(0.940)	(1.480)
Post_PNTR×NTR Gap	1.181	1.578*	1.654***	2.239**
	(0.732)	(0.869)	(0.614)	(0.899)
Full Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry×Year FE	No	Yes	No	Yes
Observations	6,343	6,343	6,419	6,419
R^2	0.712	0.741	0.713	0.741

Table 9: Prior Trade Shocks from Low Wage Countries and ESG Engagement

Table 9 reports the results of the triple-difference regression of ESG scores on the interaction of *NTR gaps*, an indicator for the post PNTR periods, and the import penetration from low wage countries to US in 1999 (*IMPL1999*). The import penetration is taken from Bernard, Jensen, and Schott (2006). Other (not shown) controls include: Ln(Assets) is the natural log of a firm's total assets (in $mil). ROA is the return to assets. Book to Market is the ratio of book value of equity to total market capitalization. Cash is the ratio of cash and short-term investments to total assets. Dividend is the ratio of dividend to total assets. Debt is the ratio of total debt (short term and long term) to total assets. All specifications control for firm, year, and/or industry-year fixed effects. Standard errors are two-way clustered at four-digit SIC and year levels.

	ESG Scores	
	(1)	(2)
Post_PNTR×NTR Gap×IMPL1999	-0.259***	-0.240***
	(0.060)	(0.076)
Post_PNTR×NTR Gap	3.444***	2.645***
	(0.671)	(0.670)
Post_PNTR× IMPL1999	0.125***	0.125***
	(0.028)	(0.034)
Full Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Industry×Year FE	No	Yes
Observations	5,779	5,779
R^2	0.715	0.745

Table 10: The Effects of Chinese Import Competition on Firms' Environmental Performance
Evidence from TRI

Table 10 reports results of DiD regressions of toxics release on the interaction of *NTR gaps* with an indicator for the post PNTR periods. The data is from Toxics Release Inventory (TRI) Program by EPA during 1991 to 2007. All specifications control for year, firm-by-chemical, zip code-by-year fixed effects. Standard errors are two-way clustered at four-digit SIC and year levels.

	Total Toxics Release (mil pounds)			
	(1)	(2)	(3)	(4)
Post_PNTR× NTR Gap	-0.026***	-0.053***	-0.043***	-0.060***
	(0.004)	(0.006)	(0.006)	(0.009)
Firm × Chemical FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Zip Code × Year FE	Yes	Yes	Yes	Yes
Firm × Year FE	No	Yes	No	Yes
Industry × Chemical × Year FE	No	No	Yes	Yes
Observations	865306	865306	865306	865306
R^2	0.548	0.559	0.565	0.576

Online Appendix

A.1: Job Satisfaction Survey Trends

Figure A.1: Job Satisfaction Survey Trends

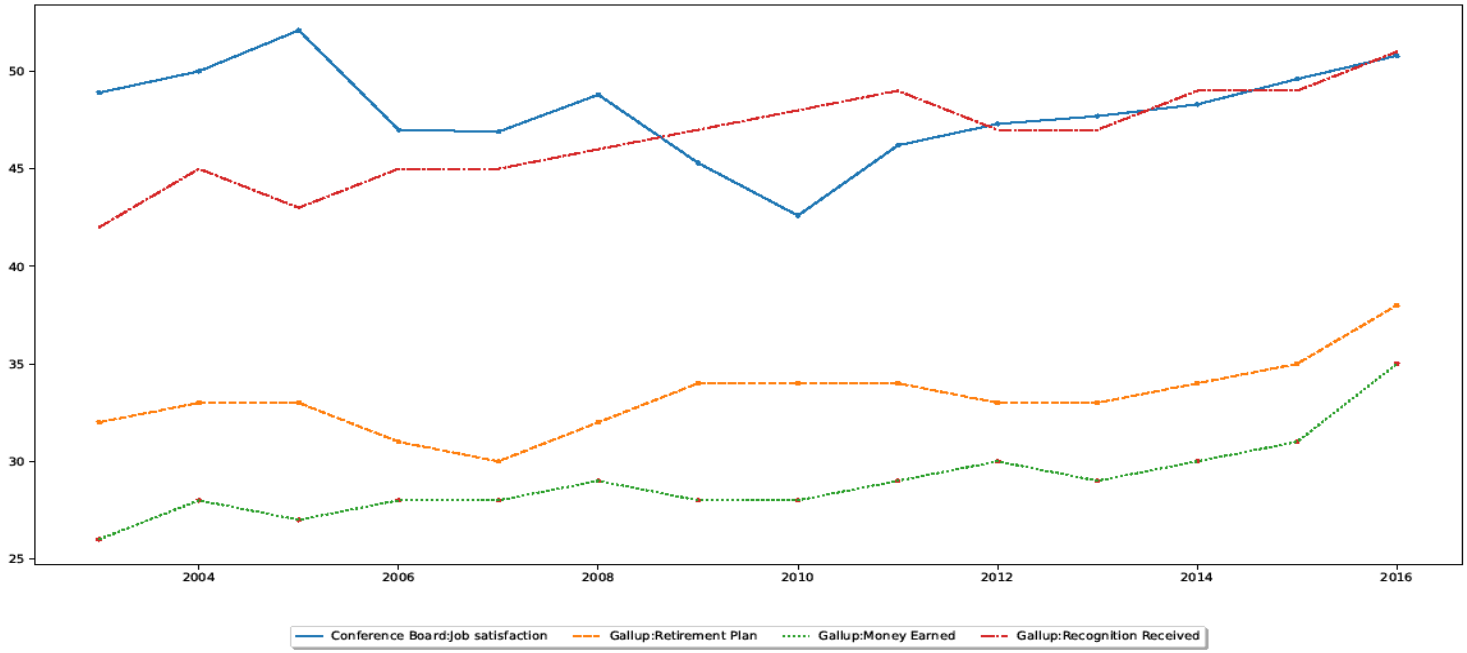

Figure A.1 plots the results of job satisfactory survey by the Conference Board (solid), retirement-plan satisfaction survey by Gallup (dashed), money-earned satisfaction survey by Gallup (dotted) and recognition-received satisfaction survey by Gallup (dot-dashed) from 2003 to 2016.

A.2: Categories and Indicators Included in the ESG measure

Table A.2: Categories and Indicators Included in the ESG measure

Category	Indicator	Strength/ Concern
Environment	Environmental Opportunities – Opportunities in Clean Tech	Strength
Environment	Pollution & Waste – Toxic Emissions and Waste	Strength
Environment	Pollution & Waste – Packaging Materials & Waste	Strength
Environment	Climate Change - Carbon Emissions	Strength
Environment	Environmental Management Systems	Strength
Environment	Natural Capital - Water Stress	Strength
Environment	Natural Capital - Biodiversity & Land Use	Strength
Environment	Natural Capital - Raw Material Sourcing	Strength
Environment	Climate change - Financing Environmental Impact	Strength
Environment	Environmental Opportunities – Opportunities in Green Building	Strength
Environment	Environmental Opportunities – Opportunities in Renewable Energy	Strength
Environment	Pollution & Waste - Electronic Waste	Strength
Environment	Climate Change – Energy Efficiency	Strength
Environment	Climate Change – Product Carbon Footprint	Strength
Environment	Climate Change - Climate Change Vulnerability	Strength
Environment	Environment - Other Strengths	Strength
Environment	Toxic Emissions and Waste	Concern
Environment	Energy & Climate Change	Concern
Environment	Biodiversity & Land Use	Concern
Environment	Operational Waste (Non-Hazardous)	Concern
Environment	Supply Chain Management	Concern
Environment	Water Stress	Concern
Environment	Environment - Other Concerns	Concern

Category	Indicator	Strength/ Concern
Social	Community Engagement	Strength
Social	Impact on Community	Concern
Social	Union Relations	Strength
Social	Cash Profit Sharing	Strength
Social	Employee Involvement	Strength
Social	Employee Health & Safety	Strength
Social	Supply Chain Labor Standards	Strength
Social	Human Capital Development	Strength
Social	Labor Management	Strength
Social	Controversial Sourcing	Strength
Social	Human Capital – Other Strengths	Strength
Social	Collective Bargaining & Unions	Concern

Social	Health & Safety	Concern
Social	Supply Chain Labor Standards	Concern
Social	Child Labor	Concern
Social	Labor Management Relations	Concern
Social	Labor Rights & Supply Chain – Other Concerns	Concern
Social	Representation	Strength
Social	Board Diversity - Gender	Strength
Social	Discrimination & Workforce Diversity	Concern
Social	Board Diversity - Gender	Concern
Social	Product Safety and Quality	Strength
Social	Social Opportunities – Access to Healthcare	Strength
Social	Social Opportunities - Access to Finance	Strength
Social	Social Opportunities - Access to Communications	Strength
Social	Social Opportunities - Opportunities in Nutrition and Health	Strength
Social	Product Safety - Chemical Safety	Strength
Social	Product Safety -Financial Product Safety	Strength
Social	Product Safety - Privacy & Data Security	Strength
Social	Product Safety - Responsible Investment	Strength
Social	Product Safety - Insuring Health and Demographic Risk	Strength
Social	Product Quality & Safety	Concern
Social	Marketing & Advertising	Concern
Social	Anticompetitive Practices	Concern
Social	Customer Relations	Concern
Social	Privacy & Data Security	Concern
Social	Other Concerns	Concern

Category	Indicator	Strength/ Concern
Governance	Corruption & Political Instability	Strength
Governance	Financial System Instability	Strength
Governance	Governance Structures	Concern
Governance	Controversial Investments	Concern
Governance	Bribery & Fraud	Concern
Governance	Governance - Other Concerns	Concern

A.3: Variable Definitions and Descriptions

Table A.3: Variable Definitions and Descriptions

Variable	Variable Description	Data Source
ESG Scores	the difference between total strengths and total concerns	KLD
Total Strengths	total strengths	KLD
Total Concerns	total concerns	KLD
Environmental Scores	the difference between total environmental strengths and environmental concerns	KLD
Social Scores	the difference between total social strengths and social concerns	KLD
Governance Scores	the difference between total governance strengths and governance concerns	KLD
Ln(Assets)	natural log of a firm's total assets (AT)	Compustat
ROA	return to assets. Income Before Extraordinary Items (IB) over total assets (AT)	Compustat
Book to Market	Book to Market ratio. Book value of equity is CEQ item in Compustat. Market value of equity is the product of share price (PRC) and shares outstanding (SHROUT) in CRSP.	Compustat & CRSP
Cash	Cash and Short-Term Investments (CHE) over total assets (AT)	Compustat
Dividend	Dividend over total assets. Dividend is the sum of common dividend (DVC) and preferred dividend (DVP)	Compustat
Debt	Total debt outstanding over total assets. Debt is the sum of short-term debt (dlc) and long-term debt (dltt)	Compustat
Staff Expense (firm level)	Staff expense (XLR) over sales (SALE). Missing values of XLR are replaced with 0.	Compustat
Capital Intensity (firm level)	Capital expenditure (CAPX) over total number of employees (EMP)	Compustat
R&D Expense (firm level)	R&D expenditure (XRD) over sales (SALE). Missing values of XRD are replaced with 0.	Compustat
Advertising (firm level)	Advertising expenditure (XAD) over sales (SALE). Missing values of XAD are replaced with 0.	Compustat

Variable	Variable Description	Data Source
Staff Expense (industry level)	average of firm-level staff expense for all firms in the same 4-digit SIC industries in the same year. Ignore any missing values.	Compustat
Capital Intensity (industry level)	average of firm-level capital intensity for all firms in the same 4-digit SIC industries in the same year. Ignore any missing values.	Compustat
R&D Expense (industry level)	average of firm-level R&D expenditure for all firms in the same 4-digit SIC industries in the same year. Ignore any missing values.	Compustat
Advertising (industry level)	average of firm-level advertising expenditure for all firms in the same 4-digit SIC industries in the same year. Ignore any missing values.	Compustat
Outsourcing	sum of product of the input weights and import penetration of the input industries.	Computed from US Bureau of Economic Analysis and Acemoglu et al. (2016)
Contract Intensity	the proportion of intermediate inputs of the industry that require relationship-specific investments	Nunn (2007)
Import Penetration	imports from China scaled by the initial absorption level at the start of the period in 1991	Acemoglu et al. (2016)
High_HHI	a dummy variable equal to 1 if the calculated industry HHI is above the median; based on Hoberg and Phillips (2010) and Hoberg and Phillips (2016)	Hoberg-Phillips Data Library
Standardized	a dummy variable equal to 1 if the 3-digit industry is classified as standardized based on product similarity measure of Hoberg and Phillips (2016) or Rauch (1999)	Hoberg-Phillips Data Library; James Rauch's website
IMPL1999	the import penetration from low wage countries to US in 1999	Bernard, Jensen, and Schott (2002)
TRI	Toxics Release Inventory	EPA

A.4 Robustness Tests

We conduct four robustness tests. First, we show our results stand if we control for industry-by-year fixed effects at three-digit SIC level, if we use different weights (average number of firms in the industry and/or total industry sales), or if we require a firm to appear in the sample both before and after 2001. Second, we further control for other major events concurrent with the passage of PNTR in 2001. Third, we follow Pierce and Schott (2016) and instrument the constructed *NTR Gap* with two separate instruments: non-NTR tariff rates set by Smoot–Hawley Tariff Act, and the *NTR gap* observed in *1990*. Both of the instruments are distantly ahead of PNTR and the subsequent increase in US firms' ESG engagement, and thus, are plausibly exogenous. Finally, we present an alternative identification strategy and pinpoint the effect of trade shock from China with import penetration, similar to Autor et al. (2014).

Granular Industry Classification and Alternative Weighting

Our baseline results in Table 3 account for industry-by-year fixed effects at two-digit SIC level. Instead, Table A.4.1 control for industry-by-year fixed effects at three-digit SIC level (Column 1), use different weights (the average number of companies in the four-digit SIC industries over the sample period and/or total industry sales) (Columns 2 and 3), or require a firm to appear in the sample both before and after 2001 (Column 4). Despite the changes, the results remain quantitatively similar.

Other Contemporaneous Major Events

Our identification leverages the passage of PNTR in 2001 and the variation in the decrease of expected tariffs across industries. However, multiple major events also transpired around the same time, including the termination of Multi-Fiber Agreement Quotas on products from the textile, apparel and leather sectors in 2002 and 2005, the decline of unionization in the US manufacturing sector, and the burst of the Dot-com bubble in the US. Therefore, it is necessary to rule out the possibility of confounding impacts from the alternative shocks on the US firm's ESG performances.

To address the concern, we follow Pierce and Schott (2016) and include more covariates in our baseline specification. Specifically, we include MFA quota fill rate from Khandelwal, Schott, and Wei (2013) and US Union membership rates from Hirsch and MacPherson (2003). To account for the impacts from the Dot-com bubble, we introduce a

dummy variable $Advanced\ Technology_i$ for advanced technology products defined by US Census Bureau and include its interaction with *Post_PNTR*. Finally, similar to Pierce and Schott (2016), we also include the variable of Δ *China Import Tariffs*, the change in the import tariff rates of China following its accession to the WTO, and *NTR*, the tariff rates stipulated by PNTR on imports from China into the US, to account for more industry-level characteristics that may affect the ESG engagement of US firms. Table A.4.2 reports the results of our robustness tests. The coefficient of interest is still significant at 1% level, and if anything, controlling for other concurrent shocks only greatly increase the magnitude of the coefficients of interest relative to the baseline results in Table 3.

Instruments for *NTR Gap*

Our baseline results in Table 3 use the *NTR Gap* in 1999 and therefore the causal interpretation hinges on its exogeneity. To assess the exogeneity of *NTR gap*, we also follow Pierce and Schott (2016) and instrument the constructed *NTR Gap* with two separate instruments: non-NTR tariff rates set by Smoot–Hawley Tariff Act, and the *NTR gap* observed in *1990*. As noted earlier, nearly 80% of the variations in *NTR Gap* stem from non-NTR tariff rates. Both of the instruments are distantly ahead of PNTR and the subsequent increase in US firms' ESG engagement, and thus, are plausibly exogenous. Table A.4.3 presents the second stage of IV regressions. As a reference, Column (1) reports the baseline results from Table 3. Both IV regressions yield similar results in terms of coefficient magnitude and statistical significance, indicating that moving *NTR Gap* from 25th percentile to 75th percentile increases a firm's ESG score by 0.449 (based on Column (2) result), approximately 19% of one standard deviation of the ESG score. Hence, the IV regressions support the robustness of our results, further confirming that US firms improve their ESG performance following the Congress granting PNTR to imports from China.

An Alternative Identification Approach

Our main identification strategy follows Pierce and Schott (2016) by exploiting the change in trade policy related to China's attainment of PNTR in 2001, and by exploiting the variations across industries in expected tariff decrease on imports from China. Although our robustness checks, e.g., the pre-trend analysis and IV estimations, strongly support the exogeneity of the DiD strategy, to further substantiate our findings, we follow Autor et al.

(2014) and present an alternative identification strategy. Specifically, we use Chinese import penetration in the United States as the measure for trade exposure to Chinese goods across different U.S. industries. We then show that the rise in industry-level Chinese import penetration from year 1991 to 2007 leads to increase in U.S. firms' ESG performance.

As in Autor et al. (2014), the change in import penetration is defined as

$$\Delta IP_{j,t} = \frac{\Delta M_{j,t}^{UC}}{Y_{j,91} + M_{j,91} - E_{j,91}} \tag{A.1}$$

at each four-digit SIC industry level *j*, where Δ denotes the eight-year long difference operator over time period *t*. $\Delta M_{j,t}^{UC}$ is the change in imports from China, and $Y_{j,91} + M_{j,91} - E_{j,91}$ is the initial absorption level at the start of the period in 1991 similarly defined in equation (4) in the main text. We consider the following regression model,

$$\Delta ESG_{i,j,t} = \alpha_1 \Delta IP_{j,t}^{CH} + \Delta X_{i,j,t} + \Delta \epsilon_{i,j,t} \tag{A.2}$$

where $\Delta ESG_{i,j,t}$ is the ESG score change of firm *i* operating in industry *j* over time period *t*; $\Delta IP_{j,t}^{CH}$ is the change in Chinese import penetration; $\Delta X_{i,j,t}$ are a set of change in firm level control variables. In essence, regression equation (A.2) is a first-difference estimator of a fixed-effect model. Unlike our primary identification strategy, the trade shock from China is now measured with import penetration. We collect the industry-level import penetration data from Acemoglu et al. (2016), and match it to our firm-level ESG data. Our final sample consists of two stacked sub-periods, 1991 to 1999 and 1999 to 2007. For this reason, the final sample size is substantially smaller than the one in the primary identification strategy.

One caveat is that the growth in Chinese import penetration may be related to unobserved shocks to US domestic productivity or demand, i.e., consumer preferences, that is also correlated with a firm's ESG performance, resulting in potential biased estimates. To correct for the bias, we follow Autor et al. (2014) and instrument for the rising import penetration of China in the United States using the change in industry-level import penetration in other high-income countries,

$$\Delta IP_{j,t} = \frac{\Delta M_{j,t}^{OC}}{Y_{j,88} + M_{j,88} - E_{j,88}} \tag{A.3}$$

where $\Delta M_{j,t}^{OC}$ denotes the change in Chinese imports in industry *j* over period *t* for eight high-income countries other than the United States.[1] Autor et al. (2014) provide evidence on the robustness of this instrument in studying the impacts of the trade shock from China.[2] They argue that other high-income economies experience similar growth in Chinese imports that is driven by supply shocks originating in China, but are not exposed to the same demand shocks originated in the US. The instrumental variables, therefore, allow us to isolate the effect of exogenous supply-driven component of rising Chinese imports on ESG performance of U.S. firms.

Table A.4.4 shows the impact of rising import penetration of China in the United States on the local firm's ESG score in the OLS model (column (1)-(2)), reduced-form (column (3)-(4)) and 2SLS model (column (5)-(6)). The result in column (2) shows that a one standard deviation increase in import penetration is associated with a 0.28-point increase in firm's ESG score, approximately 12% of a standard deviation of ESG scores.[3] Note that the magnitude is very close to the estimate of 16% from our baseline identification.

Column (5) of Table A.4.4 reports the result from 2SLS regression, and indicates a more prominent effect of import competition on ESG engagement. The magnitude of the coefficient almost doubles compared to the OLS regression in Column (1) of Table A.4.4 and is significant at 5% level, suggesting that IV estimation helps correct the measurement error in import penetration from China to the US. The result shows that one standard deviation increase in the trade exposure variable raises the firm's ESG score by 0.48 point, equivalent to 21% of one standard deviation of ESG scores. Our IP measures follow Autor et al. (2020) and assign zeros to (non-manufacturing) industries that have no records of import from China. To make sure that our results are not driven by industries with zero IPs, Column (6) adds a dummy of manufacturing sector (SIC 2000-3999) along with a year dummy, and shows that one standard deviation in crease in the IP raises the firm's ESG score by 17%. Therefore, using the alternative strategy by Autor et al. (2014), we find similar encouraging effects of the trade shock from China on local US firm's ESG engagement.

[1] These countries are Australia, Denmark, Finland, Germany, Japan, New Zealand, Spain, and Switzerland.
[2] Also see Hombert and Matray (2018) for importance to instrument the import penetration from China.
[3] Import penetration increased by a mean of 2.47 (standard deviation 9.31) for the firms in our sample.

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Table A.4.1: The Effects of Chinese Import Competition on Firms' ESG Performance

Robustness Test I

Table A.4.1 reports results of DiD regressions of ESG scores on the interaction of *NTR gaps* with an indicator for the post PNTR periods. All models include the same set of control variables as in Table 3. In particular, Column (1) controls for industry-by-year fixed effects at three-digit SIC industries, Column (2) and (3) use alternative weights (average number of firms in the industry and total industry sales), and Column (4) requires a firm to appear in the sample both before and after 2001. Standard errors are two-way clustered at four-digit SIC and year levels.

	ESG Scores			
	(1)	(2)	(3)	(4)
Post_PNTR× NTR Gap	1.909**	2.184**	2.976**	2.415***
	(0.822)	(0.909)	(1.187)	(0.650)
Full Controls	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Notes	3-digit SIC×Year FE	Weighted by No. of Firms	Weighted by Total Ind Sales	To Appear Before & After 2001
Observations	6,528	6,528	6,528	3,405
R^2	0.778	0.721	0.718	0.725

Table A.4.2: The Effects of Chinese Import Competition on Firms' ESG Performance
Robustness Test II: Other Concurrent Shocks and Control Variables

Table A.4.2 reports the results of DiD regressions of ESG scores on the interaction of *NTR gaps* with an indicator for the post PNTR periods. Ln(Assets) is the natural log of a firm's total assets (in $mil). ROA is the return to assets. Book to Market is the ratio of book value of equity to total market capitalization. Cash is the ratio of cash and short-term investments to total assets. Dividend is the ratio of dividend to total assets. Debt is the ratio of total debt (short term and long term) to total assets. Δ China Import Tariffs is the change in Chinese import tariffs, originally from Brandt et al. (2017). Advanced Technology is a dummy variable for advanced technology products defined by US Census Bureau. US Union Membership is unionization rates, originally from Hirsch and MacPherson (2003). NTR refers to the import tariff rates stipulated by U.S. Normal Trade Relations. MFA is the fill rates of Multi Fiber Arrangement quotas, originally from Khandelwal, Schott, and Wei (2013). Standard errors are two-way clustered at four-digit SIC and year levels.

	ESG Scores	
	(1)	(2)
Post_PNTR× NTR Gap	3.026***	3.330***
	(0.611)	(0.738)
Ln(Assets)	-0.121	-0.103
	(0.092)	(0.099)
ROA	0.467***	0.454***
	(0.135)	(0.148)
Book to Market	-0.067	-0.095
	(0.084)	(0.082)
Cash	-0.112	-0.168
	(0.231)	(0.251)
Dividend	-0.528	-0.892
	(0.638)	(0.685)
Debt	0.542***	0.267
	(0.199)	(0.218)
Post_PNTR× Δ China Import Tariffs	-0.779	-0.166
	(0.600)	(0.697)
Post_PNTR× Advanced Technology	1.047***	0.942***
	(0.225)	(0.237)
US Union Membership	-0.015*	0.014
	(0.008)	(0.013)
NTR	7.895*	17.523***
	(4.288)	(5.076)
MFA Exposure	0.084	-3.578***
	(0.757)	(0.972)

Firm FE	Yes	Yes
Year FE	Yes	Yes
Industry×Year FE	No	Yes
Observations	5,511	5,511
R^2	0.721	0.748

Table A.4.3: The Effects of Chinese Import Competition on Firms' ESG Performance
Robustness Test: Instrumental Variables

Table A.4.3 reports results of DiD regressions of ESG scores on the interaction of *NTR gaps* with an indicator for the post PNTR periods. Column (2) and (3) instrument *NTR gaps* with non-NTR tariff rates set by Smoot–Hawley Tariff Act and the *NTR gaps* observed in 1990, respectively. Ln(Assets) is the natural log of a firm's total assets (in $mil). ROA is the return to assets. Book to Market is the ratio of book value of equity to total market capitalization. Cash is the ratio of cash and short-term investments to total assets. Dividend is the ratio of dividend to total assets. Debt is the ratio of total debt (short term and long term) to total assets. Standard errors are two-way clustered at four-digit SIC and year levels.

	ESG Scores		
	(1)	(2)	(3)
Post_PNTR×NTR Gap	2.429***	2.442***	1.660**
	(0.625)	(0.640)	(0.735)
Log(Asset)	-0.078	-0.078	-0.082
	(0.088)	(0.088)	(0.088)
ROA	0.441***	0.440***	0.445***
	(0.146)	(0.146)	(0.147)
Book to Market	-0.093	-0.093	-0.092
	(0.075)	(0.075)	(0.075)
Cash	0.153	0.153	0.158
	(0.229)	(0.229)	(0.230)
Dividend	-0.822	-0.823	-0.819
	(0.638)	(0.638)	(0.639)
Debt	0.002	0.002	0.007
	(0.201)	(0.201)	(0.201)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry×Year FE	Yes	Yes	Yes
Instrument Variable	-	Non-NTR rates	NTR Gap (1990)
Observations	6,528	6,528	6,518
R^2	0.745	0.745	0.744

Table A.4.4: Import Competition from China & US Firms' ESG Performance Alternative Identification

Table A.4.4 reports the results of OLS, reduced-form and 2SLS IV regressions of change in ESG scores on change in Chinese import penetration. The sample consist of two stacked long difference sub-periods, 1991 to 1999 and 1999 to 2007. Δ refers to the first-order difference of a variable. Ln(Assets) is the natural log of a firm's total assets (in $mil). ROA is the return to assets. Book to Market is the ratio of book value of equity to total market capitalization. Cash is the ratio of cash and short-term investments to total assets. Dividend is the ratio of dividend to total assets. Debt is the ratio of total debt (short term and long term) to total assets. Standard errors are clustered at four-digit SIC level.

	ESG Scores					
	US imports from China (OLS)		Third country imports from China (OLS reduced form)		Third country imports from China (2SLS)	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Import Penetration	0.030**	0.016	0.056***	0.045**	0.052**	0.043**
	(0.012)	(0.012)	(0.021)	(0.020)	(0.022)	(0.021)
Δ Ln(Assets)		0.029		0.036		0.024
		(0.226)		(0.223)		(0.222)
Δ ROA		-1.147		-1.136		-1.241
		(1.952)		(1.919)		(2.022)
Δ Book to Market		-0.164		-0.177		-0.162
		(0.232)		(0.226)		(0.232)
Δ Cash		-1.183		-1.193		-0.996
		(1.038)		(1.106)		(1.047)
Δ Dividend		6.430		6.821		7.169
		(6.370)		(6.247)		(6.422)
Δ Debt		-0.261		-0.426		-0.349
		(0.902)		(0.934)		(0.935)
Year Dummy	No	Yes	No	Yes	No	Yes
Manufacturing Dummy	No	Yes	No	Yes	No	Yes
Observations	596	582	596	582	596	582
R^2	0.01	0.047	0.017	0.058	0.004	0.045