Migration of Global Supply Chains: A Real Effect of Mandatory ESG Disclosure*

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Abstract

Unlike traditional financial reporting, ESG reporting guidelines lack standardization in measurement, comparability, and enforcement. Mandating ESG reporting amidst these limitations, thus, provides firms the flexibility of implementing strategies to hide their ESG obligations. This study examines firms' global supply chain strategies following the staggered introduction of mandatory ESG disclosure in different countries. We find that mandatory ESG disclosure is associated with the selection of a greater number of new suppliers from countries with weaker ESG-related regulatory enforcement and a more opaque ESG-related corporate information environment. These findings suggest that mandating ESG disclosure led firms to transfer ESG risks to their suppliers. The extent by which firms engage in such strategies is influenced by their financial constraints and the role of financial intermediaries such as analysts and institutional investors. Further results show that these strategies resulted in the improvement of firms' perceived ESG profile.

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1. INTRODUCTION

Heightened awareness on environmental, social, and governance- (ESG) issues led to enhanced demand for ESG-related information to understand corporate performance by various stakeholders. This resulted in the passage of mandatory ESG disclosure regulations across various countries (Krueger et al. [2021]). A major criticism of many ESG disclosure regulations, however, is extreme heterogeneity in firms' ESG-related practices that pose significant challenges for measurement, comparability, and standardization in reporting guidelines (Christensen et al. [2021]). We posit that these challenges may rather create firm incentives to evade firms' ESG-related responsibilities by heightening stakeholder attention on ESG issues. This study addresses this possibility by examining the impact of mandatory ESG disclosure on firms' global supply chain management.

ESG issues cover a wide range of topics with constantly evolving objectives targeting different stakeholders. In the absence of well-defined measurement, auditing, and enforcement systems, thus, information on firms' ESG activities is inherently reliant on firms' *voluntary* disclosures. Prior research shows that firms possess incentives to shape their disclosures as a means to improve their corporate image by, for example, timing the release of information, using various information disclosure channels, and/or leveraging communication tone (e.g., Kothari et al. [2009], Crowley et al. [2022], Huang et al. [2014]). Accordingly, *mandating* information disclosure makes firms' ESG activities more transparent, which may lead to significant reputation loss for firms that lack investments in ESG management practices. Even for firms that are compliant with minimum ESG-related standards (e.g., environment and labor laws), mandatory ESG disclosure may enhance incentives to compete on ESG performance due to heightened awareness on ESG issues by the investment community. That is, managers may be concerned that full disclosure of ESG-related information may negatively affect firm value as it could deter existing and potential ESG-conscious investors. Prior studies have documented positive capital market effects of the disclosure of voluntary ESG information (e.g., Dhaliwal et al. [2011] and Dhaliwal et al. [2012]).

In light of these ESG reporting challenges, we posit that mandating ESG information disclosure may create firm incentives to evade and/or hide their ESG-related obligations by transferring potential ESG-related risks to their suppliers – specifically, by selecting suppliers that operate in jurisdictions with lower ESG-related standards such that firms may accuse suppliers' local institutional factors in constraining their ESG-related responsibilities. This is plausible as current reporting standards fail to adequately capture firms' sustainability-related activities along the entire supply chain (Kaplan and Ramanna [2021]). In fact, Dai et al. [2021] provide evidence that firms "outsource" their carbon emissions to foreign suppliers – a tendency that is more pronounced for firms that face heightened domestic pressures for better environmental performance. Supply chain decisions also span social issues. Nike, for example, has been accused of unethical sourcing practices in the 1990s and 2000s as they sub-contracted factories to Southeast Asian countries with poor working conditions to save on labor costs.[1]

However, whether mandatory ESG disclosure will lead firms to evade their ESG-related obligations by transferring potential ESG-related risks to their suppliers is an open empirical question. Whereas adjusting firms' supply chain configuration may comprise an immediate strategy to evade reputational risks stemming from mandatory ESG disclosure standards, doing so may be too costly if firms rely on long-term contractual supplier relationships in their operations (e.g., Costello [2013]). If so, it is possible that heightened stakeholder attention on ESG issues accompanied with the implementation of mandatory ESG disclosures may incentivize firms into making real investments at existing suppliers to adhere with ESG standards, and we should not observe any changes in firms' supply chain configurations.

We study this conjecture using supply chain data of 22,890 global firms from FactSet Revere Global Supply Chain spanning 2003 to 2021. Specifically, we rely on Krueger et al. [2021] to identify the year in which mandatory ESG disclosure was introduced in different countries, and examine the change in firms' global supply chain composition following mandatory ESG

[1] See for example the article "Nike accused of tolerating sweatshops" that reports adverse working conditions in Nike's supplier factories in the 2000s (https://www.theguardian.com/world/2001/may/20/burhanwazir.theobserver).

disclosure.[2] Thus, our empirical estimation follows a standard difference-in-differences framework with firm- and year- fixed effects whereby we compare the supply chain composition of firms subject to mandatory disclosure (i.e., treated) to those that were not (i.e., control).[3]

To distinguish between supplier firms that are more or less likely to absorb potential ESG-related risk in the relationship with a focal customer firm, we consider two supplier classifications. First, we consider the institutional environment around ESG issues, specifically, enforcement strength. In particular, we distinguish between suppliers located in countries that exhibit lower or higher levels of ESG performance relative to the location of the focal firm.[4] The intuition is that suppliers located in countries that exhibit lower (higher) ESG performance than the focal firm are more likely to operate in countries with weaker (stronger) enforcement of ESG standards, thus, making it easier (harder) for the focal firm to "evade" their ESG-related obligations by allocating ESG-adverse activities to their suppliers. Second, we consider the corporate information environment around ESG issues. In particular, we distinguish between suppliers located in countries with or without mandatory ESG disclosure. The intuition is that focal customer firms can more likely "hide" their ESG-obligations when suppliers are located in countries without mandatory ESG disclosure as it is difficult for external stakeholders to acquire information about the ESG-related practices of these suppliers. That is, we argue that both, weaker enforcement and poorer corporate information environment around ESG issues at supplier firms, allow for a higher likelihood of concealment of customer firms' adverse ESG activities.

[2] We have independently reviewed the list of treatment years using the Carrots and Sticks and UNPRI databases to identify the introduction of mandatory ESG disclosure regulations. Our independent perusal of the data only contained minimal differences. Our results were robust to these alternative classifications and, thus, we report all our main results based on the treatment years as identified in Krueger et al. [2021]. Moreover, we also show that our results remain robust to using mandatory ESG disclosure regulations that specifically mention supply chain related considerations which are reported in the Online Appendix.

[3] For countries with multiple treatments (i.e., countries that passed several mandatory ESG disclosure regulations), we take the earliest year. Moreover, the term country effectively refers to countries and regions because our sample includes Hong Kong Special Administrative Region (S.A.R.) and the Taiwan region.

[4] Measures for the environmental sustainability/performance of countries are obtained from the Socioeconomic Data and Applications Center (SEDAC) under NASA. The measures are constructed by Yale Center for Environmental Law and Policy (YCELP).

Based on these supplier type classifications, we construct two supply chain composition proxies that capture two different supply chain management practices. First, firms may conceal their adverse ESG activities by *expanding* their supplier network and adding new suppliers from such countries with weaker ESG regulatory enforcement and corporate information environment. To capture this strategy, we use the natural logarithm of the number of new suppliers that belong to each of the two supplier types as the outcome variable. Second, firms may conceal their adverse ESG activities by *switching* from existing suppliers to new suppliers from such countries with weaker ESG regulatory enforcement and corporate information environment. To capture this strategy, we control for the size of the overall supplier network by using the fraction of suppliers that belong to the two supplier types of the total number of suppliers. We also note, however, that both of these strategies need not necessarily be mutually exclusive.

Our empirical findings support the conjecture that mandatory ESG disclosure leads firms to adjust their supply chain composition to benefit from weak and opaque ESG standards of their suppliers. We find that, after the introduction of mandatory ESG disclosure, firms reduce their existing relationship with domestic suppliers (i.e., suppliers located in the same country) and establish more new relationships with suppliers from countries that exhibit lower levels of ESG performance. Furthermore, we find that firms exhibit an increase of new suppliers from countries without mandatory ESG disclosure. These results hold for both, when we consider only the number of new suppliers and the fraction of suppliers that belong to each supplier type. Collectively, these findings highlight a real effect of mandating ESG reporting in individual jurisdictions. That is, due to complex global supply chain configurations, firms located in areas with enhanced ESG disclosure requirements *migrate* their ESG-related responsibilities to their suppliers.

Next, we examine heterogeneous treatment effects for the observed supply chain composition changes following the introduction of mandatory ESG disclosure. Previous research shows that financially-constrained firms face higher regulatory costs stemming from ESG-related policies (Bartram et al. [2022]). Consistent with prior findings, we document that the shift towards

suppliers that allow for a higher likelihood of concealment of their adverse ESG activities is more likely in firms subject to greater financial constraints. We also explore the role of different types of external governance mechanisms that may mitigate firms' incentives to adjust their supply chain composition following the introduction of mandatory ESG disclosure. Specifically, we consider three external factors that have been shown to influence firms' corporate governance practices: enforcement by regulatory bodies (e.g., Kedia and Rajgopal [2011]), analyst coverage (e.g., Chen et al. [2015]), and institutional ownership (e.g., Bushee [1998]). First, to examine the role of enforcement strength, we use the rule of law index that captures the extent to which agents in a country have confidence in and abide by the rules of society. We find that the supply chain migration activities are concentrated by firms in countries with a higher degree of law enforcement. Second, to examine the role of analysts, we use commonly-used analyst coverage proxies and find that the supply chain migration activities are mitigated in firms that are followed by more analysts. Third, to examine the role of institutional investors, we use the shares held by institutional investors, and find that the supply chain migration activities are mitigated in firms that have higher institutional ownership. Collectively, these results corroborate the role of financial intermediaries as external monitors.

We also examine potential other effects following the introduction of mandatory ESG disclosure. First, we explore whether and how mandatory ESG disclosure is associated with reported ESG performance. Specifically, we examine the number of reported ESG incidents and find that the introduction of mandatory ESG disclosure is associated with an overall decline in the number of reported ESG incidents (i.e., improved ESG profile). Moreover, we also find that the effect of an improved ESG profile following the introduction of mandatory ESG disclosure is primarily driven by those firms that engaged in supply chain migration activities in the three years following the introduction of mandated ESG disclosure. This latter finding suggests that firms' supply chain management strategies were successful in attaining an improved ESG profile. Second, we explore whether and how mandatory ESG disclosure is associated with changes in firms' cost

structure. A potential explanation for observing changes in the global supply chain composition towards suppliers may be that it is simply driven by rising production costs such that firms have incentives to relocate production to relatively underdeveloped countries. Whereas we find an overall increase in production costs following the introduction of mandatory ESG disclosure, we do not find evidence that the cost increases exhibit significant differences between firms with and without engagement in supply chain migration activities in the three years following the introduction of mandated ESG disclosure. This latter finding corroborates that the differential adjustments in supply chain composition in response to mandatory ESG disclosure may not be driven by cost-based motives, but based on reputational incentives to conceal adverse ESG-related activities.

Finally, we conduct several tests to demonstrate the robustness of our findings. First, we consider an alternative treatment year indicator that specifically mentions supply chain related considerations as examples of ESG-related information that firms are required to disclose. Second, we control for the possibility of existing voluntary ESG information disclosures. Third, we consider alternative measures when classifying suppliers subject to weak/strong ESG-related enforcement strength. Lastly, we employ newly developed estimation methods to address potential concerns in staggered differences-in-differences research designs. The results are robust to these additional considerations.

This paper contributes to mainly three strands of literature. First, our study adds to the literature on governance mechanisms for ESG performance. Whereas most studies in this area have focused on *firm-level* measures to promote enhanced ESG commitment by firms (e.g., disclosure regulation, board structure, executive compensation design, etc.), our study highlights the potential limitations of such governance mechanisms in that they cannot impose adequate means by which firms' internal management practices can be adjusted. Supply chain practices have long been a contentious issue for evaluating firms' ESG performance with only limited success to enforce sustainable practices as supplier relationships frequently transcend the

traditional legal boundaries of the firms. Accordingly, there have been many advocates that call for the role of "private" regulators to promote higher ESG standards in supply chains (Kuruvilla [2021]). This study sheds light on the need for a collective approach towards introducing regulations to enhance ESG performance which cannot be enforced by nation-wide regulatory requirements per se.

Second, our study adds to the literature that examines the *real* effects of mandatory disclosure regulations. Whereas the intended benefits from mandatory disclosure primarily revolve around a reduction in information asymmetry that allows for better capital allocation across the economy, a growing literature also documents (costly) unintended consequences from the introduction of mandatory disclosures. For example, Jayaraman and Wu [2019] argue that mandatory disclosure elicits lower investment efficiency by discouraging informed trading. That is, mandatory disclosure has the effect of decreasing managerial learning based on decision-relevant information extracted from prices. Studies also document unintended spillover effects of the introduction of mandatory disclosure regulations between different jurisdictions. For example, Breuer et al. [2021] show that regulated firms' mandatory disclosures can have a crowding-out effect on unregulated firms' voluntary disclosures. This study adds to the literature by documenting that firms respond to mandatory disclosure regulation by adjusting their internal business practices such as supply chain management.

Third, our study adds to the supply chain literature on sustainable practices that examines how firm policies are influenced by customers and suppliers (Dai et al. [2020]), and how risks are transmitted within the supply chain (Schiller [2018]). Our analyses address whether the limited availability of information on suppliers' ESG practices may induce firms to improve their ESG profiles through migration activities with adverse ESG-related consequences to suppliers. Thus, to advocate for supply chain ESG practices, policymakers may need to restrict unethical migration activities in addition to stronger disclosure requirements.

2. PRIOR LITERATURE & HYPOTHESES DEVELOPMENT

Increased societal pressure for sustainable management practices has led to regulatory changes *mandating* the disclosure of such information in many countries (e.g., Christensen et al. [2021], Krueger et al. [2021]). The intended effect of such mandatory ESG disclosures is an increase in transparency that would allow for pressure from various external stakeholders to enhance firms' commitment to ESG-related activities. However, reporting on firms' ESG activities significantly differs from traditional financial reporting. Whereas the purpose of financial reporting lies in providing external stakeholders (mainly investors) information about the results of operations, financial position, and cash flows of an organization, there is considerable heterogeneity in the range of interests, preferences, and objectives for reporting on ESG-related firm operations. Inevitably, this creates many challenges in defining, measuring, and standardizing guidelines for firms' ESG-related information such that external stakeholders are predominantly reliant on firms' voluntary and selective disclosures in evaluating ESG performance. Accordingly, credibly differentiating firms' actual ESG-related activities from what they report remains a significant challenge (Christensen et al. [2021]).

The ambiguity around well-defined ESG information due to its overarching focus spanning a variety of different topics and stakeholders, thus, creates managerial opportunities to shape ESG information disclosures to primarily contribute to maximizing firm valuation. In fact, earlier research in accounting shows that, in the context of earnings announcements, managers have incentives to time the release of information disclosures (e.g., Kothari et al. [2009]), use various information disclosure channels (e.g., Crowley et al. [2022]), and leverage communication style and tone (e.g., Huang et al. [2014]) to influence market returns. Moreover, research examining the effects of voluntary ESG-related information disclosures documents associations with decreased cost of capital and analyst forecast errors (e.g., Dhaliwal et al. [2011], Dhaliwal et al. [2012]), thereby providing evidence of positive capital market effects from signaling engagement in ESG-related activities to external stakeholders.

On the contrary, using the passage of a directive in the European Union (EU) which *mandated* increased ESG disclosures, Grewal et al. [2019] document an average negative market reaction across all firms, and that such negative effects are more pronounced with weak ESG performance and disclosure. Prior research also suggests that mandating ESG disclosures is associated with wider-reaching impacts affecting society, beyond just shareholders. Chen et al. [2018] examine the impact of mandating ESG disclosure on social externalities using China's 2008 mandate requiring firms to disclose CSR activities. They find that mandatory CSR reporting firms experience a decrease in profitability, but that cities most impacted by the disclosure mandate also experienced a decrease in their pollution levels. Whereas the empirical evidence in their study suggests that mandatory ESG disclosure alters firm behaviors to generate positive social externalities at the expense of shareholders, such "redistribution" effects may be difficult to materialize in the absence of strong regulatory institutions that can enforce the ESG obligations.

In the absence of well-defined measurement, auditing, and enforcement systems, we posit that mandating ESG information disclosure can result in firm incentives that may also generate negative social externalities. The passage of mandatory ESG disclosure regulations is likely accompanied by heightened awareness for ESG issues. For firms with relatively weaker ESG profiles, the mandate could, thus, impose pressures to signal to their outside stakeholders that their firm operations are at least compliant with an acceptable minimum ESG standard. Moreover, given the recent evidence that firm investments in sustainability issues are associated with shareholder-value enhancing effects, firms may even possess incentives to compete for better ESG performance to attract potential investors (e.g., Khan et al. [2016]). The associated reputational costs from mandated ESG disclosures can, thus, be substantial as fundamental improvement in ESG performance requires a commitment to long-term investment horizons with significant changes to firms' management practices.

Firms' supply chain practices are particularly susceptible to such pressures. Existing research suggests that firms' supply chain management has considerable ESG-related consequences,

especially around environmental and social issues (e.g., Yawar and Seuring [2017], Quarshie et al. [2016]). However, one major challenge in promoting sustainable management practices along the supply chain is that supplier firms effectively transcend the legal boundaries of the firm such that meaningful ESG-related involvement requires significant commitments by the customer firm (e.g., Distelhorst and Shin [2022]). Moreover, current limitations in reporting standards fail to adequately capture firms' sustainability-related activities along the entire supply chain (Kaplan and Ramanna [2021]) which may further fuel firm incentives to evade their ESG obligations by adjusting their supplier selections. For example, Dai et al. [2021] show that firms "outsource" their carbon emissions to foreign suppliers – a tendency that is more pronounced for firms that face heightened domestic pressures for better environmental performance.

A priori, however, it is unclear whether and how mandatory ESG disclosures will affect firms' supply chain management practices. On the one hand, it may be possible that the reputational costs resulting from mandatory ESG disclosure are insufficient in inducing any changes to firms' *real* behaviors including their supply chain decisions. Moreover, if, as documented in Chen et al. [2018], mandating ESG disclosure can generate positive externalities and/or firms are reliant on long-term contractual supplier relationships (e.g., Costello [2013]), firms may decide to increase their investments into improving the management practices at their *existing* supplier firms. In fact, She [2021] documents how mandatory nonfinancial disclosure affects firms' real decisions by showing that suppliers' human rights performance improves following the regulation, thus, suggesting that firms improved supply chain due diligence following enhanced disclosure requirements. Under these situations, we would not expect to observe any changes to firms' global supply chain composition subsequent to the introduction of mandatory ESG disclosure.

On the other hand, if firms choose to evade or hide their ESG-related obligations that could potentially harm their ESG profile by taking advantage of the limited supply chain related reporting guidelines, they may rather choose to change to supplier firms that are not subject to stringent ESG-related requirements. Specifically, we consider two country-specific supplier firm

characteristics that allow for such ESG risk transfers. First, we classify suppliers depending on whether they are located in countries where economic development likely outweighs ESG concerns resulting in weak enforcement of ESG-related standards. The intuition is that customer firms may "outsource" adverse ESG activities to suppliers by leveraging their less stringent ESG-related regulatory environment. Second, we classify suppliers depending on whether they are located in countries with (without) mandatory ESG disclosure policies. The intuition is that customer firms may "blame" the lack of relevant information that would have allowed for more responsible supplier selection choices. This leads to the following two stated hypotheses:

Hypothesis 1a: Mandatory ESG disclosure is associated with a change in a firm's global supply chain composition increasing reliance on suppliers from countries with lower ESG standards.

Hypothesis 1b: Mandatory ESG disclosure is associated with a change in a firm's global supply chain composition increasing reliance on suppliers from countries without mandatory ESG disclosure.

Alternatively, it may also be possible that mandatory ESG disclosure may incentivize firms to improve their ESG profile by encouraging the selection of suppliers with higher ESG-related standards. If so, we would expect to observe a change in a firm's global supply chain composition following mandatory ESG disclosure in favor of new suppliers with higher ESG-related enforcement standards and disclosure policies.

3. DATA AND SAMPLE

3.1. FactSet Revere Supply Chain Relationship Data

We obtain data on supply chain relationships from the FactSet Revere. The dataset covers 157,956 customers around the world comprising over 1,880,141 business relationships dating back to 2003. The supply chain information is collected from 10-Ks/annual reports, investor presentations, websites, press releases, corporate actions, and 10-Q, 8-K filings and is updated on an annual basis. The data uniquely identifies each customer-supplier pair for which we have

information on the supplier, customer, as well as the start and end date of the relationship. FactSet Revere also collects company data that include their location information which allows us to generate a dataset with the geographical distribution of a firm's global supplier network.[5] The data show that our sample is evenly spread across 2003 and 2010 and begins to increase in 2011.

3.2. Environmental Performance Index (EPI) Data

To proxy for the enforcement strength of ESG-related standards, we use the environmental performance index (EPI) scores from the Yale Center for Environmental Law and Policy (YCELP).[6] The data utilizes a proximity-to-target methodology focused on a core set of environmental outcomes linked to policy goals that facilitate cross-country comparisons among economic and regional peer groups of 180 countries. Specifically, EPI derives a score for each of the 180 countries on 32 performance indicators. The indicators span 11 different environmental categories: air quality, sanitation and drinking water, heavy metals, waste management, biodiversity and habitat, ecosystem services, fisheries, climate change, pollution emissions, agriculture, and water resources. Our intuition for the use of the EPI measure is that it captures the institutional environment on environmental regulation and protection at the country-year level. That is, we consider countries with lower EPI to be representative of jurisdictions where immediate economic development-related matters outweigh long-term environment-related considerations.[7]

3.3. RepRisk Datasets

RepRisk provides due diligence data on corporate conduct around ESG-related matters by screening over 90,000 public media sources daily in 20 languages and flags negative ESG-related

[5] We admit that our supply chain data retrieved from the FactSet Revere data does not cover the entirety of customer-supplier relationships as firms do not have the obligation to reveal their complete supplier list. Thus, our sample is likely biased towards supply chain relationships with larger firms. Yet, we also note that this bias likely works against finding an effect.

[6] Details on the EPI framework and the data can be obtained at: https://sedac.ciesin.columbia.edu/data/set/epi-environmental-performance-index-2020.

[7] We admit that the EPI proxy only captures environment-related matters. This is due to the relative ease of the availability of relevant metrics. Environment-related concerns, however, comprise one of the most considerable supply chain risks along with social considerations around ethical sourcing practices. In robustness analyses in Section 6.3, we discuss the robust results using the Social Progress Index as an alternative proxy that considers countries' status on development for basic human needs, foundations of well-being, and opportunity to progress (www.socialprogress.org).

incidents (e.g., environmental degradation, child labor, corruption, etc.). The dataset covers approximately 20,000 publicly listed companies and 160,000 non-listed companies from all sectors and geographies beginning in January 2007.

3.4. Refinitiv Worldscope

The Refinitiv Worldscope Fundamentals data of Thomson Reuters provides annual financial statement information of over 95,000 global listed companies in over 120 countries since 1980. We obtain data on firm-level characteristics and define firm-level variables as follows: *Ln(Asset)* as the natural logarithm of [1 + Raw Total Assets]; *Leverage* ratio as the ratio of total debt to total assets; *ROA* calculated as [Net Income / Total Assets] * 100; *Market-to-Book* ratio as Market Capitalization / (Total Assets - Total Liabilities); *Tangibility* calculated as Property, Plant And Equipment / Total Assets; *Liquidity* calculated as Total Current Assets / Total Current Liabilities; *Sales Growth* calculated as (Current Year's Net Sales or Revenues / Last Year's Total Net Sales or Revenues - 1) * 100; and *Market Share* calculated as the firm's percentage share of sales by all public firms in the same Fama & French 48 industry and in the same country.

3.5. Sample Selection and Descriptive Statistics

We begin by merging the location information from the company level data into the customer-supplier-year level dataset by FactSet Revere. We then merge the EPI scores for customers and suppliers corresponding to each country-year. The final dataset used for our empirical analyses collapses the data to the customer-year level whereby for each customer we calculate the average EPI score of the countries for all suppliers, the number of suppliers that are located in countries with lower (higher) EPI than the location of the customer, the number of suppliers from the same country, and the number of suppliers from countries with (without) mandatory ESG disclosure. After aggregating the supplier information to the firm-year level, we then merge in the Refinitiv Worldscope data for the remaining firm-level characteristics.

Table 1 provides descriptive statistics of all variables used in our empirical analyses which are defined in Appendix A. The final sample comprises 109,741 firm-year observations,

representing 22,890 unique firms. Regarding supply chain characteristics, each customer firm has an average of 11.06 supplier firms. The average total number of suppliers is similar to what has been reported in the prior literature (Gofman et al. [2020], Agca et al. [2021]). We winsorize all continuous variables at 1% and 99% to mitigate the influence of outliers.

(Insert Table 1 about here)

4. EMPIRICAL RESEARCH DESIGN

For our empirical analyses, we exploit the variation of mandatory ESG disclosure in different countries and examine the associated changes in firms' global supply chain composition following the introduction of mandatory ESG disclosure in the country a firm is located. We rely on the mandatory ESG disclosure identification provided in Krueger et al. [2021]. They show that mandatory ESG disclosure is associated with increases in the availability and quality of ESG reports. Furthermore, they also provide empirical evidence for an improvement in the corporate information environment after the introduction of mandatory ESG disclosure based on higher analyst earnings forecast accuracy. A list of all treatment countries with the corresponding introduction year of mandatory ESG disclosure is provided in the Online Appendix. Accordingly, our treatment variable *Mandatory Disclosure* is defined at the country-year level. It is an indicator variable that equals one if the country in which the firm is located has passed a nationwide law or stock exchange requirement for listed companies that mandates ESG disclosure, and zero otherwise. The merged dataset contains firms that are located in 116 countries, and only 29 countries have introduced mandatory ESG disclosure (i.e., become "treated") during our sample period between 2003 and 2021. That is, firms located in the remaining 87 countries serve as "never-treated" controls. Since Australia and France have passed their mandatory ESG disclosure policies as early as 2003, firms located in these two countries are coded as "always-treated."[8]

[8] In unreported tables, we also conduct all analyses on the sample that is limited to the firms in the "ever-treated" countries. We note similar but more significant effects.

Our estimation resembles a staggered difference-in-differences design. We estimate the following model using ordinary least squares (OLS):

$$Y_{i,j,t} = \beta_0 + \beta_1 Mandatory\ Disclosure_{j,t} + \gamma X_{i,t} + \alpha_i + \alpha_t + \varepsilon_{i,j,t} \quad (1)$$

where $Y_{i,j,t}$ assumes different supply chain composition variables from firm i in country j at time t. Specifically, we consider (1) the natural logarithm of the number of *new* suppliers and (2) the fraction of suppliers that categorize supplier types based on ESG-related regulatory and corporate information environment. $Mandatory\ Disclosure_{j,t}$ equals one if country j has passed a mandatory disclosure requirement at time t and zero if otherwise. $X_{i,t}$ denotes the firm-level control variables including *Total Assets*, *Leverage*, *ROA*, *Market-to-book Ratio*, *Tangibility*, *Liquidity*, *Sales Growth* and *Market Share*.[9] α_i and α_t represent firm- and year- fixed effects, respectively. The coefficient of interest is β_1 which measures the effect of mandated ESG disclosure on the firm's supply chain composition. Standard errors are clustered at the country level.

5. EMPIRICAL RESULTS

5.1. Treatment Effects on Supply Chain Composition

The results for our tests of H1a are reported in Table 2. Specifically, in columns 1 through 3 we examine whether the introduction of mandatory ESG disclosure resulted in changes of the number of *new* supplier firms from countries with the same, lower, and higher EPI scores than the customer firm, respectively. The outcome variables capture the extent by which customer firms are more likely to select suppliers located in countries with similar, weaker, and stronger enforcement of ESG-related standards, respectively. These tests directly examine whether customer firms are inclined to expand their supply chain network by adding suppliers from countries with a weaker as opposed to similar and/or stronger ESG-related regulatory environment.

[9] To isolate the impact of mandatory ESG disclosure, we control for firm fundamentals (*Total Assets*, *Leverage*, *Tangibility*, and *Liquidity*) and firm performance (*ROA* and *Market-to-book*) following Krueger et al. [2021]. These variables are also likely to affect our dependent variables of interest (Luo and Nagarajan [2015]). Moreover, because of the theorized impact of sales growth and market share on supply chain (Hendricks and Singhal [2005]), we further control for *Sales Growth* and *Market Share*.

In columns 4 through 6, we consider the fraction of suppliers corresponding to their different local ESG-related enforcement standards out of total suppliers. Unlike focusing merely on the supplier selection decisions of new suppliers, these results, thus, control for the overall size of the supply chain network – thereby, considering the overall supply chain composition that also includes existing suppliers.

The results in Table 2 Panel A lend support for H1a, and suggest that following the introduction of mandatory ESG disclosure firms are more likely to switch their suppliers to the countries in which ESG-related enforcement is weaker. Specifically, the significant negative (positive) coefficient on *Mandatory Disclosure* in column 1 (2) suggests that firms select a lower (higher) number of suppliers from countries with the same (weaker) ESG-related enforcement in response to mandatory ESG disclosure – a change corresponding to about 19%. The results in columns 4 and 5 corroborate that the selection of new suppliers also resulted in a significant supply chain composition change. The estimated coefficients suggest a decrease (increase) of about 8% in terms of the fraction that domestic (lower EPI) suppliers comprise the overall global supply chain. In contrast, we do not find evidence of a change in the selection of suppliers with stronger ESG-related enforcement as shown in columns 3 and 6. These findings confirm that stronger ESG-related standards at supplier firms may comprise a burden in light of elevated ESG-related disclosure standards.

(Insert Table 2 about here)

A perusal of our results on the firm-level control variables suggests that larger firms are more likely to exhibit changes in their supply chain composition (e.g., Wagner and Neshat [2012]). The coefficient on *Total Assets* is positive in columns 1 through 6 except in column 4 where it is significantly negative. The negative coefficient when the *fraction* of suppliers from the same country is considered is consistent with findings from prior literatures that smaller firms are more likely to rely on domestic suppliers and less likely to import their inputs (Oberholtzer et al. [2013]). Moreover, smaller firms are less likely to raise financial capital by issuing debt (Rajan and Zingales

[1995]). Thus, the results on *Leverage* are also consistent with smaller firms being more likely to rely on domestic suppliers, while larger firms are more capable of resorting to global outsourcing practices. Finally, the significantly negative coefficients on *ROA* in columns 1 through 3 suggest that more profitable firms are less likely to select new suppliers. This is consistent with findings in prior literatures that suggest that firms have the greatest incentive to engage actively with their suppliers (e.g., via sharing technologies, knowledge and capabilities) when they are most likely to have an impact on product performance (Tan et al. [1998]). In contrast, the coefficient on *ROA* is not significant in columns 4 through 6 which suggests that profitability does not comprise a significant determinant for a firm's overall supply chain composition.

In Table 2 Panel B, we examine the overall degree of ESG-related enforcement of the firm's newly selected suppliers (column 1), and the firm's overall global supply chain network (column 2) by using the average of EPI scores of the suppliers. As shown by the negative coefficient in both columns, these results provide corroborating evidence that firms' global supply chain subsequent to the introduction of mandatory ESG disclosure reflects an overall deterioration of the ESG-related regulatory environment at their suppliers. Overall, the results in Table 2 collectively suggest that the introduction of mandatory ESG disclosure incentivized firms to shift their supply chain network to countries where ESG-related enforcement is weak.

The results for our tests of H1b are reported in Table 3. These results also suggest that following the introduction of mandatory ESG disclosure, firms hide their ESG-related supply chain activities by switching to suppliers where they are not required to disclose information on their ESG-related activities. Specifically, the significant positive coefficient on *Mandatory Disclosure* in column 1 suggests that firms select a higher number of *new* suppliers from countries without mandatory ESG disclosure – an increase corresponding to about 18%. Similarly, the result in column 3 indicates an increase of about 6% in terms of the fraction that suppliers without mandatory ESG disclosure obligations comprise the overall global supply chain. Overall, these

findings suggest that firms exploit their suppliers' weak corporate information environment to cope with the reputational costs associated with mandatory ESG disclosure.

(Insert Table 3 about here)

In Figure 1, we plot the results from the event study analyses following Sun and Abraham [2021]. The corresponding result tables are reported in the Online Appendix. Panel A (Panel B) reports the results that parallel the analyses in Table 2 Panel A (Table 3) when the dependent variable captures suppliers classified based on their regulatory enforcement environment (corporate information environment). The figures on the left (right) plot the results when the number of new suppliers (fraction) corresponding to each supplier type is considered. Several observations are notable from the dynamic effects relative to the year of mandatory ESG disclosure. First, whereas there is a sudden drop in the number of new and fraction of suppliers from the same country in the years immediately following the introduction of mandatory ESG disclosure, this difference is gradually recovered in the long term. This suggests that decreasing the number of suppliers from the same country likely corresponds to a short-term supply chain strategy to cope with the introduction of mandatory ESG disclosures. Second, the trend for the number of new and fraction of suppliers from lower (higher) EPI countries continues to exhibit an increase (decrease) also into the long-term since the introduction of mandatory ESG disclosures, suggesting longer-lasting changes to firms' supply chain composition due to the policy. Finally, the results in Panel B show that the number of new suppliers from countries without mandatory ESG disclosure continuously increases whereas the number of new suppliers from countries with mandatory ESG disclosure does not. The results on the percentage of suppliers from countries with and without mandatory ESG disclosure are less clear. We note that the percentage of suppliers from countries with (without) mandatory ESG disclosure shows an upward (downward) trend leading up to the introduction of the mandatory ESG disclosure regulations, but that such a trend stops afterward.

(Insert Figure 1 about here)

So far, our results provide empirical evidence consistent with both supply chain strategies – i.e., *expanding* the supplier network by adding new suppliers from such countries with weaker ESG regulatory enforcement and corporate information environment (as documented in the tests using the natural logarithm of the number of new suppliers that belong to each of the two supplier types as the outcome variable) and *switching* from existing suppliers to new suppliers from such countries with weaker ESG regulatory enforcement and corporate information environment (as documented in the tests using the fraction of new and existing suppliers that belong to each of the two supplier types as the outcome variable). To further examine the possibility of the expansion strategy, we conduct additional analyses that use the natural logarithm of the total number of suppliers as the outcome variable in equation (1). Untabulated results suggest that the overall supply chain size is not significantly associated with the introduction of mandatory ESG disclosure. Thus, while our empirical results seem to lend greater support to the switching strategy, we note that both supply chain strategies are not mutually exclusive and are likely operating simultaneously.

5.2. Heterogeneous Treatment Effects on Supply Chain Composition

5.2.1. The Role of Financial Constraints

The corporate finance literature suggests that financial constraints comprise a significant factor in explaining firm dynamics including growth, volatility of growth, job creation, job destruction, and exit (Cooley and Quadrini [2001]). Financial constraints arise due to frictions in the supply of capital, primarily due to information asymmetries between investors and the firm, and research shows that financially-constrained firms exhibit different firm behaviors including corporate investment (e.g., Rauh [2006], Almeida and Campello [2007], Duchin et al. [2010]), and entrepreneurship (e.g., Kerr and Nanda [2009]). Financial constraints and cost reduction considerations often affect how firms choose suppliers, including from whom to outsource. Accordingly, we posit that the extent by which firms adjust their supply chain practices in response to mandatory ESG disclosure as documented in Table 2 and Table 3 may vary depending on their financial constraints. In fact, prior research documents consistent evidence that financially-

constrained firms exhibit differences when coping with heightened regulatory compliance costs. For example, exploiting the cap-and-trade program implemented in California that universally applied to all industrial greenhouse gas emissions, Bartram et al. [2022] show that financially constrained firms shifted emissions from California to other states, while unconstrained firms did not.

To examine whether firms' financial constraints pose a significant factor in how firms adjust their supply chain practices in response to mandatory ESG disclosure, we explore heterogeneous treatment effects depending on firms' financial constraints. We rely on prior literature to measure firms' financial constraints by constructing the KZ-Index (Kaplan and Zingales [1997]) following Lamont et al. [2001]. A higher KZ index value captures higher reliance on external financing, thus, a higher likelihood of experiencing difficulties in financing ongoing operations when financial conditions tighten. Specifically, we include an interaction term between *Mandatory Disclosure* and *KZ Index* in equation (1). The results of these analyses are reported in Table 4. Consistent with expectations that financially-constrained firms exhibit heightened pressures to enhance their ESG profile by adjusting their supply chain practices, the results suggest that firms with greater financial constraints are more likely to shift their ESG-related obligations away from suppliers with similar levels of ESG-related enforcement (column 1) by choosing new suppliers from countries with weak levels of ESG-related enforcement (column 2). Moreover, the results in column 4 also suggest that firms with greater financial constraints are more likely to choose new suppliers from countries without mandatory ESG disclosure requirements, thus, hiding their ESG-related supply chain activities.[10]

(Insert Table 4 about here)

5.2.2. The Role of External Governance Mechanisms

[10] We note that all our results on the heterogeneous treatment effects reported in Tables 4 through 7 are robust to using the overall supply chain composition that includes existing suppliers (i.e. the fraction of suppliers corresponding to each supplier type).

We also explore whether the main treatment effects documented in Table 2 and Table 3 vary depending on factors that have been shown to influence firms' corporate governance practices: enforcement strength by regulatory bodies, analyst coverage, and institutional ownership.

5.2.2.1. Enforcement Strength

Prior research suggests that enforcement strength by regulatory bodies can significantly impact corporate governance oversight (e.g., Kedia and Rajgopal [2011]). Accordingly, we expect that firms' propensity to evade and/or hide ESG-related obligations to their suppliers is less pronounced when firms are subject to stronger legal enforcement. To examine this conjecture, we use the rule of law index provided by World Governance Indicators (WGI) provided by the World Bank.[11] Specifically, we include an interaction term between *Mandatory Disclosure* and *Rule of Law Index* in equation (1) that captures the heterogeneous treatment effect depending on the strength of legal enforcement for the country in which a firm is located. The results of the analyses are tabulated in Table 5. Column 1 documents a further decrease of about 7% in the number of suppliers from countries with similar levels of ESG-related enforcement for each unit increase in the rule of law index after the introduction of mandatory ESG disclosure. Moreover, column 2 documents an increase of about an 18% increase in the number of suppliers from countries with lower levels of ESG-related enforcement for each unit increase in the rule of law index. Consistent with the earlier results for the main treatment effects, the propensity to switch to suppliers from countries with higher levels of ESG-related enforcement is insignificant. Finally, the results in columns 4 and 5 when focusing on suppliers with and without mandatory ESG disclosure requirements also confirm the important role of legal enforcement. Each unit increase in the rule of law index suggests an increase of about 11% in the number of new suppliers from countries without mandatory ESG disclosure requirements. However, the interaction effect remains insignificant when considering suppliers from countries with mandatory ESG disclosure

[11] Skaaning [2010] compares seven commonly-used rule of law indexes and concludes that WGI measures legal compliance while other indices focus on legal equality. The WGI index captures perceptions of the extent by which agents have confidence in and abide by the rules of society, especially with regard to contract enforcement, property rights, the police, and the court. Biglaiser and Staats [2012], for example, use the WGI index and document significant positive effects with bond ratings.

requirements. Overall, these cross-sectional results provide further corroborating evidence for our hypotheses by showing that firms' supply chain migration activities are significantly impacted by the level of regulatory enforcement of the introduction of mandatory ESG disclosure.

(Insert Table 5 about here)

5.2.2.2. Analyst Coverage

Research suggests that analyst following can serve as effective external monitors by mitigating agency problems between firm insiders and outsiders. For example, studies show that higher analyst coverage is associated with fewer earnings management activities (Yu [2008]), stock crash risks (Kim et al. [2019]), and management compensation (Chen et al. [2015]). Consistent with the external monitoring hypothesis, we, thus, expect that firms' propensity to evade and/or hide ESG-related obligations to their suppliers following mandatory ESG disclosure will be less pronounced for firms that have greater analyst coverage. To test this conjecture, we use the number of analysts who made forecasts about firms' earnings in a specific year in the I/B/E/S database, and construct the variable *Residual Coverage* following Yu [2008] by estimating the residual of the regression that controls for firm size, past performance, growth, external financing activities, and volatility of business (Bhushan [1989], Dechow and Dichev [2002], Kasznik [1999]). The results of the first-stage estimation are shown in the Online Appendix.[12] Table 6 presents the results of analyses that include an interaction term between *Mandatory Disclosure* and *Residual Coverage* in equation (1). The interaction term is significantly negative in columns 2 (4) which suggests that firms with higher analyst coverage are less likely to choose new suppliers from countries with weaker ESG-related enforcement (without mandatory ESG disclosure) in response to the introduction of mandatory ESG disclosure. Collectively, these results corroborate the role of analysts as external monitors by showing that firms' propensity to evade and/or hide ESG-related obligations to their suppliers following mandatory ESG disclosure is less pronounced for firms that have greater analyst coverage.

[12] We note that our results are robust to using the raw number of *Analyst Coverage*, instead of *Residual Coverage.*

(Insert Table 6 about here)

5.2.2.3. Institutional Ownership

Prior literature has documented that institutional ownership is positively associated with management conservatism (Ramalingegowda and Yu [2012]), corporate governance (Chung and Zhang [2011]), and innovation (Aghion et al. [2013]). Recent years have seen an increasing demand for sustainability principles in asset management by institutional investors (e.g., Krueger et al. [2020]). For example, in 2020, the United States Forum for Sustainable and Responsible Investment (USSIF) reports $16.6 trillion of assets under management according to sustainable and responsible investment principles with significant representation by institutional investors. This constitutes an increase by more than 8 times since 2003, the beginning of our sample period.[13] Accordingly, we expect that the likelihood for firms to engage in unethical supply chain activities in response to mandatory ESG disclosure will be less pronounced for firms with higher institutional ownership. To examine this conjecture, we include an interaction term between *Mandatory Disclosure* and *Institutional Ownership* in equation (1) that captures the heterogeneous treatment effect depending on the fraction of shares held by institutional investors. The results of the analyses are tabulated in Table 7. The interaction term in column 1 of Table 7 reveals that firms with higher institutional ownership are less likely to decrease the number of new suppliers from countries with the same levels of ESG-related enforcement in response to mandatory ESG disclosure compared to firms with lower institutional ownership. The results also suggest that such firms are less likely to evade ESG-related obligations by choosing new suppliers from countries with weak levels of ESG-related enforcement (column 2) and hide ESG-related obligations by choosing new suppliers from countries without mandatory ESG disclosure requirements (column 4). Collectively, these results corroborate the role of institutional investors as external monitors when faced with elevated reputational costs from mandated ESG disclosures.

(Insert Table 7 about here)

[13] The full report can be accessed here: https://www.ussif.org/currentandpast.

5.3. Effects of the Supply Chain Migration Strategy

5.3.1. ESG Performance Profile

Our results so far suggest that mandatory ESG disclosure is associated with changes in firms' supply chain practices whereby firms either allocate their ESG-related obligations to suppliers in countries that face lower ESG-related enforcement and/or hide their ESG-related supply chain activities by choosing suppliers subject to less ESG-related disclosure requirements. In this section, we explore whether firms that adjusted their supply chain practices in response to the introduction of mandatory ESG disclosure were indeed successful in creating an enhanced ESG profile. To do so, we examine changes in the number of reported ESG-related incidents of firms that adjusted their supply chain practices in response to mandatory ESG disclosure. We use data from RepRisk to capture the number of ESG risk events in a firm-year (*ESG incidents*).[14]

We report the results of these analyses in Table 8. We begin with examining the main treatment effects associated with mandatory ESG disclosure on reported ESG-related incidents in columns 1 and 2. Ex-ante, it is unclear whether mandatory ESG disclosure should have an effect on the number of reported ESG-related incidents. Elevated *disclosure* requirements alone should not have an impact unless they are accompanied by enhanced regulatory ESG-related enforcement efforts and/or public scrutiny on firms' reported ESG performance. For example, in the case of the former, we would expect higher numbers of ESG incidents when mandatory ESG disclosure is also reflective of enhanced ESG-related monitoring that can uncover many ESG events that were previously unrecognized. On the contrary, the number of reported ESG incidents may also decrease if firms invest in improving their ESG performance or engage in activities that can boost their ESG profile – one of such strategies being via the adjustment to their supply chain practices as we document in our earlier analyses. Overall, as shown by the negative coefficient on *Mandatory Disclosure*, our results suggest that the introduction of mandatory ESG disclosure

[14] RepRisk evaluates the potential impacts of ESG events based on the novelty and severity of an incident. RepRisk uses two indicators to classify ESG events: *Primary* and *All*. *Primary* indicates negative ESG events directly associated with the corresponding firm, while *All* maps the events to the hierarchical structure of a corporate group. We rely on the indicator *All* in the construction of the variable ESG incidents that is used in the reported analyses.

resulted in a decrease in reported ESG incidents.

(Insert Table 8 about here)

To the extent that some of the decreases in reported ESG incidents can be attributed to firms' supply chain migration strategies, we expect to observe a larger decrease for firms that engaged in such supply chain practices in response to the introduction of mandatory ESG disclosure. Columns 3 through 6 examine this conjecture. The interaction term between *Mandatory Disclosure* and *Migration to Lower EPI Countries*, a dummy indicating whether a firm's propensity to choose new suppliers from lower EPI countries increases within three years after mandatory ESG disclosure, is negative and significant.[15] Similarly, the interaction term between *Mandatory Disclosure* and *Migration to Countries without Mandatory ESG Disclosure*, a dummy indicating whether a firm's propensity to choose new suppliers from countries without mandatory ESG disclosure increases within three years after mandatory ESG disclosure, is also negative and significant.[16] Collectively, these results provide corroborating evidence that the lower number of reported ESG incidents from the introduction of mandatory ESG disclosure can partially be explained by firms engaging in supply chain practices to evade and/or hide their ESG-related obligations.[17]

5.3.2. Cost Savings

Rather than the introduction of mandatory ESG disclosure per se, one may argue that the changes in firms' supply chain practices are due to firms facing higher operating costs to comply with higher ESG-related demands from various stakeholders (which is likely correlated with the passage of mandatory ESG disclosure policies). That is, firms may invest more in internal systems to track and monitor compliance with ESG-related standards of their internal business operations

[15] 22.9% of firms exhibit an increase in the supply chain composition towards suppliers with lower EPI than the focal customer firm within 3 years after the disclosure law.

[16] 26.5% of firms exhibit an increase in the supply chain composition towards suppliers without mandatory ESG disclosure within 3 years after the disclosure law.

[17] In untabulated tests, we also perform all analyses by using the Primary indicator in RepRisk in the construction of the variable ESG incidents. Whereas the coefficient on *Mandatory Disclosure* is insignificant, the coefficient on the interaction term remains significantly negative.

which in turn may pressure them to seek out cheaper suppliers. To examine this possibility, we examine whether the introduction of mandatory ESG disclosure resulted in lower profit margins using the Cost of Goods Sold (COGS) ratio that divides COGS by total sales revenue. The results in column 1 of Table 9 document an increase in the COGS ratio of 6.788% after the introduction of mandatory ESG disclosure suggesting that the policies were also associated with an overall higher operating cost burden for firms. In columns 2 and 3 of Table 9, we further examine whether changes in profit margins exhibit variation depending on firms adjusting their supply chain practices in response to mandatory ESG disclosure. If the cost channel explains firms' supply chain practices, we would expect that firms adjusting their supply chain practices in response to mandatory ESG disclosure would enjoy cost reductions by doing so. As shown by the insignificant coefficient on the interaction terms, our results do not support the cost channel as a primary driver that explains firms' changing supply chain practices. Instead, these results support the explanation that firms tend to evade and/or hide their ESG-related obligations to their suppliers in response to mandatory ESG disclosure. In columns 4 through 6, we repeat the analyses by using the Selling, General, and Administrative Expense (SG&A) ratio as the dependent variable. Unlike in column 1, the results do not suggest a significant increase in SG&A. This suggests that manufacturing firms facing relatively higher ESG-related concerns were more likely affected by the mandatory ESG disclosure policies than service firms. Similar to the results in columns 2 and 3, the coefficient on the interaction terms is insignificant which yields further support that our results cannot be solely driven by the cost channel as a primary driver that explains firms' supply chain migration activities.

(Insert Table 9 about here)

We also note that the results showing insignificant differences of firms' operating costs in columns 2, 3, 5, and 6 between firms engaging in supply chain migration strategies are consistent with the switching rather than the expansion strategy. While firms may enjoy cost savings by expanding the supplier network to new (also potentially lower-cost) suppliers from countries with

a weaker ESG-related regulatory and corporation information environment because it provides them with the flexibility to adjust to lower-cost supply chain outsourcing configurations especially in the longer-term, switching mostly from domestic to international suppliers is not associated with such flexibility. That is, if the expansion strategy would be dominant, we may also observe significantly lower operating costs for firms that engage in either of the two supply chain migration strategies (i.e., reflected in a significant negative coefficient on the interaction terms) which we do not find in our empirical analyses.

6. ROBUSTNESS TESTS

6.1. Mandatory ESG Disclosure Treatment Years Mentioning Supply Chains

In our main tables, we rely on the mandatory ESG disclosure identification provided in Krueger et al. [2021] to test our hypotheses. This is consistent with our intention to capture treatment years in which the salience for ESG issues heightened, and firms experienced pressures to increase disclosure on their ESG-related activities. Admittedly, these treatment years exhibit significant variation in terms of their coverage of firms, type and scope of targeted information, and level of enforcement. To sharpen the treatment year indicators around the implementation of mandatory ESG disclosures that heightened ESG awareness that specifically involved supply chains, we recode the *Mandatory Disclosure* indicator based on the policies that explicitly mentioned supply chains (i.e., *Mandatory Supply Chain Disclosure*). We re-estimate all main treatment and heterogenous treatment effects based on this indicator and demonstrate the robustness of our findings to the alternative classification of treatment years that specifically entails supply chain related ESG policies.

Moreover, we also perform additional heterogeneous treatment effects analyses to examine the *incremental* impact of mandatory ESG policies that explicitly mention supply chain related considerations. Specifically, we limit the estimation sample to the 29 countries that have passed mandatory ESG disclosure, and include an interaction term between *Mandatory Disclosure* and

Mandatory Supply Chain Disclosure. The results show a significant negative coefficient on the interaction term suggesting that mandatory ESG disclosures that entail explicit supply chain related guidelines further mitigate firms' supply chain migration strategies. All additional analyses discussed in this section are tabulated in the Online Appendix.

6.2. Controlling for Voluntary ESG Disclosure

Unlike voluntary information disclosures, we argue that *mandatory* information disclosure regulations are associated with pressures for firms to manage their overall ESG profile. If so, we should expect to see a smaller effect for the introduction of voluntary ESG information disclosure guidelines as it is presumably relatively more costly for firms to engage in supply chain re-configuration strategies than committing to information disclosures. To test this conjecture, we rely on the treatment year classifications from Carrots and Sticks that also distinguishes between the implementation of mandatory and voluntary ESG reporting years for each country.[18] The results are reported in the Online Appendix, and we highlight two notable findings. First, our main effects remain robust to using the mandatory ESG disclosure year treatment classifications only relying on the classifications suggested by Carrots and Sticks. Second, we do not find strong evidence that firms engage in altering their supply chain strategies following the introduction of voluntary ESG disclosures. Firms do not exhibit a significant switching behavior whereby they decrease the number of new domestic suppliers and increase the number of new suppliers from countries with lower ESG enforcement standards. While the results show an increase in the number of suppliers from countries without mandatory ESG disclosure following voluntary ESG disclosures, the effect size is more than three times smaller than that for the implementation of mandatory ESG disclosures.

Firms may also disclose information voluntarily even in the absence of the implementation of any voluntary or mandatory ESG disclosure guidelines. Prior research shows that institutional investors actively engage firms in order to improve their voluntary ESG disclosures and document

[18] https://www.carrotsandsticks.net/

robust evidence of a positive association between voluntary ESG disclosure and institutional ownership (e.g., Ilhan et al. [2021], Krueger et al. [2021]). In that regard, our results in Table 7 can also serve as robustness analyses that the pressures introduced due to *mandatory* ESG disclosures are associated with changes in supply chain configurations even after controlling for firm-year variation in the level of ESG information communication with external stakeholders.

6.3. Alternative Measures for EPI

To proxy for countries with higher/lower levels of ESG engagement, we rely on the environmental performance index (EPI) scores from Yale Center for Environmental Law and Policy (YCELP) in our main tables. However, we also use two alternative measures and corroborate the robustness of our findings. First, we re-estimate Table 2 using the social progress index (SPI) measure from the Social Progress Imperative to capture the social and environmental outcomes of nations.[19] Second, the results remain similar in untabulated tests when we use the definition provided by the IMF that classifies the 40 advanced countries.[20] Our assumption for using this alternative classification rests on the idea that economic development is positively correlated with social awareness about ESG issues. In less advanced countries, the demand for economic development is likely to exceed potential ESG risks stemming from firms' supply chain practices. As a result, establishing supplier relationships in under-developed countries may facilitate firms to "exploit" less regulated local environmental and social conditions. That is, an alternative interpretation of our results is that firms tend to shift supplier relationships located in advanced countries to less advanced countries.

6.4. Bias in Staggered Difference-in-Difference Research Designs

We address the potential biases of staggered difference-in-differences regression estimators mentioned in prior literatures. First, the results of our event study analyses in Figure 1 Panel A show a lack of pre-trends in that we find no statistically significant coefficient before the year

[19] The Social Progress Index combines 54 indicators in dimensions of basic human needs, foundations of well-being, and opportunity to progress. The SPI data can be accessed through: www.socialprogress.org.

[20] https://www.imf.org/en/Publications/WEO/weo-database/2021/October/select-countries?grp=110&sg=All-countries/Advanced-economies

introducing ESG disclosure policies, but statistical significance on and after the introduction. Second, we also repeat our analyses using the Callaway and Sant'Anna estimator (Callaway and Sant'Anna [2021]) which are reported in the Online Appendix and show that our results remain robust.

7. CONCLUSION

We document that mandatory ESG disclosure is associated with changes in firms' supply chain composition. Specifically, we show that while firms select a smaller number of new suppliers located in the same country, they select a larger number of suppliers located in countries with lower levels of ESG-related enforcement following the introduction of mandatory ESG disclosure. Moreover, we also document that firms tend to select a larger number of suppliers located in countries without mandatory ESG disclosures. These findings are consistent with mandatory ESG disclosures leading firms to manage their overall ESG profile. That is, in order to evade and/or hide their ESG-related obligations that firms are forced to publicly communicate due to the implementation of mandatory ESG disclosures, they decide to engage in supply chain migration strategies that transfer the ESG-related risks to supplier firms located in countries with weaker ESG-related enforcement and corporate information environments. This strategy is not a pure cost saving decision. Further findings show that such supply chain migration strategies following mandatory ESG disclosures are mitigated with financial intermediaries such as analysts and institutional investors acting as external monitors. Finally, our evidence indicates that the migration strategy of supply chains partially explains the reduction of reported ESG incidents following the introduction of mandatory ESG disclosure.

Overall, our findings suggest that mandatory ESG disclosure policies can have long-lasting real effects in changing firms' global outsourcing practices. Our research, thus, sheds light on one important means by which firms may react to the introduction of mandatory ESG disclosure – i.e., by adjusting their global supply chains.

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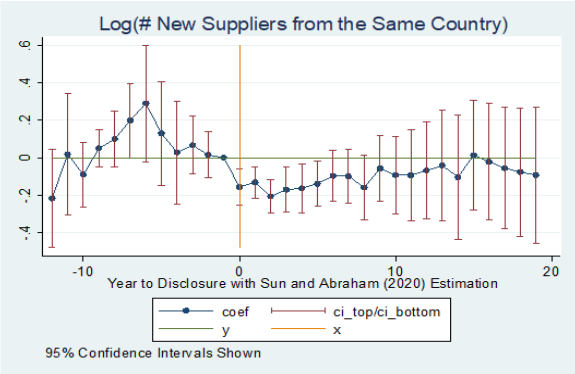
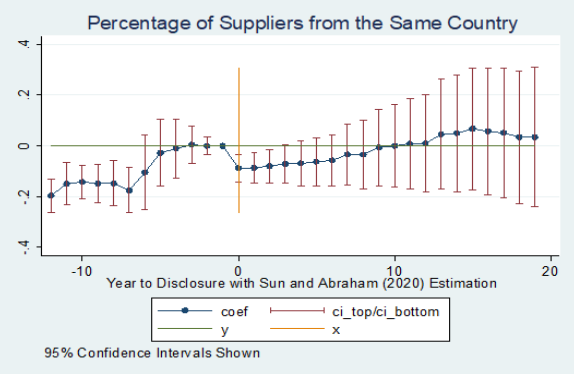
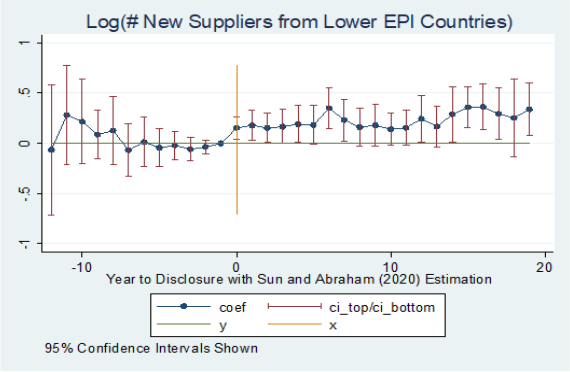
Figure 1. Dynamic Effects of Mandatory ESG Disclosure

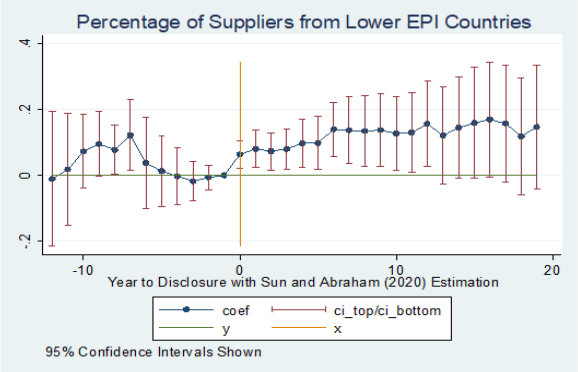
This figure shows the dynamic changes of coefficients with respect to the year to disclosure. Year to disclosure is defined as the time difference by subtracting the current year from the disclosure year. *g_0* represents the year that introduces the mandatory ESG disclosure, while *g_mk* represents *k* years prior to the ESG mandates (where k = 2, 3, …, 11, 12+), and *g_j* represents *j* years after the ESG mandates (where *j* = 1, 2, 3, …, 17, 18, 19+).

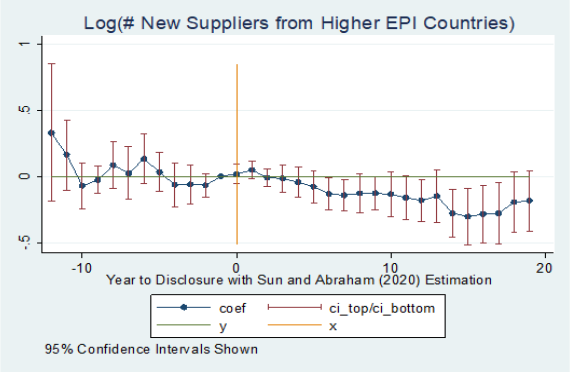
Panel A: Suppliers' Regulatory Enforcement Environment

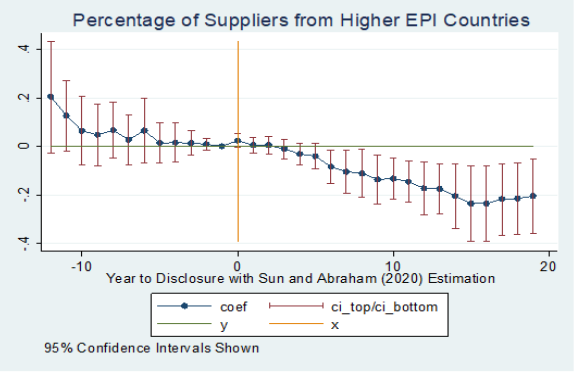




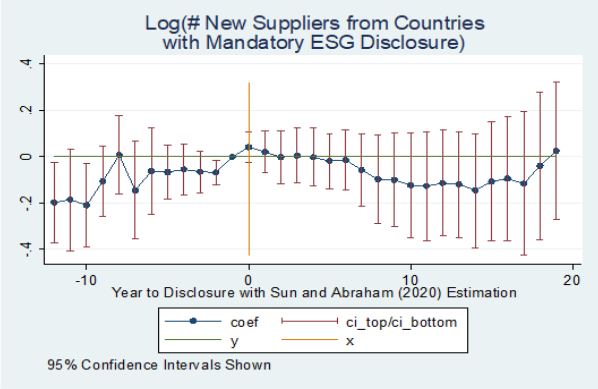


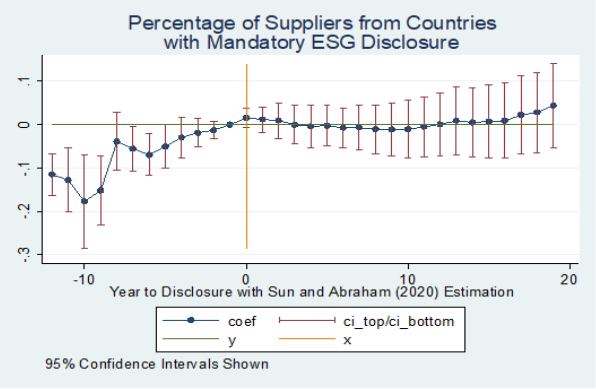


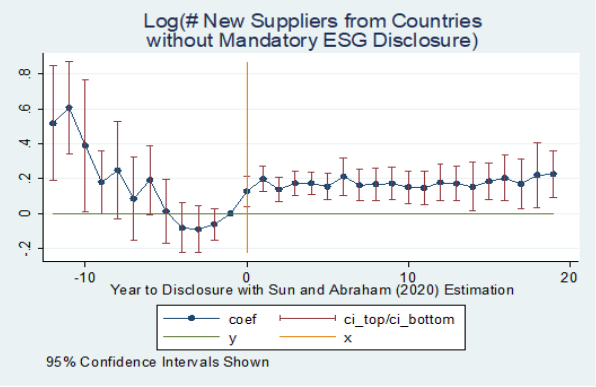




Panel B: Suppliers' Corporate Information Environment







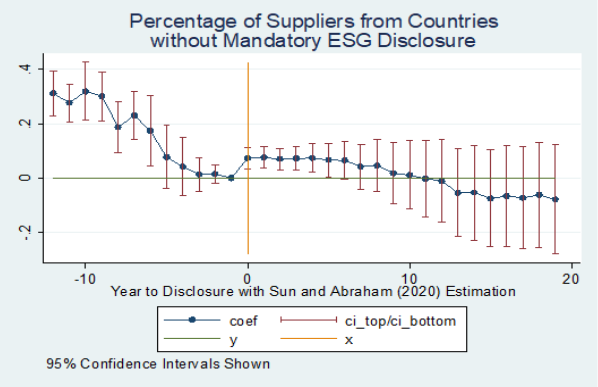


Table 1: Descriptive Statistics

This table contains summary statistics for the key variables used in all subsequent estimations. Definitions of variables are in Appendix A.

	Obs	Mean	Std Dev	5%	Median	95%
Dependent Variables						
Cost of Goods Sold / Sales	98,005	61.5	24.4	13.4	66.0	92.4
EPI of New Suppliers' Country	90,886	63.6	13.3	33.7	67.8	77.7
EPI of Suppliers' Country	109,230	63.4	13.3	33.4	67.3	77.2
Log(# ESG Incidents)	48,665	0.64	0.95	0	0	2.71
Log(# New Suppliers from Advanced Countries)	109,741	2.33	7.74	0	0	9.00
Log(# New Suppliers from Countries with Mandatory ESG	109,741	0.37	0.67	0	0	1.79
Log(# New Suppliers from Countries without Mandatory ESG	109,741	0.55	0.78	0	0	2.20
Log(# New Suppliers from Developing Countries)	109,741	0.71	3.49	0	0	3.00
Log(# New Suppliers from Higher EPI Countries)	109,741	0.48	0.73	0	0	1.95
Log(# New Suppliers from Higher SPI Countries)	93,367	0.43	0.71	0	0	1.95
Log(# New Suppliers from Lower EPI Countries)	109,741	0.38	0.73	0	0	1.95
Log(# New Suppliers from Lower SPI Countries)	93,367	0.37	0.73	0	0	1.95
Log(# New Suppliers from the Same Country)	109,741	0.76	0.84	0	0.69	2.40
Log(# Novel ESG Incidents)	48,665	0.42	0.65	0	0	1.79
Percentage of Suppliers from Advanced Countries	109,741	0.38	0.39	0.00	0.25	1.00
Percentage of Suppliers from Countries with Mandatory ESG	109,741	0.15	0.27	0	0	1
Percentage of Suppliers from Countries without Mandatory ESG	109,741	0.32	0.37	0	0.17	1
Percentage of Suppliers from Developing Countries	109,741	0.10	0.23	0.00	0.00	0.67
Percentage of Suppliers from Higher EPI Countries	109,741	0.27	0.36	0	0	1
Percentage of Suppliers from Higher SPI Countries	93,367	0.22	0.34	0	0	1
Percentage of Suppliers from Lower EPI Countries	109,741	0.20	0.32	0	0	1
Percentage of Suppliers from Lower SPI Countries	93,367	0.17	0.31	0	0	1
Percentage of Suppliers from the Same Country	109,741	0.53	0.41	0	0.54	1
Selling, General & Administrative Expense / Sales	100,972	31.5	72.9	3.19	17.3	70.9
SPI of New Suppliers' Country	77,231	82.3	9.45	61.3	86.6	90.4
SPI of Suppliers' Country	89,389	82.2	9.53	60.5	86.6	90.1
Independent Variables						
Analyst Coverage	109,741	5.60	6.94	0	2.83	20.3
Institutional Ownership	76,053	24.1	29.2	0.10	10.9	90.2
KZ Index	72,762	-2.47	5.99	-21.0	-0.28	2.54
Mandatory Disclosure	109,741	0.35	0.48	0	0	1
Rule of Law	106,031	1.09	0.78	-0.41	1.51	1.83
Control Variables						
Cash Flow Volatility	106,400	6.69	7.20	1.01	4.30	21.0
External Financing	107,690	3.08	14.2	-10.2	0	28.1
Leverage	109,741	24.0	20.7	0	21.3	61.5
Liquidity	109,741	2.29	2.25	0.56	1.62	6.38
Market Share	109,741	8.12	19.4	0.01	0.73	52.8
Market-to-Book	109,741	1.35	1.61	0.14	0.81	4.49
ROA	109,741	-0.15	17.5	-29.3	3.14	15.2
Sales Growth	109,741	9.18	34.0	-28.8	4.72	54.9
Tangibility	109,741	29.2	23.5	1.60	23.5	76.8
Total Assets	109,741	20.4	1.97	17.2	20.4	23.7

Table 2: Mandatory ESG Disclosure and Suppliers' Regulatory Enforcement Environment

This table reports the effect of introducing mandated ESG disclosure policies on firms' supply chain composition change based on the EPI of the country suppliers are located in. Panel A either uses the natural logarithm of the number of suppliers corresponding to each supplier type or the corresponding fraction. Panel B uses the average economic development status of all suppliers. *Log(# New Suppliers)* is the natural logarithm of the total number of new suppliers located in each of the different types of countries compared to the customer firms. *Percentage of Suppliers* is the fraction of suppliers in each of the different types of countries over the total number of suppliers. *Average EPI of New Suppliers' Country* is the average of EPI scores of new suppliers' countries of a given customer firm. *Mandatory Disclosure* is a dummy variable that equals one if a mandated disclosure policy has been introduced. Controls include *Total Assets*, *Leverage*, *ROA, Market-to-Book* ratio, *Tangibility*, *Liquidity*, *Sales Growth*, and *Market Share*. Definitions of variables are in Appendix A. Firm fixed effects and year fixed effects are controlled in all columns. The standard errors clustered at the country level are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%, respectively.

Panel A. Number of Suppliers

	(1) Log(# New Suppliers from the Same Country)	(2) Log(# New Suppliers from Lower EPI Countries)	(3) Log(# New Suppliers from Higher EPI Countries)	(4) Percentage of Suppliers from the Same Country	(5) Percentage of Suppliers from Lower EPI Countries	(6) Percentage of Suppliers from Higher EPI Countries
Mandatory Disclosure	-0.193***	0.192**	0.0284	-0.0809*	0.0786***	0.00167
	(0.053)	(0.076)	(0.041)	(0.045)	(0.030)	(0.028)
Total Assets	0.0918***	0.0461***	0.0866***	-0.0211***	0.00703	0.0135***
	(0.025)	(0.010)	(0.010)	(0.005)	(0.005)	(0.003)
Leverage	-0.00117***	0.000690**	0.000636***	-0.000698***	0.000327*	0.000353***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA	-0.00109***	-0.000433***	-0.000593***	1.50e-05	-5.25e-05	2.63e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-Book Ratio	-0.000249	0.00301	0.00212	-0.00313	0.000694	0.00181
	(0.006)	(0.002)	(0.003)	(0.002)	(0.001)	(0.002)
Tangibility	-5.18e-06	0.000217	0.000283	-9.43e-05	7.28e-05	2.89e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-0.00376*	0.000459	-0.00251*	0.000646	0.000970	-0.00146***
	(0.002)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)
Sales Growth	6.07e-05	-3.26e-05	1.10e-05	6.67e-05*	-8.33e-05**	2.04e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	-0.000897	-0.000707	-0.000744	-0.000638***	-0.000183	-0.000279
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Cluster at Country	Yes	Yes	Yes	Yes	Yes	Yes
Observations	109,741	109,741	109,741	109,741	109,741	109,741
R-squared	0.750	0.757	0.692	0.802	0.793	0.787

Panel B. Average EPI of Suppliers

	(1)	(2)
	EPI of New Suppliers' Country	EPI of Suppliers' Country
Mandatory Disclosure	-1.821*	-1.756**
	(0.937)	(0.797)
Total Assets	0.280***	0.250**
	(0.098)	(0.105)
Leverage	0.000306	-0.000455
	(0.003)	(0.002)
ROA	-0.00196	-0.00125
	(0.002)	(0.002)
Market-to-Book Ratio	-0.0713	-0.0292
	(0.073)	(0.066)
Tangibility	-0.00231	-0.00359
	(0.005)	(0.005)
Liquidity	-0.0551**	-0.0666***
	(0.024)	(0.020)
Sales Growth	0.00117	0.000808
	(0.001)	(0.001)
Market Share	0.0155	-0.00157
	(0.011)	(0.007)
Constant	Yes	Yes
Firm Dummy	Yes	Yes
Year Dummy	Yes	Yes
Cluster at Country Level	Yes	Yes
Observations	90,886	109,230
R-squared	0.792	0.851

Table 3: Mandatory ESG Disclosure and Suppliers' Corporate Information Environment

This table reports the effect of introducing mandated ESG disclosure policies on firms' supply chain composition change based on the ESG-related corporate information environment of the country suppliers are located in. The dependent variables are the natural logarithm and composition of new suppliers from countries with/without mandatory ESG disclosure. The independent variable of interest is *Mandatory Disclosure*, which equals one in the years after the implementation of mandatory ESG disclosure and zero otherwise. The control variables include *Total Assets, Leverage, ROA, Market-to-Book Ratio, Tangibility, Liquidity, Sales Growth,* and *Market Share*. All variables are defined in Appendix A. Firm fixed effects and year fixed effects are controlled in all columns. The standard errors clustered at the country level are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%, respectively.

	(1) Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	(2) Log(# New Suppliers from Countries with Mandatory ESG Disclosure)	(3) Percentage of Suppliers from Countries without Mandatory ESG Disclosure	(4) Percentage of Suppliers from Countries with Mandatory ESG Disclosure
Mandatory Disclosure	0.186***	0.0555	0.0627**	0.0182
	(0.043)	(0.058)	(0.031)	(0.020)
Total Assets	0.0763***	0.0653***	0.0188***	0.00231
	(0.015)	(0.009)	(0.006)	(0.003)
Leverage	0.000660***	0.000849***	0.000504***	0.000194**
	(0.000)	(0.000)	(0.000)	(0.000)
ROA	-0.000624***	-0.000485**	-2.80e-05	1.30e-05
	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-Book Ratio	0.000969	0.00481*	0.00240	0.000732
	(0.003)	(0.003)	(0.002)	(0.001)
Tangibility	-3.73e-05	0.000700**	-0.000134	0.000228
	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-0.00243*	-0.000542	-0.000810	0.000164
	(0.001)	(0.001)	(0.001)	(0.001)
Sales Growth	-1.70e-05	-4.34e-05	-8.70e-05**	2.03e-05
	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	0.000668	0.00147	-1.62e-05	0.000654***
	(0.001)	(0.001)	(0.000)	(0.000)
Constant	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes
Cluster at Country Level	Yes	Yes	Yes	Yes
Observations	109,741	109,741	109,741	109,741
R-squared	0.723	0.724	0.754	0.726

Table 4: Heterogeneous Treatment Effect by Financial Constraints

This table reports the heterogeneous effect of introducing mandated ESG disclosure policies on firms' supply chain composition change depending on the extent of firms' financial constraint. Columns 1-3 correspond to firms' supply chain composition change based on the EPI of the country suppliers are located in (i.e., Table 2). Columns 4 and 5 correspond to supply chain composition changes based on the ESG-related corporate information environment (i.e., Table 3). *Mandatory Disclosure* is a dummy variable that equals one if a mandated disclosure policy has been introduced. *KZ Index* is a Kaplan-Zingales index is based on the Kaplan-Zingales [1997] paper on financing constraints. Controls include *Total Assets*, *Leverage*, *ROA, Market-to-Book* ratio, *Tangibility*, *Liquidity*, *Sales Growth*, and *Market Share*. All variables are defined in Appendix A. Firm fixed effects and year fixed effects are controlled in all columns. The standard errors clustered at the country level are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%, respectively.

	(1) Log(# New Suppliers from the Same Country)	(2) Log(# New Suppliers from Lower EPI Countries)	(3) Log(# New Suppliers from Higher EPI Countries)	(4) Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	(5) Log(# New Suppliers from Countries with Mandatory ESG Disclosure)
Mandatory Disclosure	-0.00430**	0.00425***	0.00424	0.00735**	0.00236
* KZ Index	(0.002)	(0.002)	(0.004)	(0.004)	(0.002)
Mandatory Disclosure	-0.165**	0.216**	0.0619	0.227***	0.0920
	(0.067)	(0.085)	(0.045)	(0.057)	(0.056)
KZ Index	0.00181	-0.00259	-0.00196	-0.00224	-0.00255
	(0.001)	(0.002)	(0.003)	(0.002)	(0.002)
Total Assets	0.120***	0.0367*	0.0865***	0.0698***	0.0644***
	(0.027)	(0.021)	(0.021)	(0.026)	(0.022)
Leverage	-0.00179***	0.00106	0.000849***	0.000934***	0.00131***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
ROA	-0.00156***	-0.000637***	-0.000746***	-0.000704**	-0.000727***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-Book Ratio	-0.00936*	0.00223	-0.000976	-0.000193	0.00326
	(0.006)	(0.003)	(0.004)	(0.004)	(0.004)
Tangibility	-0.000925**	-0.000407	-0.000408	-0.000656	0.000140
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-0.00501**	-0.000474	-0.00732***	-0.00475***	-0.00468**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Sales Growth	8.02e-05	-4.16e-05	-4.11e-05	-2.00e-05	-0.000115**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	-0.00121	-0.00141	-0.000911	0.000830	0.00155*
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Constant	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes
Cluster at Country Level	Yes	Yes	Yes	Yes	Yes
Observations	72,762	72,762	72,762	72,762	72,762
R-squared	0.773	0.780	0.723	0.753	0.762

Table 5: Heterogeneous Treatment Effect by Legal Enforcement

This table reports the heterogeneous effect of introducing mandated ESG disclosure policies on firms' supply chain composition change depending on the extent of firms' legal enforcement. Columns 1-3 correspond to firms' supply chain composition change based on the EPI of the country suppliers are located in (i.e., Table 2). Columns 4 and 5 correspond to supply chain composition changes based on the ESG-related corporate information environment (i.e., Table 3). *Mandatory Disclosure* is a dummy variable that equals one if a mandated disclosure policy has been introduced. *Rule of Law Index* is a worldwide governance indicator capturing the extent to which agents have confidence in and abide by the rules of society. Controls include *Total* Assets, *Leverage*, *ROA, Market-to-Book* ratio, *Tangibility*, *Liquidity*, *Sales Growth*, and *Market Share*. All variables are defined in Appendix A. Firm fixed effects and year fixed effects are controlled in all columns. The standard errors clustered at the country level are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%, respectively.

	(1) Log(# New Suppliers from the Same Country)	(2) Log(# New Suppliers from Lower EPI Countries)	(3) Log(# New Suppliers from Higher EPI Countries)	(4) Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	(5) Log(# New Suppliers from Countries with Mandatory ESG Disclosure)
Mandatory Disclosure	-0.0762**	0.184***	0.0241	0.117***	0.0707
* Rule of Law Index	(0.035)	(0.045)	(0.042)	(0.032)	(0.045)
Mandatory Disclosure	-0.0931	-0.0338	-0.00726	0.0548	-0.0534
	(0.059)	(0.067)	(0.065)	(0.040)	(0.059)
Rule of Law Index	0.312***	-0.177**	-0.158*	-0.0711	-0.271***
	(0.105)	(0.076)	(0.082)	(0.046)	(0.060)
Total Assets	0.0937***	0.0415***	0.0825***	0.0719***	0.0607***
	(0.028)	(0.011)	(0.011)	(0.015)	(0.010)
Leverage	-0.00102***	0.000816***	0.000671***	0.000711***	0.000770***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA	-0.00106***	-0.000430***	-0.000557***	-0.000616***	-0.000518**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-Book Ratio	0.00170	0.00284	0.00133	0.000170	0.00296
	(0.006)	(0.002)	(0.003)	(0.003)	(0.002)
Tangibility	0.000248	0.000250	0.000313	4.75e-06	0.000565*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-0.00365	0.000521	-0.00296*	-0.00172	-0.000694
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Sales Growth	3.47e-05	-3.43e-05	8.42e-07	-2.99e-05	-3.78e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	3.49e-05	0.00271*	0.00207	0.00248	0.00272*
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Constant	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes
Cluster at Country Level	Yes	Yes	Yes	Yes	Yes
Observations	106,031	106,031	106,031	106,031	106,031
R-squared	0.752	0.778	0.702	0.724	0.726

Table 6: Heterogeneous Treatment Effect by Analyst Coverage

This table reports the heterogeneous effect of introducing mandated ESG disclosure policies on firms' supply chain composition change depending on the extent of firms' analyst coverage. *Residual Analyst Coverage* is the residual from the regression shown in the Online Appendix following Yu [2008]. Columns 1-3 correspond to firms' supply chain composition change based on the EPI of the country suppliers are located in (i.e., Table 2). Columns 4 and 5 correspond to supply chain composition changes based on the ESG-related corporate information environment (i.e., Table 3). *Mandatory Disclosure* is a dummy variable that equals one if a mandated disclosure policy has been introduced. Controls include *Total* Assets, *Leverage*, *ROA, Market-to-Book* ratio, *Tangibility*, *Liquidity*, *Sales Growth*, and *Market Share*. All variables are defined in Appendix A. Firm fixed effects and year fixed effects are controlled in all columns. The standard errors clustered at the country level are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%, respectively.

	(1) Log(# New Suppliers from the Same Country)	(2) Log(# New Suppliers from Lower EPI Countries)	(3) Log(# New Suppliers from Higher EPI Countries)	(4) Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	(5) Log(# New Suppliers from Countries with Mandatory ESG Disclosure)
Mandatory Disclosure	-0.00388	-0.0103**	-0.00675	-0.00930**	-0.00902
* Residual Coverage	(0.005)	(0.005)	(0.005)	(0.004)	(0.006)
Mandatory Disclosure	-0.185***	0.169**	0.0513	0.187***	0.0558
	(0.063)	(0.075)	(0.035)	(0.045)	(0.057)
Residual Coverage	0.00869*	0.00679	0.0138***	0.00960**	0.00796
	(0.005)	(0.006)	(0.004)	(0.004)	(0.006)
Total Assets	0.118***	0.0453***	0.102***	0.0818***	0.0787***
	(0.028)	(0.011)	(0.010)	(0.016)	(0.010)
Leverage	-0.00154***	0.000835**	0.000651***	0.000613***	0.000992***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA	-0.00132***	-0.000491***	-0.000634***	-0.000601***	-0.000620**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-Book Ratio	-0.00979*	-0.000771	-0.00495*	-0.00371	0.00117
	(0.006)	(0.004)	(0.003)	(0.004)	(0.004)
Tangibility	-0.000823*	-0.000253	-0.000227	-0.000388	0.000111
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-0.00499**	0.00150	-0.00366***	-0.00325**	-0.000309
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Sales Growth	0.000101	1.56e-05	6.32e-05	2.92e-05	-4.79e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	-0.00115*	-0.00101	-0.00121	0.000425	0.00115
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Constant	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes
Cluster at Country Level	Yes	Yes	Yes	Yes	Yes
Observations	82,314	82,314	82,314	82,314	82,314
R-squared	0.771	0.775	0.715	0.745	0.753

Table 7: Heterogeneous Treatment Effect by Institutional Ownership

This table reports the heterogeneous effect of introducing mandated ESG disclosure policies on firms' supply chain composition change depending on the extent of firms' institutional ownership. Columns 1-3 correspond to firms' supply chain composition change based on the EPI of the country suppliers are located in (i.e., Table 2). Columns 4 and 5 correspond to supply chain composition changes based on the ESG-related corporate information environment (i.e., Table 3). *Mandatory Disclosure* is a dummy variable that equals one if a mandated disclosure policy has been introduced. *Institutional Ownership* is a firm-year variable indicating shares held by institutional investors in percentage. Controls include *Total* Assets, *Leverage*, *ROA, Market-to-Book* ratio, *Tangibility*, *Liquidity*, *Sales Growth*, and *Market Share*. All variables are defined in Appendix A. Firm fixed effects and year fixed effects are controlled in all columns. The standard errors clustered at the country level are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%, respectively.

	(1) Log(# New Suppliers from the Same Country)	(2) Log(# New Suppliers from Lower EPI Countries)	(3) Log(# New Suppliers from Higher EPI Countries)	(4) Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	(5) Log(# New Suppliers from Countries with Mandatory ESG Disclosure)
Mandatory Disclosure	0.00384*	-0.00550**	-0.00333	-0.0117***	0.00272
* Institutional Ownership	(0.002)	(0.003)	(0.003)	(0.004)	(0.002)
Mandatory Disclosure	-0.214***	0.239**	0.156**	0.409***	0.0198
	(0.050)	(0.104)	(0.064)	(0.066)	(0.071)
Institutional Ownership	-0.000842	-0.00145	-0.00183	0.000384	-0.00317**
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Total Assets	0.0966**	0.0552***	0.109***	0.0867***	0.0814***
	(0.037)	(0.017)	(0.014)	(0.011)	(0.020)
Leverage	-0.00145***	0.000912	0.000715*	0.000623	0.00131***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
ROA	-0.00106***	-0.000373*	-0.000655***	-0.000756***	-0.000261
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-Book Ratio	-2.45e-05	0.00789**	0.00500	0.00389	0.00904***
	(0.007)	(0.003)	(0.003)	(0.004)	(0.003)
Tangibility	0.000377	-0.000143	0.000113	-0.000375	0.000421
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Liquidity	-0.00298	0.000346	-0.00479*	-0.00409**	-0.00257
	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)
Sales Growth	0.000139	-0.000130**	-0.000119	-0.000129	-0.000175***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	-0.00110*	-0.000497	-0.000170	0.000848	0.00172*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes
Cluster at Country Level	Yes	Yes	Yes	Yes	Yes
Observations	76,053	76,053	76,053	76,053	76,053
R-squared	0.768	0.786	0.724	0.757	0.747

Table 8: Mandatory ESG Disclosure and Reported ESG Performance

This table reports the effect of introducing mandated ESG disclosure policies on firms' reported ESG performance. The dependent variables are *Log(# ESG incidents)* and *Log(# Novel ESG incidents)*. *Migration to Lower EPI Countries* is a dummy variable that equals one if the percentage of suppliers from lower EPI countries increases within three years after the introduction. *Migration to Countries without Mandatory ESG Disclosure* is a dummy variable that equals one if the percentage of suppliers from lower EPI countries in countries that have not yet passed mandatory disclosure increases within three years after the introduction. Controls include *Total Assets*, *Leverage*, *ROA*, *Market-to-Book ratio*, *Tangibility*, *Liquidity*, *Sales Growth*, and *Market Share*. All variables are defined in Appendix A. Firm fixed effects and year fixed effects are controlled in all columns. The standard errors clustered at the country level are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%, respectively.

	(1) Log(# ESG incidents)	(2) Log(# Novel ESG incidents)	(3) Log(# ESG incidents)	(4) Log(# Novel ESG incidents)	(5) Log(# ESG incidents)	(6) Log(# Novel ESG incidents)
Mandatory Disclosure	-0.146***	-0.0684*	-0.0684	-0.0101	-0.100*	-0.0317
	(0.049)	(0.035)	(0.048)	(0.034)	(0.054)	(0.039)
Mandatory Disclosure * Migration to Lower EPI Countries			-0.205***	-0.154***		
			(0.071)	(0.037)		
Mandatory Disclosure * Migration to Countries without Mandatory ESG Disclosure					-0.134**	-0.107***
					(0.060)	(0.036)
Total Assets	0.0742***	0.0588***	0.0744***	0.0590***	0.0746***	0.0591***
	(0.022)	(0.011)	(0.022)	(0.011)	(0.022)	(0.011)
Leverage	0.000647	0.000523*	0.000640	0.000518*	0.000646	0.000523*
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
ROA	-0.00186***	-0.00130***	-0.00185***	-0.00129***	-0.00185***	-0.00130***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-Book Ratio	0.00154	0.00545**	0.00144	0.00538**	0.00154	0.00545**
	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
Tangibility	6.69e-05	-0.000409	8.42e-05	-0.000396	6.48e-05	-0.000410
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Liquidity	0.00452	0.00335	0.00459	0.00341	0.00454	0.00337
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Sales Growth	-0.000371***	-0.000144	-0.000377***	-0.000149	-0.000370***	-0.000143
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	0.00154	0.000860	0.00155	0.000873	0.00155	0.000868
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Cluster at Country Level	Yes	Yes	Yes	Yes	Yes	Yes
Observations	48,665	48,665	48,665	48,665	48,665	48,665
R-squared	0.702	0.606	0.702	0.606	0.702	0.606

Table 9: Mandatory ESG Disclosure and Cost Savings

This table reports the effect of introducing mandated ESG disclosure policies on firms' profit margin. The dependent variables are *Cost of Goods Sold / Sales* and *Selling, General & Administrative Expense / Sales*. *Migration to Lower EPI Countries* is a dummy variable that equals one if the percentage of suppliers from lower EPI countries increases within three years after the introduction. *Migration to Countries without Mandatory ESG Disclosure* is a dummy variable that equals one if the percentage of suppliers from lower EPI countries in countries that have not yet passed mandatory disclosure increases within three years after the introduction. The control variables include *Total Assets, Leverage, ROA, Market-to-Book Ratio, Tangibility, Liquidity, Sales Growth*, and *Market Share*. All variables are defined in Appendix A. Firm fixed effects and year fixed effects are controlled in all columns. The standard errors clustered at the country level are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Cost of Goods Sold / Sales			Selling, General & Administrative Expense / Sales		
Mandatory Disclosure	6.764*	5.406	6.422	-0.531	-0.287	-0.748
	(4.017)	(5.371)	(4.375)	(0.988)	(1.432)	(0.840)
Mandatory Disclosure * Migration to		4.073			-0.748	
Lower EPI Countries		(4.460)			(1.739)	
Mandatory Disclosure * Migration to			1.071			0.700
Countries without Mandatory ESG Disclosure			(1.473)			(3.502)
Total Assets	0.789***	0.783***	0.787***	-4.698***	-4.698***	-4.699***
	(0.277)	(0.275)	(0.276)	(0.890)	(0.890)	(0.891)
Leverage	-0.0181***	-0.0180***	-0.0181***	-0.0881**	-0.0881**	-0.0881**
	(0.006)	(0.006)	(0.006)	(0.041)	(0.041)	(0.041)
ROA	-0.161***	-0.161***	-0.161***	-0.603***	-0.603***	-0.603***
	(0.012)	(0.012)	(0.012)	(0.100)	(0.100)	(0.100)
Market-to-Book Ratio	-0.413***	-0.412***	-0.412***	0.940**	0.940**	0.940**
	(0.044)	(0.044)	(0.044)	(0.373)	(0.373)	(0.373)
Tangibility	-0.0371***	-0.0372***	-0.0371***	-0.212***	-0.212***	-0.212***
	(0.010)	(0.010)	(0.010)	(0.039)	(0.039)	(0.039)
Liquidity	-0.218***	-0.218***	-0.219***	2.785***	2.785***	2.785***
	(0.056)	(0.056)	(0.056)	(0.846)	(0.846)	(0.846)
Sales Growth	-0.000743	-0.000687	-0.000740	-0.199***	-0.199***	-0.199***
	(0.003)	(0.003)	(0.003)	(0.026)	(0.026)	(0.026)
Market Share	-0.0347***	-0.0350***	-0.0348***	-0.0240	-0.0239	-0.0240
	(0.010)	(0.010)	(0.010)	(0.045)	(0.045)	(0.045)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Cluster at Country Level	Yes	Yes	Yes	Yes	Yes	Yes
Observations	98,005	98,005	98,005	100,972	100,972	100,972
R-squared	0.938	0.938	0.938	0.839	0.839	0.839

Appendix A: Variable Definition

This table reports the details about the data source and means of constructing the independent variables and control variables used in our paper.

	Dependent Variables	Source
Cost of Goods Sold / Sales	Firm-year variable. For manufacturing companies, cost of goods sold (Worldscope item 01051) represents specific or direct manufacturing cost of material and labor entering in the production of finished goods. Excise taxes and windfall profits taxes are not included. Most non-U.S. corporations do not disclose cost of goods sold. For merchandise companies, cost of goods sold represents the purchase price of items sold, as well as indirect overhead such as freight, inspecting, and warehouse costs. If a breakdown of total operating cost of non-manufacturing companies is not available then it is treated as cost of goods sold. Cost of Goods Sold is scaled by net sales and in percentage.	Worldscope
Log(# ESG Incidents)	Natural logarithm of [1 + # of ESG incidents]. # of ESG incidents is the number of negative ESG incidents in a firm-year. We measure negative ESG events using data on ESG incidents compiled by RepRisk, a company that collects firm-specific ESG news in multiple languages from public media sources. RepRisk evaluates the potential impacts of ESG event based on the novelty and severity of an incident.	RepRisk
Log(# New Suppliers from Advanced Countries)	Natural logarithm of [1 + # of New Suppliers from Advanced Countries]. # of New Suppliers from Advanced Countries is the number of new suppliers from advanced countries. According to the IMF, 40 countries and territories are officially listed as "advanced economies".	Revere
Log(# New Suppliers from Countries with Mandatory ESG Disclosure)	Natural logarithm of [1 + # of New Suppliers from Countries with Mandatory ESG Disclosure]. # of New Suppliers from Countries with Mandatory ESG Disclosure is the total number of new suppliers located in countries that have already passed mandatory disclosure before the customer firms.	Revere
Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	Natural logarithm of [1 + # of New Suppliers from Countries without Mandatory ESG Disclosure]. # of New Suppliers from Higher EPI Countries is the natural logarithm of the total number of new suppliers located in countries that have not yet past any mandatory disclosure before the customer firms.	Revere
Log(# New Suppliers from Developing Countries)	Natural logarithm of [1 + # of New Suppliers from Advanced Countries]. # of New Suppliers from Developing Countries is the number of new suppliers from developing countries. Countries not listed as advanced economies (developed countries and regions) by the IMF are considered as developing countries.	Revere
Log(# New Suppliers from Higher EPI Countries)	Natural logarithm of [1 + # of New Suppliers from Higher EPI Countries]. # of New Suppliers from Higher EPI Countries is the number of new suppliers from the countries with higher EPI than the customer's country. The raw EPI data is obtained from Yale Center for Environmental Law & Policy.	Revere

Log(# New Suppliers from Higher SPI Countries)	Natural logarithm of [1 + # of New Suppliers from Higher SPI Countries]. # of New Suppliers from Higher SPI Countries is the number of new suppliers from the countries with higher SPI than the customer's country. SPI data is provided by the Social Progress Imperative.	Revere
Log(# New Suppliers from Lower EPI Countries)	Natural logarithm of [1 + # of New Suppliers from Lower EPI Countries]. # of New Suppliers from Higher EPI Countries is the number of new suppliers from the countries with lower EPI than the customer's country. The raw EPI data is obtained from Yale Center for Environmental Law & Policy.	Revere
Log(# New Suppliers from Lower SPI Countries)	Natural logarithm of [1 + # of New Suppliers from Lower SPI Countries]. # of New Suppliers from Higher SPI Countries is the number of new suppliers from the countries with lower SPI than the customer's country. SPI data is provided by the Social Progress Imperative.	Revere
Log(# New Suppliers from the Same Country)	Natural logarithm of [1 + # of New Suppliers from the Same Country]. # of New Suppliers from the Same Country is the number of new domestic suppliers.	Revere
Log(# Novel ESG Incidents)	Natural logarithm of [1 + # of Novel ESG incidents]. # of Novel ESG incidents is the number of **new** negative ESG incidents in a firm-year. We measure negative ESG events using data on ESG incidents compiled by RepRisk, a company that collects firm-specific ESG news in multiple languages from public media sources. RepRisk evaluates the potential impacts of ESG event based on the novelty and severity of an incident.	RepRisk
Percentage of Suppliers from Advanced Countries	Firm-year variable. It is the composition of suppliers from advanced countries. According to the IMF, 40 countries and territories are officially listed as "advanced economies".	Revere
Percentage of Suppliers from Countries with Mandatory ESG Disclosure	Firm-year variable. It is the composition of suppliers in countries that have already passed mandatory disclosure before the customer firms over the total number of suppliers.	Revere
Percentage of Suppliers from Countries without Mandatory ESG Disclosure	Firm-year variable. It is the composition of suppliers in countries that have not yet past any mandatory disclosure before the customer firms over the total number of suppliers.	Revere
Percentage of Suppliers from Developing Countries	Firm-year variable. It is the composition of suppliers from developing countries. Countries not listed as advanced economies (developed countries and regions) by the IMF are considered as developing countries.	Revere
Percentage of Suppliers from Higher EPI Countries	Firm-year variable. It is the composition of suppliers from the countries with higher EPI than the customer's country. EPI data is provided by the Social Progress Imperative.	Revere
Percentage of Suppliers from Higher SPI Countries	Firm-year variable. It is the composition of suppliers from the countries with higher SPI than the customer's country. SPI data is provided by the Social Progress Imperative.	Revere
Percentage of Suppliers from Lower EPI Countries	Firm-year variable. It is the composition of suppliers from the countries with lower EPI than the customer's country. The raw EPI data is obtained from Yale Center for Environmental Law & Policy.	Revere

Percentage of Suppliers from Lower SPI Countries	Firm-year variable. It is the composition of suppliers from the countries with lower SPI than the customer's country. SPI data is provided by the Social Progress Imperative.	Revere
Percentage of Suppliers from the Same Country	Firm-year variable. It is the composition of domestic suppliers.	Revere
Selling, General & Administrative Expense / Sales	Firm-year variable. Selling, General & Administrative Expense (Worldscope item 01101) represents expenses not directly attributable to the production process but relating to selling, general and administrative functions. General & Administrative Expense is scaled by net sales and in percentage.	Worldscope

	Independent Variables	**Source**
Analyst Coverage	The number of analysts who made forecasts about firm's earnings in the year.	I/B/E/S
Institutional Ownership	Firm-year variable. The percent of shares held by institutional investors (in percentage). Calculated as [SharesHeld / Common Shares Outstanding (Worldscope item 05301)] * 100. SharesHeld represents the number of shares held by institutional investors. Winsorized at level 1% and 99% levels.	Thomson Reuters Ownership
KZ Index	Firm-year variable. Kaplan-Zingales index is based on the Kaplan-Zingales [1997] paper on financing constraints. It measures corporate relative reliance on external financing, with a higher value indicating a higher likelihood of experiencing difficulties financing ongoing operations when financial conditions tighten.	Worldscope
Mandatory Disclosure	Dummy variable that equals one for all years starting with the first year after the implementation of mandatory ESG disclosure in a country, and zero otherwise.	Manually Collected
Residual Coverage	The main proxy for analyst coverage. The residual from regression equation x for firm i in year t.	I/B/E/S
Rule of Law	Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	WorldBank

	Control Variables	**Source**
Cash Flow Volatility	Cash flow volatility is estimated by the standard deviations of cash flows of a firm in the entire sample period, scaled by total assets. Cash flow is the sum of Funds from Operations (Worldscope item 04201) and Total Other Cash Flow (Worldscope item 04151). Winsorized at level 1% and 99% levels.	Worldscope

External Financing	Firm-year variable. Calculated as [External Financing (Worldscope item 04500) / Total Assets (Worldscope item 02999)] * 100. External Financing (Worldscope item 04500) represents company financing from outside sources, including the issuance and retirement of stock and debt. Winsorized at level 1% and 99% levels.	Worldscope
Leverage	Firm-year variable. Worldscope item 08236. Calculated as the ratio of total debt to total assets. Winsorized at level 1% and 99% levels.	Worldscope
Liquidity	Liquidity. Firms with more liquid assets can use them as another internal source of funds instead of debt, leading to lower optimal debt equity ratio. Calculated as Total Current Assets (Worldscope item 02201) / Total Current Liabilities (Worldscope item 03101). Total Current Assets represents cash and other assets that are reasonably expected to be realized in cash, sold or consumed within one year or one operating cycle. Total Current Liabilities represent debt or other obligations that the company expects to satisfy within one year. Winsorized at level 1% and 99% levels.	Worldscope
Market Share	Firm-year variable. Firm's percentage share of sales by all public firms in the same Fama & French 12 industry and the same country. Winsorized at level 1% and 99% levels.	Worldscope
Market-to-Book	A higher market-to-book tends to be a sign of more attractive future growth options, which a firm tends to protect by limiting its leverage. Calculated as Market Capitalization / (Total Assets - Total Liabilities), where Total Liabilities (Worldscope item 03351) represent all short- and long-term obligations expected to be satisfied by the company. Winsorized at level 1% and 99% levels.	Worldscope
ROA	Firm-year variable. Calculated as [Net Income (Worldscope item 01651) / Total Assets (Worldscope item 02999)] * 100. Winsorized at level 1% and 99% levels.	Worldscope
Sales Growth	Firm-year variable. Worldscope item 08631. The growth rate of firm's net sales (in percentage). Calculated as (Current Year's Net Sales or Revenues / Last Year's Total Net Sales or Revenues - 1) * 100. Winsorized at level 1% and 99% levels.	Worldscope
Tangibility	Firms operating with greater tangible assets have a higher debt capacity. Calculated as Property, Plant And Equipment (Worldscope item 02501) / Total Assets (Worldscope item 02999). Property, Plant And Equipment represents Gross Property, Plant and Equipment less accumulated reserves for depreciation, depletion and amortization. Winsorized at level 1% and 99% levels.	Worldscope
Total Assets	Natural logarithm of [1 + Raw Total Assets (Worldscope item 07230)]. Raw Total Assets represent the total assets of the company converted to U.S. dollars using the fiscal year-end exchange rate.	Worldscope

Online Appendix to

"Migration of Global Supply Chains: A Real Effect of Mandatory ESG Disclosure"

Table A1: Mandatory ESG Disclosure Policies

This table summarizes the regulation that mandates ESG disclosure policies and disclosure venues and their corresponding introduction year in 29 counties (Krueger et al. [2021]).

Country	Year	Disclosure Venue	Regulation	Authority
Argentina	2008	Sustainability reports	Ley N 2594 de balance de responsabilidad social y ambiental	Buenos Aires City Council
Australia	2003	Annual Report	Listing Rule 4.10.3, Australian Stock Exchange	Australian Stock Exchange
Austria	2016	Management report; non-financial report	Transposition of EU NFR Directive: Sustainability and Diversity Improvement Act 257/ME	Ministry of Justice
Canada	2004	data disclosure	The TSX Timely Disclosure Policy	Stock Exchange
Chile	2015	Annual report	Norma de Caracter General N 385/386	Superintendencia de valores y seguros
China	2008	Annual Social Responsibility Report	Guidelines on Listed Companies' Environmental Information Disclosure	Shanghai Stock Exchange (SSE)
France	2001	Annual Report	New Economic Regulations Act (NRE)	Parliament
Germany	2016	Annual Report	Transposition of EU NFR Directive: CSR Directive Implementation Act	Governments
Greece	2006	Annual Report	Law 3487, 2006	
Hong Kong	2015	Directors' Report, ESG Report	HKEX Listing Rules Disclosure of Financial Information	Hong Kong Stock Exchange
Hungary	2016	Annual Report	Transposition of EU NFR Directive: Amendments to Accounting Act C of 2000	Governments
India	2015	Sustainability reports	Circular No. CIR/CFD/CMD/10/2015 Format for Business Responsibility Report	Securities and Exchange Board of India (SEBI)
Indonesia	2012	Annual Report	Rule No.KEP-431/BL/2012 concerning the obligation to submit annual reports for issuers of public companies	Capital Market and Financial Institutions Supervisory Agency (Bapepam-LK)
Ireland	2016	Non-financial Statement, director report	Transposition of EU NFR Directive (1)	Governments
Italy	2016	Management report	Transposition of EU NFR Directive: legislative Decree 30 December 2016, n.254	Ministry of Economic Affairs
Malaysia	2007	Annual Report	Main Markets listing requirements CSR description	Bursa Malaysia Securities Berhad
Netherlands	2016	Annual Management Report	Transposition of EU NFR Directive	Ministry of Security and Justice
Norway	2013	Annual and Sustainability reports	Act amending the Norwegian Accounting Act	Norwegian Parliament

Pakistan	2009	Directors' Report	Companies (Corporate Social Responsibility) general order	Securities and exchange commission of Pakistan
Peru	2016	Sustainability reports	Resolucion SMV No 033-2015-SMV/01	Peruvian Capital Markets Superintendency
Philippines	2011	Annual Report	Corporate Social Responsibility Act, 2011	Committee on trae and commerce
Poland	2016	Annual Report	Transposition of EU NFR Directive: Amendments to the Accounting Act	Governments
Portugal	2010	Annual Report	The Financial Reporting Accounting Standard n 26	Commission for Accounting Normalization
Singapore	2016	Sustainability reports	SGX0ST Listing Rules Practice Note 7.6 Amendments to sustainability reporting guide	Singapore Stock Exchange (SGX)
Slovenia	2017	Annual reports	Act amending the Companies Act ZGD-1J	Governments
South Africa	2010	Integrated / sustainability report	Johannesburg Stock Exchange Listing Requirement 2010	Johannesburg Stock Exchange (JSE)
Spain	2012	Annual Report /Sustainability Report	Spanish Sustainable Economy Law (revision of 2011)	The National Securities Market (CNVM)
Turkey	2014	GHG report /Annual Report	GHG Monitoring Regulation/Communique on corporate governance principles	Capital Markets Board of Turkey
United Kingdom	2013	strategic report; director's report	The companies Act 2006 Regulations 2013	Secretary of State

Table A2: Event Study Estimation

This table reports the event study coefficients of introducing mandated ESG disclosure policies on firms' supply chain composition change. The dependent variables are *Log(# New Suppliers)* and *Percentage of Suppliers*. Panel A is based on the EPI of the country suppliers are located in (Table 2), and panel B is based on the ESG-related corporate information environment (Table 3). $Mandatory\ Disclosure_k$, (where k = -5, -4, -3, -2, 0, 1, 2, 3, 4, or 5+) is a set of dummies indicating the number of years relative to the year passing mandatory disclosure. $Mandatory\ Disclosure_0$ is an indicator corresponding to the year of introducing mandated ESG disclosure policies. Controls include *Ln(Asset)*, *Leverage*, *ROA, Market-to-Book* ratio, *Tangibility*, *Liquidity*, *Sales Growth*, and *Market Share*. In the table, we use OLS estimates also for binary variables due to a large number of fixed effects. The standard errors are reported in parentheses and calculated using standard errors two-way clustered at the country level. *, **, and *** represent significant level at the 10%, 5%, and 1%, respectively.

Panel A: Mandatory ESG Disclosure and Suppliers' Enforcement Environment

	(1) Log(# New Suppliers from the Same Country)	(2) Log(# New Suppliers from Lower EPI Countries)	(3) Log(# New Suppliers from Higher EPI Countries)	(4) Percentage of Suppliers from the Same Country	(5) Percentage of Suppliers from Lower EPI Countries	(6) Percentage of Suppliers from Higher EPI Countries
g_m12	-0.278**	0.0356	0.420	-0.203***	-0.00803	0.207*
	(0.137)	(0.282)	(0.286)	(0.034)	(0.105)	(0.119)
g_m11	0.0173	0.281	0.163	-0.149***	0.0172	0.126*
	(0.166)	(0.249)	(0.138)	(0.043)	(0.086)	(0.074)
g_m10	-0.0917	0.216	-0.0701	-0.142***	0.0723	0.0641
	(0.089)	(0.213)	(0.092)	(0.034)	(0.056)	(0.072)
g_m9	0.0506	0.0867	-0.0275	-0.148***	0.0954*	0.0472
	(0.050)	(0.125)	(0.053)	(0.038)	(0.050)	(0.065)
g_m8	0.0999	0.127	0.0834	-0.148***	0.0770**	0.0659
	(0.075)	(0.175)	(0.088)	(0.045)	(0.038)	(0.059)
g_m7	0.199*	-0.0669	0.0243	-0.174***	0.122**	0.0274
	(0.101)	(0.133)	(0.103)	(0.045)	(0.055)	(0.052)
g_m6	0.290*	0.0131	0.132	-0.104	0.0376	0.0645
	(0.159)	(0.125)	(0.097)	(0.075)	(0.071)	(0.069)
g_m5	0.130	-0.0418	0.0321	-0.0266	0.0125	0.0136
	(0.141)	(0.097)	(0.075)	(0.066)	(0.054)	(0.043)
g_m4	0.0281	-0.0225	-0.0651	-0.0112	-0.00289	0.0145
	(0.141)	(0.070)	(0.085)	(0.060)	(0.044)	(0.041)
g_m3	0.0675	-0.0581	-0.0619	0.00512	-0.0182	0.0134
	(0.079)	(0.059)	(0.073)	(0.038)	(0.030)	(0.026)
g_m2	0.0157	-0.0364	-0.0687	-0.000689	-0.00654	0.00814
	(0.063)	(0.035)	(0.046)	(0.018)	(0.019)	(0.013)
g_0	-0.157***	0.152***	0.0158	-0.0876***	0.0626***	0.0241
	(0.049)	(0.057)	(0.038)	(0.027)	(0.021)	(0.015)
g_1	-0.132***	0.180**	0.0460	-0.0865***	0.0804***	0.00466
	(0.044)	(0.075)	(0.035)	(0.030)	(0.029)	(0.017)

g_2	-0.208***	0.153**	-0.0122	-0.0792**	0.0731**	0.00494
	(0.046)	(0.075)	(0.035)	(0.034)	(0.029)	(0.018)
g_3	-0.171***	0.169*	-0.0165	-0.0715*	0.0803**	-0.0105
	(0.060)	(0.086)	(0.052)	(0.039)	(0.031)	(0.021)
g_4	-0.164**	0.191**	-0.0453	-0.0687	0.0974***	-0.0311
	(0.067)	(0.094)	(0.059)	(0.046)	(0.037)	(0.022)
g_5	-0.139**	0.184*	-0.0805	-0.0630	0.0981**	-0.0404
	(0.062)	(0.099)	(0.061)	(0.048)	(0.041)	(0.027)
g_6	-0.0965	0.351***	-0.133**	-0.0567	0.140***	-0.0841**
	(0.070)	(0.106)	(0.063)	(0.052)	(0.042)	(0.035)
g_7	-0.0989	0.231**	-0.144**	-0.0345	0.136***	-0.105**
	(0.074)	(0.105)	(0.060)	(0.062)	(0.052)	(0.045)
g_8	-0.159*	0.161*	-0.129*	-0.0343	0.134**	-0.112**
	(0.088)	(0.097)	(0.074)	(0.069)	(0.055)	(0.050)
g_9	-0.0568	0.180*	-0.127*	-0.00648	0.137**	-0.138***
	(0.089)	(0.106)	(0.064)	(0.076)	(0.056)	(0.051)
g_10	-0.0915	0.141*	-0.135	-7.32e-05	0.127**	-0.134***
	(0.106)	(0.079)	(0.086)	(0.082)	(0.057)	(0.044)
g_11	-0.0931	0.157*	-0.161*	0.00844	0.130**	-0.147***
	(0.125)	(0.089)	(0.086)	(0.091)	(0.062)	(0.044)
g_12	-0.0684	0.246**	-0.183**	0.00994	0.156**	-0.174***
	(0.132)	(0.120)	(0.079)	(0.098)	(0.066)	(0.055)
g_13	-0.0420	0.167	-0.150	0.0461	0.121	-0.175***
	(0.151)	(0.105)	(0.101)	(0.111)	(0.075)	(0.053)
g_14	-0.104	0.289**	-0.279***	0.0491	0.145*	-0.206***
	(0.170)	(0.140)	(0.093)	(0.118)	(0.078)	(0.068)
g_15	0.0140	0.360***	-0.305***	0.0676	0.159*	-0.236***
	(0.150)	(0.106)	(0.109)	(0.122)	(0.086)	(0.079)
g_16	-0.0217	0.364***	-0.286**	0.0575	0.169*	-0.236***
	(0.159)	(0.117)	(0.109)	(0.127)	(0.089)	(0.080)
g_17	-0.0537	0.297**	-0.278**	0.0508	0.157*	-0.219***
	(0.166)	(0.134)	(0.119)	(0.130)	(0.090)	(0.075)
g_18	-0.0766	0.258	-0.196*	0.0342	0.119	-0.216***
	(0.176)	(0.196)	(0.117)	(0.133)	(0.091)	(0.076)
g_19	-0.105	0.286**	-0.190	0.0375	0.141	-0.204***
	(0.186)	(0.138)	(0.116)	(0.141)	(0.096)	(0.078)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Cluster at Country	Yes	Yes	Yes	Yes	Yes	Yes
Observations	109,741	109,741	109,741	109,741	109,741	109,741
R-squared	0.751	0.759	0.694	0.802	0.794	0.789

Panel B: Mandatory ESG Disclosure and Suppliers' Corporate Information Environment

	(1) Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	(2) Log(# New Suppliers from Countries with Mandatory ESG Disclosure)	(3) Percentage of Suppliers from Countries without Mandatory ESG Disclosure	(4) Percentage of Suppliers from Countries with Mandatory ESG Disclosure
g_m12	0.635***	-0.249***	0.324***	-0.122***
	(0.117)	(0.064)	(0.042)	(0.023)
g_m11	0.610***	-0.187*	0.277***	-0.128***
	(0.130)	(0.112)	(0.036)	(0.038)
g_m10	0.392**	-0.209**	0.319***	-0.177***
	(0.192)	(0.091)	(0.055)	(0.055)
g_m9	0.179*	-0.105	0.300***	-0.151***
	(0.091)	(0.076)	(0.045)	(0.041)
g_m8	0.247*	0.00901	0.186***	-0.0388
	(0.143)	(0.085)	(0.047)	(0.034)
g_m7	0.0839	-0.144	0.230***	-0.0556**
	(0.122)	(0.107)	(0.046)	(0.026)
g_m6	0.192*	-0.0613	0.174***	-0.0696***
	(0.100)	(0.094)	(0.065)	(0.024)
g_m5	0.0125	-0.0662	0.0766	-0.0501*
	(0.094)	(0.060)	(0.059)	(0.026)
g_m4	-0.0828	-0.0550	0.0414	-0.0302
	(0.073)	(0.055)	(0.054)	(0.023)
g_m3	-0.0895	-0.0648	0.0136	-0.0187
	(0.068)	(0.046)	(0.031)	(0.017)
g_m2	-0.0618	-0.0677**	0.0138	-0.0131
	(0.046)	(0.026)	(0.017)	(0.010)
g_0	0.128***	0.0413	0.0725***	0.0151
	(0.045)	(0.034)	(0.020)	(0.011)
g_1	0.198***	0.0210	0.0752***	0.0113
	(0.037)	(0.046)	(0.020)	(0.015)
g_2	0.139***	-0.00197	0.0699***	0.00932
	(0.036)	(0.057)	(0.020)	(0.021)
g_3	0.173***	0.00501	0.0717***	-0.000208
	(0.035)	(0.060)	(0.022)	(0.023)
g_4	0.174***	-0.00110	0.0728***	-0.00413
	(0.033)	(0.064)	(0.027)	(0.024)
g_5	0.156***	-0.0189	0.0659**	-0.00285
	(0.038)	(0.061)	(0.031)	(0.024)
g_6	0.213***	-0.0137	0.0643*	-0.00760
	(0.055)	(0.066)	(0.035)	(0.024)
g_7	0.163***	-0.0574	0.0416	-0.00706

	(0.046)	(0.079)	(0.042)	(0.027)
g_8	0.169***	-0.0964	0.0452	-0.0108
	(0.049)	(0.096)	(0.049)	(0.029)
g_9	0.172***	-0.0987	0.0181	-0.0116
	(0.048)	(0.103)	(0.058)	(0.031)
g_10	0.152***	-0.123	0.0108	-0.0107
	(0.048)	(0.116)	(0.064)	(0.034)
g_11	0.147***	-0.126	-0.00269	-0.00575
	(0.050)	(0.120)	(0.072)	(0.035)
g_12	0.178***	-0.113	-0.0108	0.000817
	(0.053)	(0.116)	(0.077)	(0.037)
g_13	0.172***	-0.120	-0.0547	0.00856
	(0.052)	(0.116)	(0.082)	(0.039)
g_14	0.154**	-0.144	-0.0540	0.00486
	(0.072)	(0.125)	(0.089)	(0.041)
g_15	0.186***	-0.107	-0.0752	0.00759
	(0.054)	(0.131)	(0.091)	(0.043)
g_16	0.204***	-0.0942	-0.0662	0.00870
	(0.067)	(0.136)	(0.094)	(0.044)
g_17	0.172**	-0.116	-0.0728	0.0219
	(0.073)	(0.158)	(0.096)	(0.046)
g_18	0.223**	-0.0375	-0.0625	0.0283
	(0.095)	(0.162)	(0.099)	(0.047)
g_19	0.204***	0.0170	-0.0798	0.0423
	(0.070)	(0.152)	(0.103)	(0.049)
Controls	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes
Cluster at Country	Yes	Yes	Yes	Yes
Observations	109,741	109,741	109,741	109,741
R-squared	0.723	0.724	0.755	0.726

Table A3: Residual Coverage

This table reports the results of the ordinary least squares regression that generates the variable *Residual Analyst Coverage* following Yu [2008] by estimating the residual of the regression that controls for several firm characteristics following prior literatures (e.g., Bhushan [1989], Dechow and Dichev [2002], Kasznik [1999]). *Analyst Coverage* refers to the number of analysts who made forecasts about firm's earnings in the year from I/B/E/S. *Total Assets* is the natural logarithm of firm's total assets. *ROA (Lagged)* is calculated by net income divided by total assets from previous year. *Sales Growth* is the growth rate of firm's net sales. *External Financing* activities are measured by the sum of net cash received from equity and debt issuance scaled by total assets. *Cash Flow Volatility* is estimated by the standard deviations of cash flows of a firm in the entire sample period, scaled by lagged assets. Year fixed effect is controlled. The standard errors are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%, respectively.

	(1)
	Analyst Coverage
Total Assets	2.380***
	(0.011)
ROA (Lagged)	0.00969***
	(0.001)
Sales Growth	0.00582***
	(0.001)
External Financing	0.0221***
	(0.002)
Cash Flow Volatility	0.101***
	(0.003)
Constant	Yes
Year Dummy	Yes
Observations	85,398
R-squared	0.409

Table A4: Mandatory Supply Chain Disclosure

This table uses treatment year indicators that specifically mention supply chains. Columns 1-3 correspond to firms' supply chain composition change based on the EPI of the country suppliers are located in. Columns 4 and 5 correspond to supply chain composition changes based on the ESG-related corporate information environment. *Mandatory Supply Chain Disclosure* is a dummy variable that equals one if a mandated ESG disclosure policy explicitly mentions supply chain related considerations. Panel A estimates the main treatment effects. Panels B-E estimates heterogenous effects based on *KZ Index, Rule of Law Index, Residual Coverage*, and *Institutional Ownership*, respectively. All other variables are defined in Appendix A. Firm fixed effects and year fixed effects are controlled in all columns. The standard errors clustered at the country level are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%, respectively.

Panel A: Main Treatment Effect

	(1) Log(# New Suppliers from the Same Country)	(2) Log(# New Suppliers from Lower EPI Countries)	(3) Log(# New Suppliers from Higher EPI Countries)	(4) Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	(5) Log(# New Suppliers from Countries with Mandatory ESG Disclosure)
Mandatory Supply Chain Disclosure	-0.183***	0.207**	0.0796**	0.193***	0.101
	(0.049)	(0.088)	(0.037)	(0.039)	(0.069)
Total Assets	0.0929***	0.0451***	0.0868***	0.0753***	0.0653***
	(0.025)	(0.010)	(0.009)	(0.015)	(0.009)
Leverage	-0.00117***	0.000694**	0.000640***	0.000663***	0.000853***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA	-0.00109***	-0.000431***	-0.000590***	-0.000622***	-0.000483**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-Book Ratio	1.77e-06	0.00276	0.00208	0.000728	0.00474*
	(0.006)	(0.002)	(0.003)	(0.003)	(0.003)
Tangibility	-1.49e-05	0.000226	0.000285	-2.78e-05	0.000704**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-0.00388*	0.000565	-0.00252*	-0.00232*	-0.000536
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Sales Growth	6.04e-05	-3.15e-05	1.26e-05	-1.62e-05	-4.19e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	-0.000906	-0.000710	-0.000765	0.000670	0.00146
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes
Cluster at Economy Level	Yes	Yes	Yes	Yes	Yes
Observations	109,741	109,741	109,741	109,741	109,741
R-squared	0.750	0.757	0.692	0.723	0.724

Panel B: Heterogeneous Treatment Effect by Financial Constraint

	(1) Log(# New Suppliers from the Same Country)	(2) Log(# New Suppliers from Lower EPI Countries)	(3) Log(# New Suppliers from Higher EPI Countries)	(4) Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	(5) Log(# New Suppliers from Countries with Mandatory ESG Disclosure)
Mandatory Supply Chain Disclosure	-0.00528**	0.00752***	-0.00176	0.00176	0.00258
* KZ Index	(0.003)	(0.002)	(0.003)	(0.004)	(0.002)
Mandatory Supply Chain Disclosure	-0.188***	0.256***	0.0686*	0.206***	0.132**
	(0.060)	(0.092)	(0.039)	(0.055)	(0.062)
KZ Index	0.000828	-0.00193	-8.26e-05	0.000403	-0.00199
	(0.001)	(0.002)	(0.003)	(0.003)	(0.002)
Total Assets	0.121***	0.0350*	0.0861***	0.0679***	0.0638***
	(0.026)	(0.021)	(0.020)	(0.025)	(0.021)
Leverage	-0.00181***	0.00109*	0.000856***	0.000955***	0.00133***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
ROA	-0.00158***	-0.000624***	-0.000721***	-0.000669**	-0.000717***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-Book Ratio	-0.00908	0.00187	-0.00112	-0.000648	0.00311
	(0.006)	(0.003)	(0.004)	(0.004)	(0.004)
Tangibility	-0.000946**	-0.000385	-0.000390	-0.000621	0.000152
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-0.00531**	-0.000254	-0.00678***	-0.00395**	-0.00452**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Sales Growth	8.05e-05	-4.24e-05	-3.96e-05	-1.96e-05	-0.000115**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	-0.00122	-0.00140	-0.000892	0.000876	0.00154
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Constant	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes
Cluster at Economy Level	Yes	Yes	Yes	Yes	Yes
Observations	72,762	72,762	72,762	72,762	72,762
R-squared	0.773	0.780	0.723	0.753	0.762

Panel C: Heterogeneous Treatment Effect by Legal Enforcement

	(1) Log(# New Suppliers from the Same Country)	(2) Log(# New Suppliers from Lower EPI Countries)	(3) Log(# New Suppliers from Higher EPI Countries)	(4) Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	(5) Log(# New Suppliers from Countries with Mandatory ESG Disclosure)
Mandatory Supply Chain Disclosure	-0.0829***	0.223***	-0.0378	0.0872**	0.0850
* Rule of Law Index	(0.022)	(0.062)	(0.030)	(0.039)	(0.054)
Mandatory Supply Chain Disclosure	-0.0741*	-0.0554	0.110***	0.0963**	-0.0120
	(0.041)	(0.085)	(0.038)	(0.041)	(0.068)
Rule of Law Index	0.293***	-0.115*	-0.144*	-0.0344	-0.240***
	(0.107)	(0.059)	(0.078)	(0.035)	(0.056)
Total Assets	0.0938***	0.0427***	0.0830***	0.0723***	0.0617***
	(0.027)	(0.011)	(0.011)	(0.015)	(0.010)
Leverage	-0.00101***	0.000797***	0.000675***	0.000700***	0.000767***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA	-0.00106***	-0.000439***	-0.000555***	-0.000621***	-0.000520**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-Book Ratio	0.00198	0.00259	0.00133	-0.000101	0.00295
	(0.006)	(0.002)	(0.003)	(0.003)	(0.002)
Tangibility	0.000250	0.000249	0.000322	8.12e-06	0.000569*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-0.00368	0.000427	-0.00300**	-0.00173	-0.000785
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Sales Growth	3.57e-05	-3.62e-05	1.53e-06	-3.11e-05	-3.75e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	4.20e-05	0.00265*	0.00203	0.00246	0.00266*
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Constant	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes
Cluster at Economy Level	Yes	Yes	Yes	Yes	Yes
Observations	106,031	106,031	106,031	106,031	106,031
R-squared	0.752	0.778	0.703	0.724	0.726

Panel D: Heterogeneous Treatment Effect by Analyst Coverage

	(1) Log(# New Suppliers from the Same Country)	(2) Log(# New Suppliers from Lower EPI Countries)	(3) Log(# New Suppliers from Higher EPI Countries)	(4) Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	(5) Log(# New Suppliers from Countries with Mandatory ESG Disclosure)
Mandatory Supply Chain Disclosure	-0.00555	-0.00470	-0.00554	-0.00844**	-0.00442
* Residual Coverage	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)
Mandatory Supply Chain Disclosure	-0.190***	0.218***	0.0689*	0.193***	0.112**
	(0.057)	(0.078)	(0.036)	(0.049)	(0.055)
Residual Coverage	0.00811*	0.00462	0.0126***	0.00795*	0.00608
	(0.004)	(0.006)	(0.004)	(0.004)	(0.006)
Total Assets	0.120***	0.0464***	0.103***	0.0824***	0.0802***
	(0.028)	(0.011)	(0.009)	(0.015)	(0.009)
Leverage	-0.00154***	0.000859**	0.000665***	0.000637***	0.00101***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA	-0.00132***	-0.000478***	-0.000626***	-0.000587***	-0.000611**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-Book Ratio	-0.00974*	-0.00127	-0.00521*	-0.00416	0.000819
	(0.006)	(0.004)	(0.003)	(0.004)	(0.004)
Tangibility	-0.000821*	-0.000238	-0.000215	-0.000365	0.000121
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-0.00505**	0.00154	-0.00364***	-0.00316**	-0.000309
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Sales Growth	0.000104	2.79e-05	7.04e-05	3.86e-05	-3.71e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	-0.00116*	-0.00102	-0.00122	0.000415	0.00113
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes
Cluster at Economy Level	Yes	Yes	Yes	Yes	Yes
Observations	82,314	82,314	82,314	82,314	82,314
R-squared	0.771	0.775	0.715	0.745	0.753

Panel E: Heterogeneous Treatment Effect by Institutional Ownership

	(1) Log(# New Suppliers from the Same Country)	(2) Log(# New Suppliers from Lower EPI Countries)	(3) Log(# New Suppliers from Higher EPI Countries)	(4) Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	(5) Log(# New Suppliers from Countries with Mandatory ESG Disclosure)
Mandatory Supply Chain Disclosure	0.00269	-0.00450**	-0.00239*	-0.0102***	0.00297
* Institutional Ownership	(0.002)	(0.002)	(0.001)	(0.003)	(0.002)
Mandatory Supply Chain Disclosure	-0.190***	0.241*	0.144***	0.377***	0.0386
	(0.043)	(0.123)	(0.050)	(0.062)	(0.068)
Institutional Ownership	-0.000249	-0.00226*	-0.00234	-0.00135	-0.00278
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Total Assets	0.0969***	0.0554***	0.109***	0.0876***	0.0805***
	(0.036)	(0.018)	(0.014)	(0.012)	(0.020)
Leverage	-0.00146***	0.000923	0.000722*	0.000635*	0.00132***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
ROA	-0.00107***	-0.000358	-0.000646***	-0.000728***	-0.000265
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-Book Ratio	0.000648	0.00698**	0.00444	0.00214	0.00928***
	(0.007)	(0.003)	(0.003)	(0.003)	(0.003)
Tangibility	0.000389	-0.000159	0.000102	-0.000411	0.000430
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Liquidity	-0.00297	0.000308	-0.00481*	-0.00417*	-0.00254
	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)
Sales Growth	0.000141*	-0.000132**	-0.000120	-0.000135	-0.000172***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	-0.00108	-0.000544	-0.000195	0.000754	0.00175*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes
Cluster at Economy Level	Yes	Yes	Yes	Yes	Yes
Observations	76,053	76,053	76,053	76,053	76,053
R-squared	0.767	0.785	0.723	0.756	0.747

Table A5: Heterogeneous Effect of Mandatory Supply Chain Disclosure

This table estimates the heterogeneous effects of mandatory ESG disclosures that explicitly entail guidelines for supply chain related disclosures. This estimation is limited to the sample of 29 countries that have passed mandatory ESG disclosures. *Mandatory Disclosure* is a dummy variable that equals one if a mandated disclosure policy has been introduced. *Mandatory Supply Chain Disclosure* is a dummy variable that equals one if a mandated ESG disclosure policy explicitly mentions supply chain related considerations. All other variables are defined in Appendix A. Firm fixed effects and year fixed effects are controlled in all columns. The standard errors clustered at the country level are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%, respectively.

	(1) Log(# New Suppliers from the Same Country)	(2) Log(# New Suppliers from Lower EPI Countries)	(3) Log(# New Suppliers from Higher EPI Countries)	(4) Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	(5) Log(# New Suppliers from Countries with Mandatory ESG Disclosure)
Mandatory Disclosure	0.0349	-0.339*	0.150	-0.219*	-0.0430
* Mandatory Supply Chain Disclosure	(0.053)	(0.195)	(0.147)	(0.127)	(0.068)
Mandatory Disclosure	-0.272***	0.476**	-0.0571	0.355***	0.125*
	(0.034)	(0.179)	(0.144)	(0.123)	(0.069)
Total Assets	0.0547***	0.0556**	0.0816***	0.102***	0.0543***
	(0.011)	(0.021)	(0.012)	(0.018)	(0.015)
Leverage	-0.000567	-0.000219	0.000268	0.000223	0.000334
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
ROA	-0.000508**	-0.000153	-0.000331	-0.000522**	-4.47e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-Book Ratio	0.0110	0.00757*	0.00159	0.00627	0.00562
	(0.008)	(0.004)	(0.004)	(0.005)	(0.004)
Tangibility	-0.000295	9.80e-06	0.000343	3.90e-05	0.000563
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-8.23e-07	-0.000973	-0.00211	-0.00295	-0.000191
	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)
Sales Growth	5.79e-05	-0.000124	2.65e-05	-7.83e-05	-8.80e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	-0.000594	-0.00403**	-0.000144	-0.000110	0.00109*
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Constant	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes
Cluster at Economy Level	Yes	Yes	Yes	Yes	Yes
Observations	41,447	41,447	41,447	41,447	41,447
R-squared	0.714	0.815	0.712	0.747	0.758

Table A6: Voluntary ESG Disclosure

This table uses treatment year indicators from Carrots and Sticks. *Mandatory Disclosure* is a dummy variable that equals one if a mandated ESG disclosure guideline has been introduced. *Voluntary Disclosure* is a dummy variable that equals one if a voluntary ESG disclosure guideline has been introduced. Columns 1-3 and 6-8 correspond to firms' supply chain composition change based on the EPI of the country suppliers are located in. Columns 4-5 and 9-10 correspond to supply chain composition changes based on the ESG-related corporate information environment. All other variables are defined in Appendix A. Firm fixed effects and year fixed effects are controlled in all columns. The standard errors clustered at the country level are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%, respectively.

	(1) Log(# New Suppliers from the Same Country)	(2) Log(# New Suppliers from Lower EPI Countries)	(3) Log(# New Suppliers from Higher EPI Countries)	(4) Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	(5) Log(# New Suppliers from Countries with Mandatory ESG Disclosure)	(6) Log(# New Suppliers from the Same Country)	(7) Log(# New Suppliers from Lower EPI Countries)	(8) Log(# New Suppliers from Higher EPI Countries)	(9) Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	(10) Log(# New Suppliers from Countries with Mandatory ESG Disclosure)
Mandatory Disclosure	-0.179***	0.182**	0.0345	0.176***	0.0628					
	(0.051)	(0.071)	(0.039)	(0.041)	(0.055)					
Voluntary Disclosure						0.0992	0.0975	-0.0535	0.0527*	0.0476
						(0.063)	(0.065)	(0.057)	(0.029)	(0.055)
Total Assets	0.0916***	0.0463***	0.0868***	0.0766***	0.0655***	0.0957***	0.0455***	0.0854***	0.0751***	0.0655***
	(0.025)	(0.010)	(0.010)	(0.015)	(0.009)	(0.025)	(0.011)	(0.009)	(0.015)	(0.009)
Leverage	-0.00117***	0.000688**	0.000636***	0.000657***	0.000849***	-0.00116***	0.000678**	0.000635***	0.000648***	0.000846***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA	-0.00108***	-0.000437***	-0.000593***	-0.000627***	-0.000486**	-0.00108***	-0.000442***	-0.000592***	-0.000631***	-0.000489**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-Book Ratio	-0.000254	0.00302	0.00213	0.000979	0.00483*	0.000280	0.00302	0.00193	0.000868	0.00487*
	(0.006)	(0.002)	(0.003)	(0.003)	(0.003)	(0.006)	(0.002)	(0.003)	(0.003)	(0.003)
Tangibility	-8.31e-06	0.000220	0.000283	-3.44e-05	0.000701**	-8.22e-06	0.000230	0.000281	-2.63e-05	0.000705**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-0.00375*	0.000447	-0.00252*	-0.00244*	-0.000558	-0.00410**	0.000594	-0.00242*	-0.00226*	-0.000522
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)

Sales Growth	6.18e-05	-3.35e-05	1.10e-05	-1.80e-05	-4.34e-05	6.38e-05	-3.96e-05	1.13e-05	-2.30e-05	-4.58e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	-0.000863	-0.000744	-0.000754	0.000633	0.00146	-0.00105	-0.000688	-0.000693	0.000716	0.00147
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster at Economy Level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	109,741	109,741	109,741	109,741	109,741	109,741	109,741	109,741	109,741	109,741
R-squared	0.750	0.757	0.692	0.723	0.724	0.750	0.757	0.692	0.722	0.724

Table A7: SPI Measure

This table reports the effect of introducing mandated ESG disclosure policies on firms' supply chain composition change based on the social progress index (SPI) of the country suppliers are located in. Panel A either uses the natural logarithm of the number of suppliers corresponding to each supplier type or the corresponding fraction. Panel B uses the average SPI of all suppliers. *Log(# New Suppliers)* is the natural logarithm of the total number of new suppliers located in each of the different types of countries compared to the customer firms. *Percentage of Suppliers* is the fraction of suppliers in each of the different types of countries over the total number of suppliers. *Average SPI of New Suppliers' Country* is the average of SPI scores of new suppliers' countries of a given customer firm. *Mandatory Disclosure* is a dummy variable that equals one if a mandated disclosure policy has been introduced. Controls include *Total Assets*, *Leverage*, *ROA, Market-to-Book* ratio, *Tangibility*, *Liquidity*, *Sales Growth*, and *Market Share*. Definitions of variables are in Appendix A. Firm fixed effects and year fixed effects are controlled in all columns. The standard errors clustered at the country level are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%, respectively.

Panel A. Number of Suppliers

	(1) Log(# New Suppliers from the Same Country)	(2) Log(# New Suppliers from Lower SPI Countries)	(3) Log(# New Suppliers from Higher SPI Countries)	(4) Percentage of Suppliers from the Same Country	(5) Percentage of Suppliers from Lower SPI Countries	(6) Percentage of Suppliers from Higher SPI Countries
Mandatory Disclosure	-0.182***	0.149*	0.0620	-0.0908**	0.0653***	0.0211
	(0.052)	(0.088)	(0.055)	(0.044)	(0.024)	(0.032)
Total Assets	0.0704***	0.0323**	0.0838***	-0.0206***	-0.00479*	0.0123*
	(0.011)	(0.012)	(0.012)	(0.005)	(0.003)	(0.007)
Leverage	-0.00127***	0.000316**	0.000823***	-0.000730***	0.000272**	0.000393***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA	-0.000749***	-0.000297**	-0.000497***	3.52e-05	5.27e-05	-1.70e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-Book Ratio	-0.000858	0.00171	0.000879	-0.00128	-9.95e-06	0.000315
	(0.007)	(0.003)	(0.003)	(0.002)	(0.001)	(0.002)
Tangibility	-0.000234	0.000242	0.000678*	-0.000182	7.82e-07	0.000333**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-0.00117	0.000480	-0.000781	0.00148***	0.000254	-0.000592
	(0.001)	(0.002)	(0.002)	(0.000)	(0.001)	(0.001)
Sales Growth	0.000110	-2.98e-05	3.50e-05	7.22e-05**	-4.42e-05	1.49e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	-0.00124**	0.000632	-0.000104	-0.000581**	0.000421**	6.58e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Cluster at Country	Yes	Yes	Yes	Yes	Yes	Yes
Observations	93,367	93,367	93,367	93,367	93,367	93,367
R-squared	0.760	0.812	0.743	0.804	0.816	0.785

Panel B. Average SPI of Suppliers

	(1)	(2)
	SPI of New Suppliers' Country	SPI of Suppliers' Country
Mandatory Disclosure	-0.772	-0.886***
	(0.496)	(0.329)
Total Assets	0.104	0.0677
	(0.097)	(0.081)
Leverage	-0.00112	-0.00111
	(0.003)	(0.003)
ROA	-0.00118	-0.00167
	(0.003)	(0.002)
Market-to-Book Ratio	-0.0837	-0.0612
	(0.053)	(0.044)
Tangibility	-0.00430	-0.00317
	(0.004)	(0.004)
Liquidity	-0.0373*	-0.0345**
	(0.022)	(0.017)
Sales Growth	0.00115	0.000860
	(0.001)	(0.001)
Market Share	0.00883	0.00205
	(0.007)	(0.006)
Constant	Yes	Yes
Firm Dummy	Yes	Yes
Year Dummy	Yes	Yes
Cluster at Country Level	Yes	Yes
Observations	77,231	89,389
R-squared	0.814	0.867

Table A8: IMF Advanced Economies Measure

This table reports the effect of introducing mandated ESG disclosure policies on firms' supply chain composition change based on the definition provided by the IMF that classifies countries into developing and advanced economies. *Log(# New Suppliers)* is the natural logarithm of the total number of new suppliers located in each of the different types of countries. *Percentage of Suppliers* is the fraction of suppliers in each of the different types of countries over the total number of suppliers. *Mandatory Disclosure* is a dummy variable that equals one if a mandated disclosure policy has been introduced. Controls include *Total Assets*, *Leverage*, *ROA, Market-to-Book* ratio, *Tangibility*, *Liquidity*, *Sales Growth*, and *Market Share*. Definitions of variables are in Appendix A. Firm fixed effects and year fixed effects are controlled in all columns. The standard errors clustered at the country level are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%, respectively.

	(1) Log(# New Suppliers from Developing Countries)	(2) Log(# New Suppliers from Advanced Countries)	(3) Percentage of Suppliers from Developing Countries	(4) Percentage of Suppliers from Advanced Countries
Mandatory Disclosure	0.653*	0.637	0.0605***	0.0204
	(0.386)	(0.562)	(0.019)	(0.043)
Total Assets	0.0894***	0.585***	-0.000797	0.0219***
	(0.031)	(0.093)	(0.002)	(0.004)
Leverage	0.00413**	0.00881***	0.000125*	0.000573***
	(0.002)	(0.002)	(0.000)	(0.000)
ROA	-0.00102***	-0.00392***	1.65e-05	-3.15e-05
	(0.000)	(0.001)	(0.000)	(0.000)
Market-to-Book Ratio	0.0290***	0.0654***	-0.000479	0.00361*
	(0.011)	(0.019)	(0.001)	(0.002)
Tangibility	-0.00157	0.00583*	-1.70e-05	0.000111
	(0.001)	(0.003)	(0.000)	(0.000)
Liquidity	0.00295	0.000931	0.00108	-0.00173**
	(0.003)	(0.014)	(0.001)	(0.001)
Sales Growth	-0.000152	-0.000448	-2.32e-05*	-4.35e-05
	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	0.000196	0.0210	0.000287	0.000351*
	(0.005)	(0.014)	(0.000)	(0.000)
Constant	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes
Cluster at Economy Level	Yes	Yes	Yes	Yes
Observations	109,741	109,741	109,741	109,741
R-squared	0.774	0.800	0.731	0.777

Table A9: Callaway and Sant'Anna Estimator

This table reports robustness tests of the effect of introducing mandated ESG disclosure policies on firms' supply chain composition change using the Callaway and Sant'Anna estimator based on the EPI of the country suppliers are located in (Table 2) in Panel A; and on the ESG-related corporate information environment (Table 3) in Panel B.

Panel A. Mandatory ESG Disclosure and Suppliers' Enforcement Environment

	(1) Log(# New Suppliers from the Same Country)	(2) Log(# New Suppliers from Lower EPI Countries)	(3) Log(# New Suppliers from Higher EPI Countries)	(4) Percentage of Suppliers from the Same Country	(5) Percentage of Suppliers from Lower EPI Countries	(6) Percentage of Suppliers from Higher EPI Countries
ATT (Mandatory Disclosure)	-0.142***	0.184**	-0.0255	-0.0690*	0.0790***	-0.0145
	(0.034)	(0.082)	(0.043)	(0.036)	(0.030)	(0.017)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Cluster at Country Level	Yes	Yes	Yes	Yes	Yes	Yes
Observations	65,021	65,021	65,021	65,021	65,021	65,021

Panel B. Mandatory ESG Disclosure and Suppliers' Corporate Information Environment

	(1) Log(# New Suppliers from Countries without Mandatory ESG Disclosure)	(2) Log(# New Suppliers from Countries with Mandatory ESG Disclosure)	(3) Percentage of Suppliers from Countries without Mandatory ESG Disclosure	(4) Percentage of Suppliers from Countries with Mandatory ESG Disclosure
ATT (Mandatory Disclosure)	0.168***	0.0259	0.0701***	-0.00118
	(0.031)	(0.033)	(0.022)	(0.017)
Controls	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes
Firm Dummy	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes
Cluster at Country Level	Yes	Yes	Yes	Yes
Observations	65,021	65,021	65,021	65,021