Board Gender Diversity and Supply Chain Risk Management

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Abstract

How does corporate board gender diversity affect supply chain risk management? Board gender diversity can influence supply chain risk management through behavioral and agency-based mechanisms. Female directors' greater risk aversion, lower overconfidence in the face of uncertainty, and heightened accountability pressures may lead to stronger oversight and risk mitigation efforts in operations, where risks are quantifiable and failures are highly visible. Therefore, we should expect supply chain risk management to increase with increased women representation in corporate boards. We test this prediction leveraging on a reform requiring California firms to increase board gender diversity. We find that the propensity to use purchase obligations, supply contracts designed to mitigate the risk of future price fluctuations and reduce procurement uncertainty, increased for California buyers following the reform. We also find that California buyers increased their geographic supply chain diversification and became more likely to discontinue relationships with high-default risk suppliers after the reform. These changes are larger when female directors are better positioned to influence corporate decisions, contributing to validate board gender diversity as an important channel for operational changes. The takeaway for corporate leaders, policymakers, and shareholders is that board gender diversity can lead to a greater focus on supply chain risk management, which increases profitability.

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1 Introduction

Corporate boards steer firm decisions (e.g., Clark, 1986; Bebchuk, 2005). In parallel with global regulatory efforts to enhance board gender diversity, there has been increasing scholarly interest in understanding how board gender diversity affects corporate outcomes. Studies have shown that board gender diversity impacts corporate policies, for example, on capital structure (Bernile, Bhagwat, and Yonker, 2018), cash holdings (Ahern and Dittmar, 2012), acquisitions (Levi, Li, and Zhang, 2014), and employment (Matsa and Miller, 2013). Given that a core responsibility of a corporate board is to define the firm's risk tolerance level, guide risk management strategies, and oversee risk mitigation and resilience efforts [1] (see, for example, Moats, DeNicola, and Parker, 2022; Lipton et al., 2011, 2020), the potential implications of board gender diversity on supply chain risk management are significant. Yet, the relationship between board gender diversity and supply chain risk management remains underexplored. The aim of this paper is to fill this gap.

Board gender diversity can considerably influence supply chain risk management through behavioral and agency-based mechanisms. Drawing on foundational behavioral research (Brody, 1993; Fujita et al., 1991; Loewenstein et al., 2001), a large body of economic literature has established that women are generally more risk-averse than men (see, for example, Cohen and Einav, 2007; Croson and Gneezy, 2009; Bertrand, 2010; Byrnes, Miller, and Schafer, 1999, and Section 2 for further discussion). In turn, agency theory emphasizes the role of corporate leaders' personal risk aversion in shaping corporate risk management practices. Specifically, more risk-averse corporate leaders are more likely to implement robust risk management systems and practices to avoid unexpected shocks that can endanger both firm performance and their personal reputational, financial, or career-related outcomes (e.g., Stulz, 1984; Smith and Stulz, 1985; Holmström and Ricart i Costa, 1986; Lambert, Larcker, and Verrecchia, 1991; Carpenter, 2000; Ross, 2004). Importantly, operational failures and shocks can directly draw shareholder scrutiny on to board members (some recent examples include Baxter and Cerence Inc., see LaCroix, 2023, Baxter v. Defendants, 2023, and Leonard, 2023). Taken together, this suggests that female directors may have a heightened focus on risk oversight and mitigation, especially concerning operations where risk can be quantified and managed through policy-based decision making.

Moreover, female corporate leaders often operate under intensified scrutiny relative to their male counterparts, facing higher performance expectations and narrower margins for error (see, for example, Brescoll et al., 2010, and Rosette and Livingston, 2012). This asymmetry in evaluative

[1] For example, Coca-Cola Company's Audit Committee Charter (The Coca-Cola Company, 2025) specifies Risk Oversight as a "principal recurring process" and states that: "*The Committee will periodically receive reports on and discuss governance of the Company's risk assessment and risk management processes and will review significant risks and exposures identified to the Committee by management, the internal auditors or the independent auditors (whether financial,* ***operating****, regulatory or otherwise), and management's steps to address them.*"

pressure may further incentivize female directors to exercise heightened diligence in risk oversight, particularly in high-salience areas such as operations where failures can be highly visible (see Hendricks and Singhal, 2005b; and Shabong, 2024, and Pfeifer, 2025 for recent examples) and subject to personal repercussions. Relatedly, compared to women, men tend to exhibit greater overconfidence (e.g., Prince, 1993; Barber and Odean, 2001), a cognitive bias that leads them to overestimate their knowledge, abilities, and the accuracy of their decisions, which can lead to riskier decision making. This suggests that female corporate leaders are less overconfident with regards to future uncertainties, and consequently, more inclined to engage in risk oversight in operations-related areas where uncertainty can be managed.

In aggregate, through their distinct risk preferences, lower susceptibility to overconfidence, and heightened accountability pressures, female directors can be more risk aware and strengthen the board's capacity for risk oversight and mitigation in operational domains. Consequently, our main prediction is that increased female representation in corporate boards should lead to an increased focus in supply chain risk management.

Anecdotal and survey-based evidence supports this view. A survey of close to 900 public company board directors from U.S. found that majority of the directors believe that board diversity is an important factor in improving risk management and oversight (PwC, 2017). Women's heightened propensity for more rigorous risk management is also echoed in quotes from corporate leaders:

"*When it comes to gender differences in approaching risk, that's the biggest one I've seen: men are more likely to pretend that problems simply will not occur.*" Michel Wucker, former president of the World Policy Institute (Michelson, 2021).

"*We have a natural ability to scenario plan and find creative solutions. That's key to success in risk management.*" Julie Pemberton, director of enterprise risk and insurance at Coinstar (Widmer, 2013).

"*Women take the time to understand the risk and evaluate all the potential drawbacks and how a decision might affect those they care about most - families, companies, and society.*" Amber Ortiz, Senior Advisor at City Bank (Stewart, 2025).

To study how women's participation in corporate boards affects supply chain risk management, we rely on a regulatory change requiring public listed firms headquartered in California, which have a combined market capitalization of $6.9 trillion, to have at least one female board director by the end of 2019, making California the first and only US state to have ever passed a board gender quota regulation. We call these changes collectively the California Board Gender Diversity Act or the Act. Our first measure of supply chain risk management is purchase obligations. Purchase obligations are legally binding supply contracts to buy goods or services from a supplier at a certain point in the future or within a specified time period. Buyers rely on these supply contracts to secure important production factors, hedge against future price changes, and plan their production processes, making purchase obligations established measures of supply chain risk management (see, for example, Almeida, Hankins, and Williams, 2017, 2020; Giambona and Wang, 2020; Moon and Phillips, 2021, and section 2 for further discussion).

We gather purchase obligation data by parsing the annual reports available through the SEC EDGAR database for the firms in our sample over the sample period 2018-2021. To exemplify, we report the description of the purchase obligation agreements in the 2020 annual report of Hershey Co.:

"*We enter into certain obligations for the purchase of raw materials. These obligations were primarily in the form of forward contracts for the purchase of raw materials from third-party brokers and dealers. These contracts minimize the effect of future price fluctuations by fixing the price of part or all of these purchase obligations.*" Hershey (2020)

Similarly, in its 2020 annual report Ford Motor Co. writes:

"*We enter into contracts with suppliers for purchases of certain raw materials, components, and services to facilitate adequate supply of these materials and services.*" Ford (2020)

As can be gathered from the language of the annual reports, firms rely on purchase obligations to help secure future supply of goods and services and fix their prices.

Using a difference-in-difference design, we find that the propensity to use purchase obligations increased by 3.1% for California buyers (treated firms) relative to buyers from other states (control firms) in the two years following the Act. In line with our main prediction, our findings suggest that supply chain risk management increased for the treated firms compared to the control firms after the increased representation of women in the corporate boards of California firms with the Act. We find no evidence that our purchase obligations results could be driven by a violation of the parallel-trend assumption.

To further assess the effect of the Act on supply chain risk management, we also consider the following two measures of supply risk management: (1) level of geographic supply chain diversification and (2) propensity for high default-risk supplier termination. Supply risk emerges as a key risk factor concerning a company's ability to continue operations and reach their profit forecast. Further, supply chain related failures are highly visible where such news led to sharp drops in the stock price. Airbus, for example, was hit with a 12% drop in its stock price after it revealed its inability to secure engines to reach its production goal for 2024 (Pfeifer, 2025). Aston Martin's shares dropped 28% after disclosing supply issues and needing to revise its 2024 production volume (Shabong, 2024). Hendricks and Singhal (2005b) document that stock returns can drop as much as 40% due to supply chain disruptions.

Geographical supply chain diversification enables managing geopolitical risk (e.g., political instability, international conflicts, trade tensions, civil unrest, strikes), risk of localized supply disruptions due to natural and man-made disasters (e.g., earthquakes, hurricanes, terrorist attacks), and serves as a hedge for the changes in the regulatory environment (see, for example, Namdar et al., 2025; Cohen and Lee, 2020; Kleindorfer and Saad, 2005). In a general equilibrium trade model, Ahn and Tan (2025) show that multi-regional supply chain diversification improves resilience. Relatedly, supply chain diversification/multi-sourcing is extensively studied in analytical operations management literature as a key tool for supply risk management (see, for example, Anupindi and Akella, 1993; Federgruen and Yang, 2009; Hu and Kostamis, 2015; Zhao and Freeman, 2019; and section 2 for further discussion).

Notably, industry leaders increasingly recognize the importance of geographical supply chain diversification for risk management. In her 2023 APEC CEO Summit speech, the CEO of City Bank, Jane Fraser stated: "*It took too long but we've all woken up to the fact that concentrating the sourcing or production of any good — let alone essential goods — in one part of the world can have dire consequences.*" (Fraser, 2023).

To measure the degree of geographical supply chain diversification, we use import-level data from the Panjiva Supply Chain Intelligence platform to identify the main imported production factor of a given US buyer in a certain quarter. Next, we identify the number of global regions from which the buyer imports at least 10% of its main product, with a higher number indicating a higher degree of geographic supply chain diversification.[2]

As an example, consider Cisco Systems Inc. At the end of 2020, its main imported product was Harmonized System (HS) Code 8517, which includes telephone sets, including smartphones, for cellular or other wireless networks, and other apparatus for transmitting or receiving voice, images, or data. Cisco imported its main product from four regions, Asia, Europe, North America, and Oceania. As another example, consider Netgear Inc. At the end of 2020, its main imported product was also HS Code 8517, but the company imported it from only one region, Asia. The higher number of regions from which Cisco imports its main product compared to Netgear suggests that Cisco's supply chain is characterized by a higher degree of geographic diversification and potentially better positioned to absorb regional production-network shocks. Using our difference-in-difference design, we find that the number of regions from which California buyers import their main production factors increased by about 3.3% relative to control firms in the post-Act period, further supporting our prediction that supply chain risk management increased for California firms

[2]We consider the following global regions: Africa and the Middle East, Asia, Europe, Latin America, North America, and Oceania.

post-Act.

Our third measure of supply chain risk management is an indicator for whether a discontinued supplier in a given quarter has a high default risk, measured as having financial leverage in the sample top quintile. The logic of this measure is that buyers concerned with their operational risk might want to discontinue relationships with highly leveraged suppliers that are likely to face financial distress, default on the supply contracts, and file for bankruptcy. This measure is in line with earlier analytical models concerning supplier default risk. Chaturvedi et al. (2021) proposes intensifying supplier screening and eliminating riskier suppliers in order to reduce supplier non-performance risk. Gernert et al. (2023) and Babich et al. (2007) show that firms may choose to avoid suppliers with higher default risk even when the supply base size is limited. Motivated by prior analytical research (see section 2 for further discussion), this paper provides, to the best of our knowledge, the first empirical measure of high-risk supplier termination propensity. Using this measure, we find that the high default-risk suppliers of California buyers are 2.2% more likely to be discontinued relative to the high default-risk suppliers of the control firms following the Act, consistent with an increased propensity to manage operational risk for California firms with the Act-induced increase in the number of female board directors.

If newly hired female directors are the channel through which supply chain risk management changed for the affected firms, we should expect the changes to be larger when the Act is more likely to be impactful. To explore this channel we develop two additional predictions. Our first additional prediction is that the marginal change in supply chain risk management will be lower for boards with a higher degree of female representation at the baseline. To this end, we partition California buyers into two groups depending on whether or not prior to the reform they had already a sufficient number of female directors to satisfy the requirements of the Act. In support of this additional prediction, our analysis reveals that the propensity to utilize purchase obligations, adopt a more diversified supply chain structure, and discontinue high default-risk suppliers increased significantly more post-Act for California firms without enough female directors pre-reform relative to California buyers with enough female directors.

Further, we should expect the changes in supply chain risk management to be larger when female directors are better positioned to influence corporate decisions (e.g., DeMarzo, Vayanos, and Zwiebel, 2003; Larcker, So, and Wang, 2013; Burt, Hrdlicka, and Harford, 2020). To test this prediction, we partition California buyers depending on whether or not their female directors' pre-reform tenure was above or below 5 years (sample top quintile), which according to the Bureau of Labor Statistics (2025) is the required work experience for top executives.[3] In line with this

[3]See also Bonini et al. (2024), for a discussion on the importance of directors' tenure to mitigate risk.

argument, we expect that supply chain risk management will change relatively more for California buyers whose female directors have a tenure longer than 5 years. In support of this prediction, we find larger increases in our three supply chain risk management measures for California buyers with high-tenure female directors (i.e., more than 5 years) relative to California buyers with low-tenure female directors (i.e., less than 5 years). We also find a significantly larger increase in supply chain risk management post reform for treated firms that add new female directors with previous operations management and supply chain experience. In line with the logic of our identification strategy, this analysis indicates that it is when female directors are more likely to influence corporate decisions that our findings are economically larger.

Is it possible that California firms were affected differently more by the coronavirus pandemic? Our combined tests indicate that this is unlikely to be the case. We find that all our results hold if we exclude the year 2020, the apex of the pandemic, from our estimates. Importantly, we also find that all our results hold when we partition firms based on whether or not their sales in 2020 were above their average sales in the last five years. The logic of this test is that firms that did not experience a sales decline in 2020 are unlikely to have been severely affected by the pandemic. We find that our results hold for both the sample of firms whose sales declined and did not decline in 2020 relative to their average sales in the last five years. Further, we find that our results hold in a general regression setting using data for the 10-year period ending the year prior to the Act. More specifically, our regression analysis shows in a general setting that the propensity to use purchase obligations, the degree of supply chain diversification, and the propensity to discontinue high default-risk suppliers all increased when women are added to corporate boards. Because this analysis is performed using data before the coronavirus pandemic, it further helps validating our argument that female directors have a direct impact on supply chain risk management practices. We note additionally that all our regressions include industry-year fixed effects. This means that we are effectively comparing the supply chain risk management strategies of treated firms and control firms operating in similar industries and, hence, more likely to be similarly exposed to the pandemic.

Notably, we also find that supply chain risk management increases when we consider repeated purchase-obligation relationships (as opposed to one-off contracts) and commodity hedging (which firms use to protect themselves against the increase in the price of commodities) as dependent variables. Further, we find that all our results hold when we use propensity score matching to identify control firms with characteristics similar to the treated firms. Our results also hold when we use alternative proxies of supplier default risk, we consider additional control variables, we extend the sample period, and we cluster standard errors at the firm level, we use alternative estimation methods.

The main takeaway for corporate executives is that board gender diversity can lead to a greater focus on supply chain risk management. Our paper highlights supply chain risk management as an important channel for the increase in performance with higher board gender diversity documented in previous studies (e.g., Hyndman and Honhon, 2020; Chu et al., 2019; Gutierrez et al., 2020; Webb, 2022). Importantly, our results also suggest that, even without regulatory requirements, corporate policies that promote equity, diversity, and inclusion can facilitate operational changes that benefit shareholders, while also improving firms' corporate social responsibility profile.

The rest of the paper is organized as follows. Section 2 discusses additional literature. The California Board Gender Diversity Act is discussed in section 3. Data and empirical design are discussed in section 4. Section 5 presents our main supply chain risk management results, tests additional risk management implications of the Act, and discusses robustness and validity tests. Section 6 concludes.

2 Other Related Literature

Diversity, equity, and inclusion are emerging as important focal points in operations and supply chain management, addressing relevant dynamics across a variety of contexts, including team diversity in apparel manufacturing (Narayanan and Terris, 2020), software development and maintenance (Narayanan, Swaminathan, and Talluri, 2014; Huckman and Staats, 2011; Narayanan, Balasubramanian, and Swaminathan, 2009), medical product recalls (Wowak et al., 2021), gender-based pay in beauty services (Pierce, Wang, and Zhang, 2021), gender diversity in product development teams (Sethuraman et al., 2023), workforce diversity and consumer choice (Balakrishnan, Nam, and Buell, 2024), differences in ordering behavior across genders (Ma, Hao, and Aloysius, 2021), racial bias in sourcing (Aral and Van Wassenhove, 2024), and practices of equal employment opportunity in supply chains (Cen, Han, and Wu, 2024). We contribute to this growing literature by studying the link between gender diversity in corporate boards and supply chain risk management. Our work also contributes to the literature on the role of human capital on operations strategy and improvement (Menor, Kristal, and Rosenzweig, 2007; Carrillo and Gaimon, 2004) highlighting the importance of knowledge and skill diversity (e.g., Lapré and Van Wassenhove, 2001).

Research shows that men are less risk-averse than women across a variety of contexts, including cognitive tasks such as informed guessing and intellectual risk-taking (see, for example, Croson and Gneezy, 2009; Bertrand, 2010; Byrnes, Miller, and Schafer, 1999). Using a structural econometric model to extrapolate risk preferences from insurance deductible choices, Cohen and Einav (2007) find that women exhibit greater risk aversion than men in the insurance context - with a 20 percent larger coefficient of absolute risk aversion compared to men. Donkers, Melenberg, and

Van Soest (2001) develop a parametric approach built on cumulative prospect theory to study the heterogeneity in risk preferences on a large-scale survey data, and find statistically significant differences in risk preferences between male and female respondents. Hartog, Ferrer-i-Carbonell, and Jonker (2002) test whether higher risk aversion in women can be due to their employment status to rule out the hypothesis that more women not having their own income leads them to act more risk averse and find that women display a higher degree of risk aversion even after controlling for the employment status.

Using both large-scale survey data and incentivized experiments, Dohmen et al. (2011) show that higher risk aversion in women is robust to the inclusion of a rich set of controls including wealth (e.g., assets and property values), income level, education, health status, and employment status (e.g., white versus blue collar). Their findings confirm that women demonstrate higher levels of risk aversion in both economic and non-economic decisions. Relatedly, compared to women, men tend to exhibit greater overconfidence (e.g., Prince, 1993), a cognitive bias that leads them to overestimate the accuracy of their decisions. In an influential paper, Barber and Odean (2001) show that men trade 45% more frequently than women rather than maintaining stable portfolios that reduce transaction costs. This higher volume of trading results in men's net returns being 2.65 percentage points lower, as their overconfidence leads them to overestimate the accuracy of their market information and insights and the potential benefits of frequent trading.

Importantly, supply chain risk management is vital for firm success, where failures can lead to halted operations, factory closures, lay-offs and downsizing, and substantial losses (see, for example, Tang, 2006 Chopra and Sodhi, 2004; Monahan et al., 2003; and Martha and Subbakrishna, 2002). Relatedly, the role of diversification, price and quantity commitment, and supplier audits/qualification/screening/termination has been of focal interest in the analytical operations/supply chain risk management literature.

Purchase obligations (which are effectively contractual price and quantity commitments) are established measures of supply chain risk management in the finance literature (see, for example, Almeida, Hankins, and Williams, 2017, 2020; Giambona and Wang, 2020; Moon and Phillips, 2021). Many papers in the analytical operations management literature analyze such price and quantity commitments in conjunction with supplier diversification for risk mitigation. In an influential paper, Anupindi and Akella (1993) examine the implications of purchase quantity commitments for managing supply risk, analyzing how firms allocate orders across suppliers under both demand and supply uncertainty. More recently, Hwang et al. (2018) demonstrate that purchase obligations/wholesale price contracts with fixed prices and quantities can effectively ensure reliable supply even when suppliers are subject to endogenous reliability risks that they can reduce with costly effort. Relatedly, Cui et al. (2020) find that wholesale contracts can outperform other types of contracts both in a behavioral model and controlled experiments - explaining the dominance of such contracts across sectors (see, for example, Hwang et al., 2018; Kalkanci et al., 2011; MacDonald et al., 2004; Chatterjee et al., 1999). In a Stackelberg game where competing suppliers set the price and the buyer sets the order quantity, Babich et al. (2007) study suppliers' equilibrium wholesale prices for different levels of default risk correlation across suppliers. In a setting with quantity-based Cournot competition, Tang and Kouvelis (2011) analyze the benefits of supplier diversification facing yield uncertainty when the buyers compete in a duopoly and need to set order quantities from suppliers given a wholesale price. While the source of supplier risk is tangential to the model specifications in these stylized models, in practice, supplier location constitutes a large component of supplier risk (see, for example, Namdar et al., 2025; Cohen and Lee, 2020; Kleindorfer and Saad, 2005). In a general equilibrium trade model, Ahn and Tan (2025) show that multi-regional supply chain diversification improves resilience. In light of this prior literature, we use geographical diversification and purchase obligations as two of our empirical measures of supply chain risk management.

In order to identify and remove unreliable suppliers, allowing firms to eliminate high-risk vendors from the supply base and safeguard operational continuity, firms can choose to invest in supplier audits and screening (see, e.g., Oboloo, 2025; ECQA, 2025). Buyers can also legally retain the right to terminate suppliers due to worsening financial position or failing an audit (see, for example, Allen & Heath, 2025; Rayner, 2025; Teufelberger, 2025). In the analytical operations management literature, supplier audits, screening, and assessments are studied as tools to evaluate suppliers' risk profile (see, for example, Aral et al., 2021; Wan et al., 2012; Hwang et al., 2006). Chen and Lee (2017) recognizes supplier terminations' importance to induce supplier compliance in settings with repeated interactions. Chaturvedi et al. (2021) advocate for intensified supplier screening and the removal of high-risk suppliers to mitigate the risk of supplier non-performance. Similarly, Gernert et al. (2023), as well as Babich et al. (2007), demonstrate that firms may strategically avoid engaging with suppliers exhibiting elevated default risk even when operating with a limited supply base. Motivated by these studies, in our paper, we empirically study the buyer's supplier termination behavior. To the best of our knowledge, our paper is the first to provide and use an empirical measure for risky supplier termination.

Our paper contributes to the growing empirical literature on supply chain risk management focusing on, for example, the effect of buyer's own bankruptcy risk on its sourcing strategy (Aral et al., 2023), the impact of supply chain glitches and disruptions on firm stock market performance (Hendricks and Singhal, 2005a,b; Hendricks, Jacobs, and Singhal, 2020), the role of long-term buyer-supplier relationships in accelerating recovery from supply chain disruptions (Jain, Girotra, and Netessine, 2022), and the effects of operational disruptions on airline performance and stock returns (Ramdas, Williams, and Lipson, 2013). We contribute to this literature by studying the effect of board gender diversity on three novel supply chain risk management measures: (1) purchase obligations; (2) geographical supply chain diversification; (3) termination of high default-risk suppliers. We combine this experimental setting with a compilation of novel datasets that allow us to study the relationship between corporate gender diversity and supply chain risk management. We believe that this setting can be fruitfully used by future research to study other OM policies.

3 The Board Gender Diversity Act of California

To study the effect of board gender diversity on supply chain risk management, we rely on several important changes that were introduced with the California Board Gender Diversity Act of 2018 (Senate Bill 826 – SB 826). Prior to SB 826, California had a resolution, the Senate Concurrent Resolution 62 of September 2013, which only encouraged, with little success, California firms to increase female representation on their boards (Jackson, Atkins, and Levya, 2018). It took nearly 5 years for California to pass a regulation requiring firms headquartered in the state to increase female representation on their boards. SB 826 was introduced on January 3, 2018, it was signed into law by Governor Jerry Brown on September 30, 2018, and chaptered by the Secretary of State as Chapter 954, (Statutes of 2018) on September 30, 2018.[4] SB 826 made California the first and only state in the US to ever pass a board gender diversity law.[5]

SB 826 required that by the end of 2019 all publicly listed firms headquartered in California have at least one female director on their corporate boards. In addition, SB 826 required that by the end of 2021 California corporations have two or more female directors or three or more female directors for boards of five members and boards of six or more members, respectively. Our analysis shows that 81.6% of the California firms in our sample had to add one or more female directors following the Act. However, by the end of 2019, 2020, 2021, 94.0%, 97.7%, and 99.2% of the California firms had at least one female director, respectively, while about 35% of the California firms with larger boards still needed to add one or more female directors at the end of the 2021 deadline. Overall, these figures suggest that California firms complied with the law, which is expected given that each

[4] SB 826 was declared unconstitutional on May 13, 2022, by a California Superior Court judge. California secretary of state has announced the intention to appeal the ruling. This type of reversals highlights the importance of studies on the role of corporate diversity on corporate decisions to help inform the policy debate. Our paper focuses on the period ending on December 31, 2021, when the Act was in full effect.

[5] Six other states have enacted legislation to encourage firms to increase board gender diversity (Colorado, Ohio, and Pennsylvania) or to disclose information on board gender diversity (Maryland, Illinois, and New York). Five other states, including Hawaii, Massachusetts, Michigan, New Jersey, and Washington, are each considering mandatory board gender diversity legislation. None of these states has mandatory board gender diversity legislation in place during our sample period. There are also two bills under discussion in the U.S. Congress to increase disclosure and further analysis of board gender diversity issues.

first violation is fined $100,000 and subsequent violations are fined $300,000 each. Notably, the Act introduced a binding obligation to add and retain female directors.[6] The reform affected about 16.2% of all publicly listed firms in the US, with a combined market capitalization of $6.9 trillion.

To assess the validity of our empirical design, we start by analyzing how board gender diversity and propensity to relocate changed for California firms after the Act. See Table A1 in the E-Companion for detailed definitions of the main variables used in the article. Table A2 (E-Companion) shows that the presence of female board members increased by 6% for the California firms relative to control firms in the four quarters leading to 2019Q4, the date by when SB 826 required California firms to have at least one female board member. We further find that the number of female board members increased by 8.8% in the quarters ending in 2021Q4, when the Act required additional female board members for California firms with larger boards. We also find that about 3% of the firms headquartered in California prior to the Act relocated to a different state by the end of 2019 (Table A3, E-Companion).[7]

4 Data and Empirical Design

Our data comes from a variety of sources. Our purchase obligations data is parsed from annual reports available through the SEC EDGAR database for our sample firms. In particular, we use a custom HTML parser to identify tables referencing "purchase obligation(s)", and verify that the associated tables report a non-zero amount of purchase obligations. We also extract each firm's CIK and filing year to enable merging with our main dataset. We have access to the annual reports of all the firms in our sample through the SEC Edgar database. Purchase obligations are formally legally binding contracts that require that the seller delivers a certain amount of goods or services at a certain price and follows a certain schedule, and are established measures of supply chain risk management (see, for example, Almeida, Hankins, and Williams, 2017, 2020; Giambona and Wang, 2020; Moon and Phillips, 2021).

In a purchase obligation, the buyer is obliged to receive the goods or services and pay the specified price. Failure from either party to fulfill the contract is a breach of the contract. For example, if the seller fails to deliver the contractual goods or services, the buyer can terminate the contract and find alternative suppliers, pursue a court order to compel delivery, and claim damage for losses (Uniform Commerce Code § 2-711, § 2-712, § 2-713, and § 2-716). Overall, breaching a purchase obligation has both significant legal and financial costs for the breaching

[6] This means that the Act is important for both firms that needed to add female directors and firms that had already a sufficient number of female directors, giving these directors more protection from the risk of being removed from their roles.

[7] This relatively low percentage of corporate headquarters changes is perhaps unsurprising given that relocation can be costly, requiring firms, for example, to conform to state-level regulations, potentially face challenges to retain some of their key employees, and incur direct costs associated with the relocation.

party. Notably, Accounting Standard Codification (ASC) 440, which provides guidance about commitments (including purchase obligations) and their disclosure, came into effect in the US when FASB issued its Accounting Standards Codification in 2019. Further, for publicly listed firms, which are exclusively the firms in our sample, the SEC requires (through the S-X 5-02 regulation) that commitments be explicitly reported on balance sheets.[8] Figure A1 in the E-Companion reports the purchase obligation tables in the 2020 annual reports of Ford Motor Co. and Hershey Co. In our regressions, we use as dependent variable, *Purchase Obligations*, an indicator for whether a given US buyer relies on purchase obligation in a given year. Refer to Table A1 in the E-Companion for detailed variable definitions.

Import-level data is from the Panjiva Supply Chain Intelligence platform. Using import-level data, we identify the quarterly number of regions from which a given US buyer imports its main production factors. We use *Log of Num. of Regions of Top Imported Product*, the natural logarithm of the number of regions from which the US buyer imports at lest 10% of its top production factor, as dependent variable in our regressions.[9] Supply chain relationship data is from the FactSet Revere Supply Chain Relationships database.[10] For each of the suppliers, we measure leverage, the ratio of financial debt to assets, using data from the FactSet Fundamentals North America and International databases. Using the combined supply chain relationship and leverage data, we define an indicator for suppliers that have a high default-risk, defined as having leverage above the sample 95th percentile of 68%, in the quarter in which they are exiting the pool of suppliers of a given

[8]Failing to report these commitments, even if they are non-written agreements, could result in legal/financial penalties and loss of reputation. This is the case because commitments are effectively future liabilities, and the SEC and other financial regulators require that current and prospective stock investors are informed about the financial soundness of the firms they invest in. Consequences from missing to report these commitments could go from the auditor issuing an adverse opinion, to regulators imposing fines or even criminal charges against the individuals involved. Despite these regulatory requirements, it is still possible that some firms could choose not to report purchase obligations in their annual reports. However, as discussed, this would be in violation of accounting and SEC regulations.

[9]This focus on global regions is motivated by two main considerations. First, nearly all major regions around the globe have established trading blocks with regulations and trade agreements to encourage import-export activities between the participating countries. Some of the major trading blocks include, for example, the European Union (including 27 European countries), the USMCA (USA-Mexico-Canada), RECP (including, among others, China, Japan, South Korea), and AfCFTA (including all 55 African Union nations) (see, for example, Cypher, 2025; Broom, 2023; Richter, 2020). Second, research has identified a strong economic interdependence among countries within the same geographic region, making them particularly vulnerable to intra-regional disruptions. For example, Kumra and Seong (2024) document that nearly 57% of Asia total trade value in 2022 occurred within the region, making Asia the most economically integrated trade region after the European Union (see, also, Marukawa, 2021). Further, because member countries operate under the umbrella-trade-policy of the block, they are are collectively affected by shifts in the trade policies of external import partners (see, for example, Ross and Cocks, 2025; European Commission, 2025).

[10]As discussed on the FactSet website, the dataset contains up-to-date information of material intercompany relationships obtained from supply contracts, SEC 10-K filings, investor presentations, press releases, and other public sources. The FactSet database coverage represents a significant improvement compared to the COMPUSTAT Segment Files of earlier studies, which are limited to large suppliers representing 10% or greater of public buyers' sales and hence are skewed towards small buyers.

buyer, *High-Default Risk Supplier Termination*.[11] We use this indicator as dependent variable in our regressions.

We combine *Purchase Obligations*, *Log of Num. of Regions of Top Imported Product*, and *High-Default Risk Supplier Termination* with buyer-level financial information from COMPUSTAT using CIKs, GVKEYs, and CUSIPs,[12] respectively. Our main sample includes publicly listed buyers, except financial firms (SICs 6000-6999). We obtain additional information for buyers from the following sources: historical headquarters information is parsed from corporate filings on the SEC EDGAR Database,[13] while corporate board information is from BoardEx. To test whether supply chain risk management changed for public firms headquartered in California after 2019, we estimate the following difference-in-difference model:

$$\begin{aligned} &Purchase\ Obligations_{i,t} = \\ &\qquad \beta(Treated_i \times Post\text{-}Act_t) + \boldsymbol{\gamma}'\mathbf{Controls}_{i,t-1} + y_i + z_t + i_i \times z_t + s_i \times z_t + \epsilon_{i,t} \end{aligned} \tag{1}$$

where $Purchase\ Obligations_{i,t}$ is a dummy variable equal to one if buyer i reports purchase obligations in year t, and 0 otherwise. $Treated_i$ is an indicator for firms headquartered in California (treated firms) in 2017 (the year before the Act was signed into law). $Post\text{-}Act_t$ is an indicator equal to 1 for the period starting in 2020. We consider 2020 as the first post-reform period because we are interested in testing the effect of the presence of female directors on supply chain risk management and the Act gave public firms headquartered in California until the end of 2019 to have at least one female corporate board director. y_i are firm fixed effects,[14] z_t are year fixed effects, and $i_i \times z_t$ and $s_i \times z_t$ are industry (2-digit SIC code) times year fixed effects and Delaware incorporation times year fixed effects, respectively. Our main analysis focuses on the sample period 2018–2021. These estimations include 326 treated firms, 1,551 control firms, and 58 2-digit SIC industries. The focus of our analysis is on $Treated \times Post\text{-}Act$: difference-in-difference estimator.

Our control variables include: (1) Size, the logarithm of assets; (2) Gross Margin, the ratio of earnings before interest, taxes, depreciation, and amortization to sales; (3) Capital Intensity, the ratio of property, plant, and equipment to assets; (4) Leverage, the ratio of debt to market assets;

[11] Overall, there are about 55 high-default risk suppliers terminations in our sample. This number resembles bankruptcy probabilities that we observe in the data, which are rare (but very costly) events. For example, the LoPucki Bankruptcy Research Database shows that during our sample period only 43 of the publicly listed firms in our sample filed for bankruptcy.

[12] See, for example, Cronqvist and Yu (2017), Oehmke and Zawadowski (2017), and Musto, Nini, and Schwarz (2018) for recent papers using CUSIPs.

[13] COMPUSTAT only includes the most current headquarters information. Because for our study we need historical headquarters data, we parse it directly from corporate filings.

[14] Because of the firm fixed effects, individual-specific intercepts α_i are absorbed in our estimations. Consequently, the reported constant term in fixed effect models by Stata and other regression packages does not represent a traditional intercept but rather an approximation that is not directly interpretable as the intercept for an individual unit (Greene, 2002, page 285; Wooldridge, 2012, page 489).

(5) Board Size, the natural logarithm of the number of directors; (6) Board Independence, the ratio of the number of independent directors to total directors. Standard errors are clustered at the headquarters' state level (e.g., Bertrand and Mullainathan, 2003; Cameron and Miller, 2005). These control variables are defined following standard practice in the literature (e.g., Gaur, Fisher, and Raman, 2005; Rumyantsev and Netessine, 2007; Kesavan, Gaur, and Raman, 2010; Jain, Girotra, and Netessine, 2014; Masulis and Zhang, 2019; Cai, Nguyen, and Walking, 2022).

Table 1 reports basic descriptive statistics for firms headquartered in California (treated firms) and firms headquartered in other states (control firms). On average, about 47% of the treated firms uses purchase obligations, compared with 38% for the control group. The number of regions from which treated and control firms import their top product is very similar, while the exit propensity of high default-risk suppliers is higher for California firms relative to firms from other states, 0.8% vs. 0.5%. Table 1 displays some other differences between the two groups, with the treated firms, for example, being smaller than the control firms, Size: 6.846 vs. 7.461. Table A4 in the E-Companion provides detailed descriptive statistics for all other variables used in the paper.[15]

[Table 1]

5 Supply Chain Risk Management after the Board Gender Diversity Act

In this section, we examine the effect of the California Board Gender Diversity Act on the propensity to use purchase obligations for California firms (treated group) relative to non-California firms (control group) by estimating Eq. (1). In these estimations, the dependent variable is an indicator for firms using purchase obligations. Table 2, columns 1 and 2, presents these results. Across all estimations in Table 2, the coefficient on the interaction term of interest—Treated × Post-Act—is positive and always statistically significant at the 1% level. For purchase obligations, this finding indicates that treated firms increased their propensity to use purchase obligations relative to control firms following the Act-induced increase in the number of female directors. Focusing on column 2 (estimation with all control variables), the coefficient on the interaction term suggests that the treated firms increased their propensity to use purchase obligations by 3.1% relative to the control firms after the Act. Turning briefly to the control variables, Table 2 shows that larger firms are more likely to use purchase obligations. Other control variables (coefficients unreported) are not statistically significant.

[15]To mitigate the concern that some of these differences could bias our results, we: (1) control for firm characteristics in all our regressions; (2) perform within-firm regression estimations by including firm fixed effects; (3) control for industry-quarter and Delaware incorporation-quarter fixed effects; (4) use Propensity Score Matching; (5) saturate the regression model with additional control variables to account for CEO and COO demographics. Our main findings and robustness tests suggest that results are unlikely to be influenced by differences in firm characteristics across treated and control firms.

[Table 2]

To further estimate the effect of the Act on supply chain risk management, we also estimate our difference-in-difference model using as dependent variables the natural logarithm of the number of regions from which a US buyer imports its top production factor and an indicator for suppliers with high default-risk when they exit the pool of suppliers of a given buyer. The significantly positive coefficient in Table 2, column 4, indicates that the number of regions from which buyers import at least 10% of their main production factor increased by about 3.3% (exponential of the coefficient in Table 2) for California firms relative to control firms following the Act. That is, the degree of supply chain diversification of California firms relative to firms from other states increased following the reform. Relatedly, Table 2, column 6, shows a higher propensity for California firms to discontinue high-default risk suppliers following the Act. These findings suggest that California buyers are more likely to discontinue supply chain relationships with suppliers that may file for bankruptcy in the foreseable future. Overall, the combined evidence in Table 2 indicates a higher propensity to engage in supply chain risk management for California buyers relative to control firms following the increase in women representation with the Act, consistent with the argument that women exhibit a higher degree of risk aversion than men (e.g., Cohen and Einav, 2007; Croson and Gneezy, 2009; Bertrand, 2010; Byrnes, Miller, and Schafer, 1999).[16]

To explore the mechanism through which female directors can influence supply chain risk management, in our next test, we partition California buyers into two groups depending on whether or not prior to the reform they had already enough female directors to satisfy the requirements of the Act. If the effects on supply chain risk management are associated with the addition of female directors, we should expect the changes to be greater when the Act is more likely to be more impactful. That is, when California buyers need to add one or more female directors following the Act, as opposed to when they already have enough female directors to satisfy the requirements of the Act. Furthermore, we should expect changes in supply chain risk management to be greater when female directors are better positioned to influence corporate decisions (e.g., DeMarzo, Vayanos, and Zwiebel, 2003; Larcker, So, and Wang, 2013; Burt, Hrdlicka, and Harford, 2020), which we measure based on female directors' tenure. To this end, we partition California buyers depending on whether or not their female directors' pre-reform tenure was above or below 5 years (the sample top quintile), which according to the Bureau of Labor Statistics (2025) is the work experience required for top executives.[17]

[16]Figure A2 in the E-Companion reports sample averages for the three dependent variables and the number of female directors for the treated firms, showing a similar pattern of increase in supply chain risk management following the Act in these model-free plots.

[17]See also Bonini et al. (2024), for a discussion on the importance of directors' tenure to mitigate risk.

In Table 3, we estimate Eq. (1) by interacting Treated × Post-Act with Not Enough Female Directors and Enough Female Director, which are indicators for buyers without and with a number of female directors pre-reform to satisfy the requirements of the Act. In line with our conjecture, columns 1-3 show that the propensity to use purchase obligations, the increase in the number of regions from which a buyer imports its top production factors, and the propensity to discontinue high default-risk suppliers are significantly higher for California buyers without enough pre-reform female directors. For example, for purchase obligations, the coefficient on Treated × Post-Act interacted with Not Enough Female Directors is 3.7% compared with 2.9% for the coefficient on Treated × Post-Act interacted with Enough Female Directors interaction. A Wald test t-statistic reported at the bottom of Table 3 shows that the two interaction terms are statistically different at the 5% level. We note that the coefficient on Post-Act interacted with Not Enough Female Directors is insignificant in columns 1 and 2, indicating no changes in purchase obligations and number of import regions for control firms with not enough female directors relative to control firms with enough female directors in the post reform period. However, this interaction term is significantly positive in the high-default risk supplier termination regression (column 3), indicating a higher propensity to terminate risky suppliers for control firms with not enough female directors relative to control firms with enough female directors in the post reform period.

[Table 3]

We also estimate Eq. (1) by interacting Treated × Post-Act with High Female Director Tenure and Low Female Director Tenure, which are indicators for California firms whose female directors' pre-reform tenure is more than 5 years or less than 5 years, respectively. In line with our expectation, the evidence in columns 4-6 shows that the increase in our three measures of supply chain risk management is significantly higher for California firms whose female directors have a longer tenure, who are arguably better positioned to influence corporate decisions. A Wald test shows that the differences in the triple interaction terms are all statistically significant at the 5% level or higher. Overall, the evidence in Table 3 suggests that the increase in supply chain risk management for California buyers is greater when female directors are better positioned to influence corporate decisions. The insignificant coefficient on the interaction of the high female director tenure indicator and the post reform dummy in column 4 suggests no change in purchase obligations for control firms with high female director tenure relative to those with low female director tenure. However, this interaction term is statistically significant in columns 5 and 6, indicating a decrease in the number of import regions (column 5) and a higher propensity to terminate risky suppliers (column 6), respectively, for control firms with high female director tenure relative to those with low female director tenure post reform.

In a related test, we estimated our regressions after interacting our Treated × Post-Act variable with the pre-act natural logarithm of the number of female directors that the firm needs to add to comply with the Act and the pre-act natural logarithm of the tenure of female directors. Table A5 (E-Companion) shows that the triple interaction term is significantly positive for all our three regressions. If the channel through which supply chain risk management increased for the treated firms is the increase in board gender diversity, we should expect a stronger post-reform impact on firms that needed to add more female directors, which is what we find. The statistical insignificance of the interactions of treated with the post indicator and missing female directors with post in columns 1-3 suggest no change in supply chain risk management post reform for treated firms without missing female directors and for control firms with missing female directors, respectively. Similarly, the increase in supply chain risk management is higher for treated firms where female directors have a longer tenure. If female directors are the channel through which supply chain risk management increased post Act for treated firms, we should observe a larger increase for female directors with longer tenure, which is what Table A5 shows. In columns 4-6, the statistically insignificant interaction between treated and the post dummy indicates no change in supply chain risk management for treated firms with limited-tenure female directors. The negatively significant coefficient on the interaction of post with female director tenure in column 4 suggests a decrease in purchase obligations for control firms post reform based on director tenure. Further, the positively significant interactions between post and female director tenure in column 6 indicates an increase in termination of risky suppliers for control firms post reform based on director tenure.

To help identify how adding female directors would affect supply chain decisions, we use information from the Boardex Individual Profile Employment database to assess whether the newly added female directors have held supply chain or operations management positions at some point in their careers. We focus on job titles covering supply chain or operations, and related domains, including procurement, sourcing, manufacturing, production, logistics, transportation, warehousing, distribution, inventory, retail, and e-commerce. This data shows that 71% of the treated firms added female directors with supply chain or operations management expertise during the reform period. To assess whether supply chain expertise of the newly added female directors plays a role on supply chain outcomes, we partition our firms based on whether or not the female directors have acquired supply chain expertise during their careers. Table 4, column 1, shows that the propensity to use purchase obligations increased by 4.2% and 1.7% for treated firms adding female directors with or without supply chain expertise, respectively. Notably, the difference of 2.5% (=4.2% - 1.7%) is statistically significant at the 1% level (refer to Wald's test at the bottom of Table 4). Similarly, Table 4 shows that increase in supply chain diversification and the propensity to terminate risky suppliers increased more after the reform for firms adding female directors with supply chain expertise relative to those without supply chain expertise. Again, the differences in the increases for firms adding female directors with expertise relative to those adding female directors without expertise are statistically significant at the 5% level or higher. The insignificant coefficient in the interaction of the female director supply chain expertise indicator with the post reform dummy in all three regressions indicates that there is no change in supply chain risk management for control firms based on the supply chain expertise of female directors.

5.1 Robustness Analysis and Validity Tests

To assess the validity of our identification strategy, it is important to verify that, prior to the Act, supply chain risk management for treated and control firms followed a parallel trend. To test for parallel trends, we estimate our purchase obligation model in Table 2, column 2, and our log of number of regions of top imported product (Table 2, column 4) and high default-risk supplier termination (Table 2, column 6) models by adding interaction terms of the treated dummy variable with year indicators (with 2018 as base case) (e.g., Autor, 2003; Gormley and Matsa, 2011; Freyaldenhoven, Hansen, and Shapiro, 2019; Goodman-Bacon, 2021). Figure 1, Panels A-C, plot the coefficients on the interaction terms from these estimations, together with 95% confidence intervals, for our three supply chain risk management measures.

[Figure 1]

Our results could be biased if California firms were affected differently by the coronavirus pandemic. Table A6, columns 1-3, show that the coefficients on the interaction term remain statistically significant and economically sizable for all our three measures of supply chain risk management if we omit the year 2020, the peak year of the pandemic, from our sample. In an additional test, we partition firms based on whether their sales in 2020 are above or below their average sales in the five years prior to the pandemic. Importantly, Table A6, columns 4-9, show that supply chain risk management increased for both firms that experienced an increase (arguably less affected by the pandemic) and firms that experienced a decline in their 2020 sales compared to their average sales in the five years prior to the pandemic.[18]

We also consider a proxy of purchase obligations that is more likely to capture repeated relationships as opposed to one-off orders. In this test, we build a purchase obligation indicator that

[18] Overall, our results suggest that it is through the actions of newly appointed female directors and not because of the pandemic that the treated firms increased supply chain risk management post-Act. To further mitigate the concern that our results could be driven by the pandemic, we regress our three supply chain risk management measures on the change of the ratio of female directors to total directors in a general framework for the 10-year period ending in 2017, the year prior to passage of the Act. Table A8 shows that that the propensity to use purchase obligations, the degree of supply chain diversification, and the propensity to discontinue high default-risk suppliers all increased when women are added to corporate boards. Because this analysis is performed using data prior to the pandemic, it further contributes to mitigate the concern that our results could be driven by the pandemic, while also suggesting that our results hold in a general setting outside of the quasi-natural experimental used as our main identification strategy.

is equal to one in the pre-reform period if the firm reports purchase obligations in both pre-reform years (2018-2019) (which is more likely to capture long-term relations) and zero if the firm report no purchase obligations in either years (i.e., firms that source exclusively from the spot market) or if the firms report purchase obligations only in one of the years (which is more likely to capture one-off less-structure procurement relationships). We follow a similar approach to define the dummy for the two post-reform years (2020-2021). Table A7 (E-Companion) shows that the propensity to use longer-term purchase obligations increased by 5.0% for treated firms relative to control firms post reform, which is a much larger economic effect compared to the 3.1% increase in our base purchase obligation model in our main Table 2.

Next, we assess whether firms use additional risk mitigation strategies. To this end, we parse information from corporate filings on whether firms use commodity hedging to protect themselves against the increase in the price of commodities. We identify commodity hedging using a rule-based natural language processing algorithm applied to SEC 10-K filings.[19] Table A9 (E-Companion) shows the propensity to use commodity hedging increase by 1.6% for treated firms relative to control firms in the post reform period. Figure A3 (E-Companion) shows that parallel trends hold.

To the extent that we are unable to properly control for differences between treated and control firms, our results should be interpreted instead as associations under plausible exogeneity. To help mitigate the concern that alternative channel could explain our results, in a robustness test, we perform Propensity Score Matching (PSM) on our control variables.[20] Table 5 shows that all our results hold in the matched sample. To be specific, we find that propensity to use purchase obligations, geographic supply chain diversification, and propensity to discontinue risky supplies increase by 3.3%, 5.8%, and 3.3%, respectively, in the matched sample, compared to 3.1%, 3.2%, and 2.2% in the main sample (Table 2). Overall, the matched analysis contributes to mitigating the concern that alternative channels could explain our results.

Because leverage varies by industry, it is important to check whether our high-default risk

[19] Our binary indicator flags firms that actively hedge commodity price risk through financial derivatives by analyzing Items 7 (MD&A), 7A (Market Risk Disclosures), and derivative-related disclosures in Item 8. The algorithm detects co-occurrence of commodity terms (e.g., oil, copper, wheat, natural gas) and derivative instruments (e.g., futures, forwards, swaps, options) within sentence boundaries, then apply multi-stage filters to eliminate false positives from alternative meanings. We require that commodity and derivative terms appear within proximity (15 tokens) alongside risk-related terms (e.g., price, volatility, exposure) and active verbs (e.g., use, enter, maintain), ensuring we capture actual hedging activity rather than generic risk disclosures. The algorithm excludes explicit negations (e.g., "does not hedge") and temporal qualifiers indicating past or hypothetical hedging (e.g., "previously hedged," "may consider") to isolate current hedging practices. The resulting commodity hedging dummy equals one if at least one such hedging sentence is identified in a given firm-year, and zero otherwise.

[20] Reassuringly, treated and control firms are similar in terms of control variables and propensity score in the matched sample (Table A10 in the E-Companion). Figure A4 in the E-Companion further shows that the propensity scores of treated and control firms have similar distributions in the matched sample. Having confirmed that we are able to identify suitable control firms for the treated group, we use the matched sample to estimate our main regressions.

supplier termination results hold when we adjust for industry. Table A11 (E-Companion) shows that results are robust if we define high-default risk supplier termination depending on whether leverage is above the industry 95th percentile. Table A11 further shows that results are robust if we use Low-Interest Coverage Ratio and Industry-Adjusted Low-Interest Coverage Ratio, which are indicators for suppliers with interest coverage ratio, the ratio of operating income to interest expenses, below the sample and the industry 5th percentiles, respectively.[21]

In our regressions, we use a linear probability model because nonlinear models suffer from the incidental parameter bias (Neyman and Scott, 1948; and, more recently, Lancaster, 2000; Greene, 2004; Fernández-Val, 2009) and nonexistence concern due to separation (e.g., Zorn, 2005; Correia et al., 2025) with multiple fixed effects. In a robustness test, we also re-estimate our models using the Poisson Pseudo–Maximum Likelihood (PPML) estimator with high-dimensional fixed effects of Correia et al. (2020, 2025).[22] Table A14 (E-Companion) shows that our purchase obligations and high-default risk termination results (which are both dummies) hold (both statistically significant at the 1% level) when we use the PPML estimator with high-dimensional fixed effects.[23]

6 Conclusion

A core responsibility of corporate boards is to define the firm's risk tolerance level, guide risk management strategies, and oversee risk mitigation and resilience efforts (see, for example, Moats, DeNicola, and Parker, 2022; Lipton et al., 2011, 2020). We study how changes in the corporate board structure with increased women participation affect supply chain risk management. Given that a substantial body of literature documents that women, on average, exhibit greater risk aversion than men (see, for example, Cohen and Einav, 2007; Croson and Gneezy, 2009; Bertrand, 2010; Byrnes, Miller, and Schafer, 1999), we predict that the inclusion of women in corporate boards should lead to an increase in supply chain risk management.

We test this prediction empirically leveraging on a regulation requiring public firms headquar-

[21] To account for the potential stricter 2021 requirements of the reform for firms with larger boards, we re-estimate our purchase obligation and high-default risk regressions for the sample period 2016-2023. We do not have access to the Panjiva database beyond 2021. Table A12 (E-Companion) shows that the propensity to use purchase obligations and terminate risky suppliers increased for treated firms in both the 2020-2021 period as well as the 2022-2023 period. This evidence further contributes to validating the importance of the reform for supply chain outcomes. In our main analysis, we cluster standard errors at the state of incorporation level following the literature recommending to cluster at the level at which the treatment is assigned, which in our case is the state of incorporation (e.g., Bertrand and Mullainathan, 2003; MacKinnon et al., 2023). Table A13 (E-Companion) shows that our results are robust when we cluster standard errors at the firm level.

[22] To use PPML in our setting, we first transform our logit model into a Poisson regression following the Multinomial–Poisson equivalence approach developed by Palmgren (1981), Baker (1994), and Guimarães (2004). We perform the transformation using the Stata command reshape_logit developed by Correia et al. (2025). The ado file for reshape_logit can be found in the GitHub repository for the ppmlhdfe *https://github.com/sergiocorreia/ppmlhdfe/blob/master/guides/code/reshape_logit.ado.* We then estimate PPML with high-dimensional fixed effects using the Stata command ppmlhdfe, which efficiently absorbs many fixed effects and performs separation checks, dropping only problematic observations (Correia et al., 2020; Correia et al., 2025).

[23] Table A15 shows that our results are robust when we control for CEO and COO age and tenure.

tered in California to increase female corporate board representation, combined with several novel data sources. We find that treated firms increased their supply chain risk management activities following the Act by using more purchase obligations–contracts that protect buyers against price fluctuations and reduce procurement uncertainty. We also find that treated firms increased the geographic diversification of their supply base and lowered their reliance on high default-risk suppliers. These changes were larger for the California firms that were more directly impacted by the Act. Our findings highlight that greater female board representation is associated with more active and deliberate risk management. These results suggest that governance structures and board composition in particular can meaningfully shape how firms perceive and manage operational risk.

Our findings contribute to the growing empirical literature on supply chain risk management by documenting how corporate governance, and specifically, how increased female representation on boards affects firms' supply chain risk management. We also contribute to the ongoing discourse on corporate gender quotas by demonstrating that exogenous increases in female board representation are associated with significant shifts in firms' supply chain risk management practices, and by identifying supply chain risk management as an important channel for the increase in performance with higher board gender diversity documented in previous studies (e.g., Hyndman and Honhon, 2020; Chu et al., 2019; Gutierrez et al., 2020; Webb, 2022).

Our study opens several avenues for future research. First, it highlights the value of combining governance data with operational measures to better understand how governance structure can affect firms' operational outcomes. Second, our findings highlight that board diversity may influence not only financial or strategic outcomes, as prior work has shown, but also operational decisions at the core of risk exposure. Finally, the measures we employ, for example, the high-risk supplier termination propensity, can be used for empirically studying the effect of other potential factors (e.g., buyer firms' own risk profile, location, supply base size, etc.) impacting firms' supply chain risk management decisions.

The takeaway for corporate executives is that board gender diversity helps firms increase their focus on supply chain risk management, boosting profitability. Our findings can also help inform the current policy debate on the role of corporate diversity regulations. At a time when initiatives to facilitate women's corporate participation have suffered several setbacks,[24] our findings suggest that board gender diversity can lead to a shift in strategic decisions and improve performance. Shareholders should recognize that diversity facilitates operational changes that increase value, while also boosting firms' corporate social responsibility profile.

[24] See, for example, Suddath, 2022, "It's Getting Harder to Be a Woman in America," Bloomberg, for a discussion of the recent events that have made women's participation in the corporate world more challenging.

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Table 1: **Descriptive Statistics.** The table reports descriptive statics for our main variables for the period 2018–2021. Purchase obligation and historical headquarters information is parsed from the SEC EDGAR Database. Data to build the number of regions from which a buyer imports its main product is from the Panjiva Supply Chain Intelligence platform. We use data from the FactSet Revere Supply Chain Relationships database and the FactSet Fundamentals North America and International databases to build the high-default risk supplier termination indicator. All other firm-level data is from COMPUSTAT and BoardEx. Treated is a dummy variable equal to 1 for firms headquartered in California (treated firms), and 0 for firms headquartered in other states (control firms) in 2017. Refer to Table A1 for detailed variable definitions.

Panel A: Treated Firms: Yes						
Variables	Mean	Std. Dev.	25^{th} Prc.	Median	75^{th} Prc.	Obs.
Purchase Obligations	0.472	0.499	0.000	0.000	1.000	1,173
Log of Num. of Regions of Top Imported Product	0.723	0.132	0.693	0.693	0.693	984
High-Default Risk Supplier Termination	0.008	0.087	0.000	0.000	0.000	1,437
Size	6.846	1.989	5.431	6.715	8.105	1,173
Gross Margin	0.101	0.239	0.038	0.111	0.209	1,173
Capital Intensity	0.179	0.208	0.050	0.101	0.198	1,173
Leverage	0.140	0.166	0.019	0.083	0.194	1,173
Board Size	2.071	0.251	1.946	2.079	2.197	1,173
Board Independence	0.731	0.112	0.667	0.750	0.800	1,173

Panel B: Treated Firms: No						
Variables	Mean	Std. Dev.	25^{th} Prc.	Median	75^{th} Prc.	Obs.
Purchase Obligations	0.383	0.486	0.000	0.000	1.000	5,842
Log of Num. of Regions of Top Imported Product	0.728	0.173	0.693	0.693	0.693	6,737
High-Default Risk Supplier Termination	0.005	0.071	0.000	0.000	0.000	8,885
Size	7.461	1.933	6.174	7.510	8.764	5,842
Gross Margin	0.120	0.191	0.059	0.126	0.197	5,842
Capital Intensity	0.299	0.256	0.095	0.206	0.460	5,842
Leverage	0.222	0.184	0.079	0.184	0.326	5,842
Board Size	2.142	0.258	1.946	2.197	2.303	5,842
Board Independence	0.733	0.129	0.667	0.750	0.818	5,842

Table 2: **Supply Chain Risk Management after the Board Gender Diversity Act.** This table presents estimations from purchase obligations, supplier diversification, and supplier default-risk regressions. The dependent variables are Purchase Obligations, Log of Num. of Regions of Top Imported Product, and High-Default Risk Supplier Termination. Treated is an indicator for firms headquartered in California (treated firms) and 0 for firms headquartered in other states (control firms) in 2017. Post-Act is an indicator equal to 1 for 2020–2021, and zero for 2018–2019. Additional controls include Gross Margin, Capital Intensity, Leverage (except in columns 5-6), Board Size, and Board Independence. In columns 5-6, we also include the following supplier level controls: Size, Gross Margin, and Capital Intensity. In these two regressions, the level of analysis is at the buyer-supplier pair level. Refer to Table A1 for detailed variable definitions. Standard errors reported in parentheses are clustered at the headquarters state level. Note: ***, ** and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Dep. variables:	Purchase Obligations		Log of Num. of Regions of Top Imported Product		High-Default Risk Supplier Termination	
	[1]	[2]	[3]	[4]	[5]	[6]
Treated × Post-Act	0.027***	0.031***	0.032***	0.032***	0.019***	0.022***
	(0.007)	(0.007)	(0.009)	(0.009)	(0.005)	(0.004)
Size	0.042**	0.038**	0.017**	0.033**	0.029**	0.025**
	(0.018)	(0.017)	(0.008)	(0.015)	(0.013)	(0.012)
Additional Controls	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Buyer Industry × Year Fixed Effects	Yes	Yes	Yes	Yes	No	No
Supplier Industry × Year Fixed Effects	No	No	No	No	Yes	Yes
Incorp. × Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	State	State	State	State	State	State
Obs.	7,207	7,015	7,791	7,721	10,642	10,322
R-2 (adjusted)	0.861	0.862	0.384	0.382	0.253	0.272

Table 3: **Supply Chain Risk Management after the Board Gender Diversity Act: By Female Director Influence.** This table presents estimations from purchase obligations, supplier diversification, and supplier default-risk regressions. The dependent variables are Purchase Obligations, Log of Num. of Regions of Top Imported Product, and High-Default Risk Supplier Termination. Treated is an indicator for firms headquartered in California (treated firms), and 0 for firms headquartered in other states (control firms) in 2017. Post-Act is an indicator equal to 1 for 2020–2021, and zero for 2018–2019. Not Enough Female Directors (Enough Female Directors) is an indicator for firms that do not have enough (have enough) female directors pre-reform to satisfy the Board Gender Diversity Act. High Female Director Tenure (Low Female Director Tenure) is an indicator for firms whose average female directors' pre-reform tenure is above (below) 5 years. Controls include Size, Gross Margin, Capital Intensity, Leverage (except in columns 3 and 6), Board Size and Board Independence. In columns 3 and 6, we also include the following supplier level controls: Size, Gross Margin, and Capital Intensity. Regressions also include a constant term. Refer to Table A1 for detailed variable definitions. Standard errors reported in parentheses are clustered at the headquarters state level. Note: ***, ** and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Dep. variables:	Purchase Obligations	Log of Num. of Regions of Top Imported Product	High-Default Risk Supplier Termination	Purchase Obligations	Log of Num. of Regions of Top Imported Product	High-Default Risk Supplier Termination
	[1]	[2]	[3]	[4]	[5]	[6]
Treated × Post-Act × Not Enough Female Directors	0.037***	0.075***	0.027***			
	(0.006)	(0.015)	(0.006)			
Treated × Post-Act × Enough Female Directors	0.029***	0.028***	0.018***			
	(0.007)	(0.009)	(0.004)			
Post-Act × Not Enough Female Directors	-0.001	-0.001	0.003**			
	(0.008)	(0.006)	(0.002)			
Treated × Post-Act × High Female Director Tenure				0.039***	0.033***	0.059***
				(0.007)	(0.009)	(0.006)
Treated × Post-Act × Low Female Director Tenure				0.030***	0.022***	0.015***
				(0.007)	(0.008)	(0.005)
Post-Act × High Female Director Tenure				-0.001	-0.013**	0.005***
				(0.008)	(0.006)	(0.002)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Buyer Industry × Year Fixed Effects	Yes	Yes	No	Yes	Yes	No
Supplier Industry × Year Fixed Effects	No	No	Yes	No	No	Yes
Incorp. × Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	State	State	State	State	State	State
Obs.	6,995	7,718	10,248	7,015	7,721	10,322
Wald Test t-statistic: Interaction Coeff. Differences	2.12**	3.25***	2.33**	2.39**	1.82*	4.72***
R-2 (adjusted)	0.861	0.272	0.272	0.862	0.381	0.273

Table 4: **Supply Chain Risk Management after the Board Gender Diversity Act: By Female Director Supply Chain Experience.** This table presents estimations from purchase obligations, supplier diversification, and supplier default-risk regressions. The dependent variables are Purchase Obligations, Log of Num. of Regions of Top Imported Product, and High-Default Risk Supplier Termination. Treated is an indicator for firms headquartered in California (treated firms) and 0 for firms headquartered in other states (control firms) in 2017. Post-Act is an indicator equal to 1 for 2020–2021, and zero for 2018–2019. Supply Chain Exp. (No Supply Chain Exp.) equals 1 for firms that hired (did not hire) after the reform female directors with operations management and supply chain experience. Controls include Size, Gross Margin, Capital Intensity, Leverage (except in column 3), Board Size and Board Independence. In column 3, we also include the following supplier level controls: Size, Gross Margin, and Capital Intensity. Regressions also include a constant term. Refer to Table A1 for detailed variable definitions. Standard errors reported in parentheses are clustered at the headquarters state level. Note: ***, ** and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

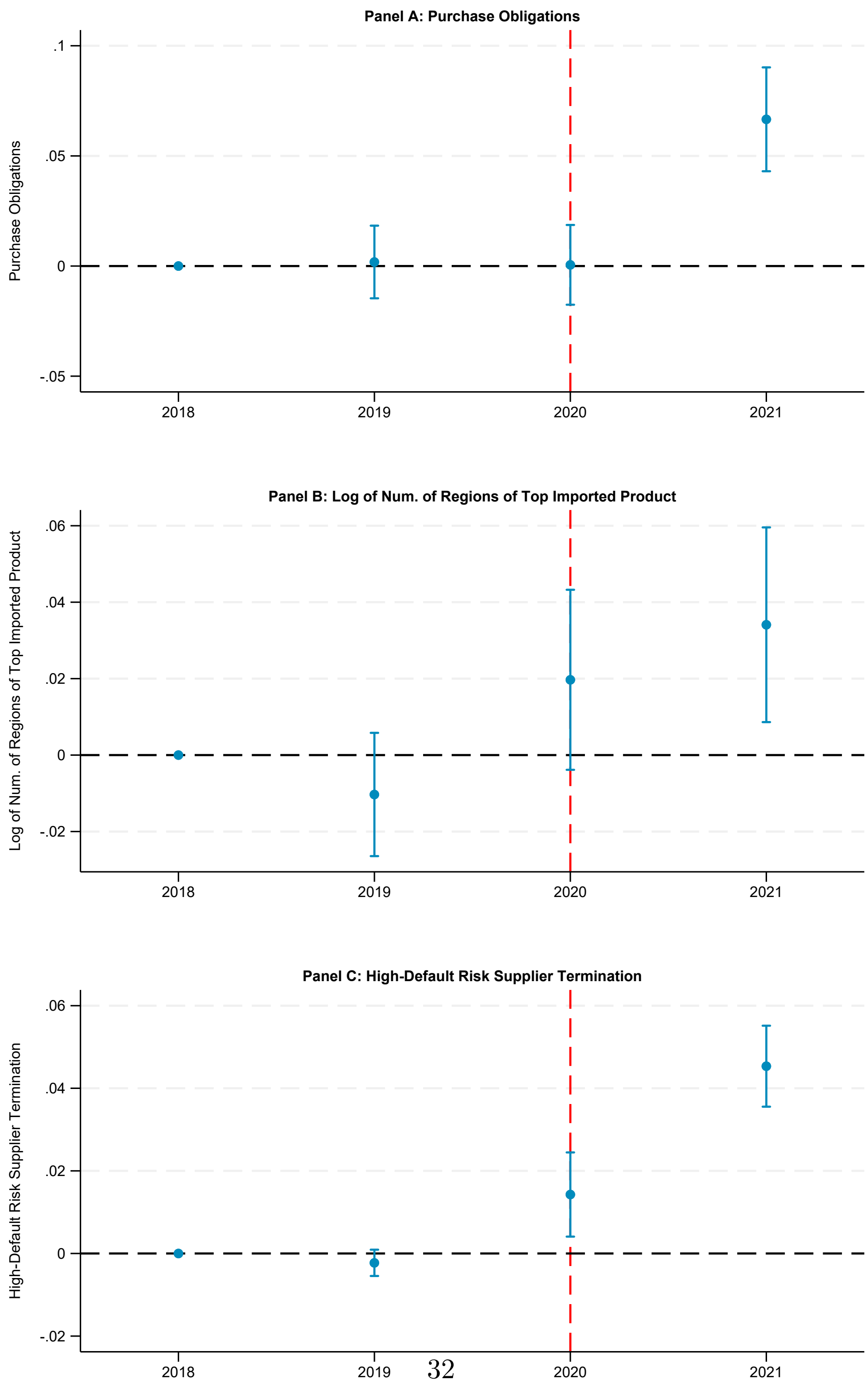
Dep. variables:	Purchase Obligations	Log of Num. of Regions of Top Imported Product	High-Default Risk Supplier Termination
	[1]	[2]	[3]
Treated × Post-Act × Supply Chain Exp.	0.042***	0.039***	0.040***
	(0.008)	(0.009)	(0.005)
Treated × Post-Act × No Supply Chain Exp.	0.017**	0.026**	0.008*
	(0.008)	(0.010)	(0.005)
Post-Act × Supply Chain Exp.	-0.001	0.007	-0.001
	(0.009)	(0.011)	(0.006)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Buyer Industry × Year Fixed Effects	Yes	Yes	No
Supplier Industry × Year Fixed Effects	No	No	Yes
Incorp. × Year Fixed Effects	Yes	Yes	Yes
Clustering	State	State	State
Obs.	7,015	7,721	10,322
Wald Test t-statistic: Interaction Coeff. Differences	3.86***	2.65**	7.68***
R-2 (adjusted)	0.862	0.382	0.273

Table 5: **Supply Chain Risk Management after the Board Gender Diversity Act: Propensity Score Matching.** This table presents estimations from purchase obligations, supplier diversification, and supplier default-risk regressions using a matched sample of treated and control firms. Matching is conducted using a one-to-one propensity score matching estimator, where the treatment indicator equals 1 for firms headquartered in California (treated firms) and 0 otherwise. The propensity score is estimated based on Size, Gross Margin, Capital Intensity, Leverage, Board Size, and Board Independence. The dependent variables are Purchase Obligations, Log of Num. of Regions of Top Imported Product, and High-Default Risk Supplier Termination. Treated is an indicator for firms headquartered in California (treated firms) and 0 for firms headquartered in other states (control firms) in 2017. Post-Act is an indicator equal to 1 for 2020–2021, and zero for 2018–2019. Controls include Size, Gross Margin, Capital Intensity, Leverage (except in column 3), Board Size and Board Independence. In column 3, we also include the following supplier level controls: Size, Gross Margin, and Capital Intensity. Regressions also include a constant term. Refer to Table A1 for detailed variable definitions. Standard errors reported in parentheses are clustered at the headquarters state level. Note: ***, ** and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Dep. variables:	Purchase Obligations	Log of Num. of Regions of Top Imported Product	High-Default Risk Supplier Termination
	[1]	[2]	[3]
Treated × Post-Act	0.033**	0.058***	0.033***
	(0.016)	(0.014)	(0.005)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Buyer Industry × Year Fixed Effects	Yes	Yes	No
Supplier Industry × Year Fixed Effects	No	No	Yes
Incorp. × Year Fixed Effects	Yes	Yes	Yes
Clustering	State	State	State
Obs.	2,162	1,781	3,285
R-2 (adjusted)	0.916	0.359	0.237

Figure 1: Supply Chain Risk Management before/after the Board Gender Diversity Act: Testing for Pre-Reform Trends

This figure plots the coefficients on the interactions of the Treated indicator with year dummies from yearly difference-in-difference purchase obligations, supplier diversification, and supplier default-risk regressions with pre-shock interactions. The dependent variables are Purchase Obligations (Panel A), Log of Num. of Regions of Top Imported Product (Panel B), and High-Default Risk Supplier Termination (Panel C). Treated is an indicator for firms headquartered in California (treated firms), and 0 for firms headquartered in other states (control firms) in 2017. In Panels A–C, the coefficients indicate the percentage change in each respective dependent variable for treated firms relative to control firms from 1 year prior to the treatment to 2 years after the treatment over the period 2018–2021 (with 2018 as the base case). Refer to Table A1 for detailed variable definitions. Ninety-five percent confidence intervals are also plotted.



E-Companion to

Board Gender Diversity and Supply Chain Risk Management

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Table A1: **Key Variables.** This table provides the definitions of the main variables used in this article.

Main firm level variables:	**Definition**
Purchase Obligations	An indicator for firms with a total amount of purchases obligations larger than $0 in their 10-Ks (Almeida, Hankins, and Williams, 2017). Purchase obligation data is parsed from corporate filings on the SEC EDGAR Database. Base sample period 2018–2021.
Log of Num. of Regions of Top Imported Product	The natural logarithm of the quarterly number of regions from which a company imports at least 10% of its top imported product based on volume (TEU). Import data is from the Panjiva Supply Chain Intelligence platform. Base sample period 2018–2021.
High-Default Risk Supplier Termination	An indicator for suppliers that have a high default-risk, defined as having leverage above the sample 95th percentile, in the quarter when they exit the pool of suppliers of a given buyer. Supply chain relationship data is from the FactSet Revere Supply Chain Relationships database. Data on supplier fundamentals is from the FactSet Fundamentals North America and International databases. Base sample period 2018–2021.
Treated	Indicator for firms headquartered in California in 2017. Historical headquarters information is parsed from corporate filings on the SEC EDGAR Database. Base sample period 2018–2021.
Size	The natural logarithm of book assets (COMPUSTAT item at). Base sample period 2018–2021.
Gross Margin	The ratio of earnings before interest, taxes, depreciation, and amortization (COMPUSTAT item oibdp) to sales. Base sample period 2018–2021.
Capital Intensity	The ratio of property, plant, and equipment (COMPUSTAT item ppent) to book assets. Base sample period 2018–2021.
Leverage	The ratio of total debt (COMPUSTAT items dlcq + dlttq) to market value of assets (COMPUSTAT items at + prcc_c × csho - ceq - txditc). Base sample period 2018–2021.
Board Size	The natural logarithm of the number of directors. Data on board of directors is from BoardEx. Base sample period 2018–2021.
Board Independence	The ratio of the number of independent directors to total directors. Data on board of directors is from BoardEx. Base sample period 2018–2021.
Additional firm level variables:	**Definition**
Not Enough (Enough) Female Directors	An indicator for firms headquartered in California that do not have enough (have enough) pre-reform female directors to satisfy the Board Gender Diversity Act. Data on board of directors is from BoardEx. Base sample period 2018–2021.
High (Low) Female Director Tenure	An indicator for firms with average pre-reform female directors' tenure above (below) 5 years. Data on board of directors is from BoardEx. Base sample period 2018–2021.
ΔFemale Directors	Changes in the ratio of number of female directors to total directors. Data on board of directors is from BoardEx.

Table A1 continued.

Variable	Definition
Log of Female Directors	The natural logarithm of the total number of female directors. Data on board of directors is from BoardEx. Base sample period 2018–2021.
CEO Age	The natural logarithm of the age of a company's CEO. Data on directors is from BoardEx. Base sample period 2018–2021.
CEO Tenure	The natural logarithm of the tenure of a company's CEO. Data on directors is from BoardEx. Base sample period 2018–2021.
COO Age	The natural logarithm of the age of a company's COO. Data on directors is from BoardEx. Base sample period 2018–2021.
COO Tenure	The natural logarithm of the tenure of a company's COO. Data on directors is from BoardEx. Base sample period 2018–2021.

Table A2: **Board Gender Composition for Treated Firms after 2018Q3.** This table presents estimations from board gender composition regressions. The dependent variable is Log of Female Directors, the natural logarithm of the number of female directors. Treated is an indicator for firms headquartered in California (treated firms), and 0 for firms headquartered in other states (control firms) in 2017. Post-2018Q3 is an indicator equal to 1 for the quarters 2018Q4 and following quarters. Data on the board of directors is from BoardEx. Sample periods range from 2017Q4-2019Q3 (column 1), 2017Q3-2019Q4 (column 2), 2016Q4-2020Q3 (column 3), 2015Q4-2021Q3 (column 4), and 2015Q3-2021Q4 (column 5), respectively. Other controls include Gross Margin, Capital Intensity, and Leverage. Regressions also include a constant term. Refer to Table A1 for detailed variable definitions. Standard errors reported in parentheses are clustered at the headquarters state level. Note: ***, ** and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Dep. variable:	Log of Female Directors				
	2017Q4-2019Q3	2017Q3-2019Q4	2016Q4-2020Q3	2015Q4-2021Q3	2015Q3-2021Q4
	[1]	[2]	[3]	[4]	[5]
Treated × Post-2018Q3	0.060***	0.059***	0.073***	0.086***	0.088***
	(0.008)	(0.009)	(0.010)	(0.010)	(0.010)
Size	0.039*	0.041**	0.077***	0.086***	0.087***
	(0.022)	(0.020)	(0.014)	(0.012)	(0.012)
Other Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Industry × Quarter FE	Yes	Yes	Yes	Yes	Yes
Incorp. × Quarter FE	Yes	Yes	Yes	Yes	Yes
Clustering	State	State	State	State	State
Obs.	13,775	17,385	27,273	38,862	41,584
R-2 (adjusted)	0.907	0.901	0.870	0.851	0.848

Table A3: **Propensity of Being Headquartered in California after 2018Q3.** This table presents estimations from board gender composition regressions. The dependent variable is California HQ's (Yes=1), a time-varying indicator for firms headquartered in California. Treated is an indicator for firms headquartered in California (treated firms), and 0 for firms headquartered in other states (control firms) in 2017. Post-2018Q3 is an indicator equal to 1 for the quarters 2018Q4 and following quarters. Historical quarterly headquarters information is parsed from corporate filings on the SEC EDGAR Database. Sample period ranges from 2017Q4-2019Q3. Other controls include Gross Margin, Capital Intensity, and Leverage. Regressions also include a constant term. Refer to Table A1 for detailed variable definitions. Standard errors reported in parentheses are clustered at the headquarters state level. Note: ***, ** and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Dep. variable:	California HQ's (Yes=1)	
	[1]	[2]
Treated × Post-2018Q3	-0.032***	-0.029***
	(0.002)	(0.002)
Size	0.003	-0.005
	(0.003)	(0.008)
Other Controls	Yes	Yes
Firm FE	Yes	Yes
Industry × Quarter FE	Yes	Yes
Incorp. × Quarter FE	Yes	Yes
Clustering	State	State
Obs.	18,803	15,031
R-2 (adjusted)	0.984	0.985

Table A4: **Descriptive Statistics.** This table reports descriptive statistics for the additional variables used in this article for the Treated: Yes firms (Panel A) and the Treated: No firms (Panel B). Sample period is 2018–2021. Refer to Table A1 for detailed variable definitions.

Panel A: Treated Firms: Yes						
Variables	Mean	Std. Dev.	25^{th} Prc.	Median	75^{th} Prc.	Obs.
ΔFemale Ratio	0.035	0.069	0.000	0.000	0.083	966
Financial Hedging	0.094	0.292	0.000	0.000	0.000	1,173
Profitability	-0.032	0.246	-0.031	0.019	0.048	1,018
Log of Female Directors	0.975	0.472	0.693	1.099	1.386	3,000
California Suppliers	0.245	0.256	0.000	0.182	0.375	3,594
CEO Age	6.981	1.053	6.328	6.999	7.675	836
CEO Tenure	7.233	0.946	6.593	7.245	7.866	835
COO Age	4.070	0.139	3.989	4.078	4.159	831
COO Tenure	4.090	0.142	4.007	4.094	4.174	825
Panel B: Treated Firms: No						
Variables	Mean	Std. Dev.	25^{th} Prc.	Median	75^{th} Prc.	Obs.
ΔFemale Ratio	0.022	0.063	0.000	0.000	0.042	4,923
Financial Hedging	0.107	0.310	0.000	0.000	0.000	5,842
Profitability	-0.023	0.287	-0.012	0.037	0.066	5,344
Log of Female Directors	0.979	0.483	0.693	1.099	1.386	16,918
California Suppliers	0.099	0.178	0.000	0.000	0.143	19,666
CEO Age	6.920	0.996	6.307	6.936	7.599	4,141
CEO Tenure	7.139	0.925	6.510	7.159	7.779	4,111
COO Age	4.078	0.128	4.007	4.094	4.159	4,120
COO Tenure	4.102	0.126	4.025	4.111	4.174	4,083

Table A5: **Supply Chain Risk Management after the Board Gender Diversity Act: Missing Female Directors and Female Director Tenure.** This table presents estimations from purchase obligations, supplier diversification, and supplier default-risk regressions. The dependent variables are Purchase Obligations, Log of Num. of Regions of Top Imported Product, and High-Default Risk Supplier Termination. Treated is an indicator for firms headquartered in California (treated firms) and 0 for firms headquartered in other states (control firms) in 2017. Post-Act is an indicator equal to 1 for 2020–2021, and 0 for 2018–2019. Missing Female Directors is the pre-act natural logarithm of the number of female directors that the firm needs to add to comply with the Act and Female Director Tenure is the pre-act natural logarithm of the tenure of female directors. Controls include Size, Gross Margin, Capital Intensity, Leverage (except in columns 3 and 6), Board Size, and Board Independence. In columns 3 and 6 we also include supplier level controls: Size, Gross Margin, and Capital Intensity. Regressions also include a constant term. Refer to Table A1 for detailed variable definitions. Standard errors (in parentheses) are clustered at the headquarters state level. Note: ***, **, and * denote significance at the 1%, 5%, and 10% (two-tail) levels, respectively.

Dep. variables:	Purchase Obligations	Log of Num. of Regions of Top Imported Product	High-Default Risk Supplier Termination	Purchase Obligations	Log of Num. of Regions of Top Imported Product	High-Default Risk Supplier Termination
	[1]	[2]	[3]	[4]	[5]	[6]
Treated × Post-Act × Missing Female Directors	0.021***	0.022**	0.030***			
	(0.006)	(0.009)	(0.006)			
Treated × Post-Act	0.012	0.005	0.002			
	(0.008)	(0.009)	(0.002)			
Post-Act × Missing Female Directors	0.016	0.002	-0.002			
	(0.013)	(0.005)	(0.005)			
Treated × Post-Act × Female Director Tenure				0.005***	0.004***	0.004***
				(0.001)	(0.001)	(0.001)
Treated × Post-Act				-0.001	-0.006	-0.003
				(0.010)	(0.009)	(0.002)
Post-Act × Female Director Tenure				-0.013**	0.002	0.006*
				(0.006)	(0.005)	(0.003)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Buyer Industry × Year FE	Yes	Yes	No	Yes	Yes	No
Supplier Industry × Year FE	No	No	Yes	No	No	Yes
Incorp. × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	State	State	State	State	State	State
Obs.	6,667	7,522	10,188	6,504	6,977	9,757
R-2 (adjusted)	0.902	0.470	0.337	0.904	0.478	0.316

Table A6: **Supply Chain Risk Management after the Board Gender Diversity Act: Robustness Tests.** This table presents estimations from purchase obligations, supplier diversification, and supplier default-risk regressions. The dependent variables are Purchase Obligations, Log of Num. of Regions of Top Imported Product, and High-Default Risk Supplier Termination. Treated is an indicator for firms headquartered in California (treated firms), and 0 for firms headquartered in other states (control firms) in 2017. Post-Act is an indicator equal to 1 for 2020–2021, and zero for 2018–2019. In columns 1-3, we exclude 2020 from the sample. In columns 4 (5), 6 (7), and 8 (9) the sample includes firms with 2020 sales above (below) their average 2015-2019 sales. Controls include Size, Gross Margin, Capital Intensity, Leverage (except in columns 3, 8, and 9), Board Size and Board Independence. In columns 3, 8, and 9, we also include the following supplier level controls: Size, Gross Margin, and Capital Intensity. Regressions also include a constant term. Refer to Table A1 for detailed variable definitions. Standard errors reported in parentheses are clustered at the headquarters state level. Note: ***, ** and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Dep. variables:	Purchase Obligations	Log of Num. of Regions of Top Imported Product	High-Default Risk Supplier Termination	Purchase Obligations		Log of Num. of Regions of Top Imported Product		High-Default Risk Supplier Termination	
	Excluding 2020			2020 Sales/Avg. 2015-2019		2020 Sales/Avg. 2015-2019		2020 Sales/Avg. 2015-2019	
				>1	≤1	>1	≤1	>1	≤1
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Treated × Post-Act	0.066***	0.040***	0.042***	0.038***	0.028***	0.042**	0.033**	0.028***	0.018***
	(0.010)	(0.010)	(0.005)	(0.010)	(0.010)	(0.018)	(0.013)	(0.006)	(0.003)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Buyer Industry × Year Fixed Effects	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No
Supplier Industry × Year Fixed Effects	No	No	Yes	No	No	No	No	Yes	Yes
Incorp. × Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	State	State	State	State	State	State	State	State	State
Obs.	5,267	5,831	8,237	4,208	2,780	3,175	4,531	5,150	5,161
R-2 (adjusted)	0.835	0.389	0.166	0.869	0.849	0.397	0.388	0.317	0.269

Table A7: **Repeated Purchase Obligations after the Board Gender Diversity Act.** This table presents estimations from repeated purchase obligations regressions. The dependent variable is Repeated Purchase Obligations, an indicator equal to 1 in 2018-2019 for firms that report purchase obligations in both years and 0 otherwise. Similarly, the indicator is equal to 1 in 2020-2021 for firms that report purchase obligations in both years and 0 otherwise. Treated is an indicator for firms headquartered in California (treated firms), and 0 for firms headquartered in other states (control firms) in 2017. Post-Act is an indicator equal to 1 for 2020–2021, and zero for 2018–2019. Additional controls include Gross Margin, Capital Intensity, Leverage, Board Size, and Board Independence. Refer to Table A1 for detailed variable definitions. Standard errors reported in parentheses are clustered at the headquarters state level. Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Dep. variable:	Repeated Purchase Obligations	
	[1]	[2]
Treated × Post-Act	0.048***	0.050***
	(0.011)	(0.011)
Size	0.026	0.023
	(0.018)	(0.017)
Additional Controls	No	Yes
Firm FE	Yes	Yes
Industry × Year Fixed Effects	Yes	Yes
Incorp. × Year Fixed Effects	Yes	Yes
Clustering	State	State
Obs.	7,207	7,015
R-2 (adjusted)	0.858	0.859

Table A8: **Supply Chain Risk Management before the Board Gender Diversity Act: General Sample Results.** This table presents estimations from purchase obligations, supplier diversification, and supplier default-risk regressions. The dependent variables are Purchase Obligations, Log of Num. of Regions of Top Imported Product, and High-Default Risk Supplier Termination. ΔFemale Directors is the change of the ratio of the number of female directors to total directors. Controls include Size, Gross Margin, Capital Intensity, Leverage (except in column 3), Board Size and Board Independence. In column 3, we also include the following supplier level controls: Size, Gross Margin, and Capital Intensity. Regressions also include a constant term. Refer to Table A1 for detailed variable definitions. Standard errors reported in parentheses are clustered at the headquarters state level. Note: ***, ** and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Dep. variables:	Purchase Obligations	Log of Num. of Regions of Top Imported Product	High-Default Risk Supplier Termination
	[1]	[2]	[3]
ΔFemale Directors	0.113**	0.119**	0.014**
	(0.056)	(0.052)	(0.007)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Buyer Industry x Year Fixed Effects	Yes	Yes	No
Supplier Industry x Year Fixed Effects	No	No	Yes
Incorp. x Year Fixed Effects	Yes	Yes	Yes
Clustering	State	State	State
Obs.	11,148	16,019	25,412
R-2 (adjusted)	0.778	0.400	0.097

Table A9: **Commodity Hedging after the Board Gender Diversity Act.** This table presents estimations from commodity hedging regressions. The dependent variable is Commodity Hedging, an indicator for whether a firm engages in commodity hedging. Treated is an indicator for firms headquartered in California (treated firms), and 0 for firms headquartered in other states (control firms) in 2017. Post-Act is an indicator equal to 1 for 2020–2021, and zero for 2018–2019. Additional controls include Gross Margin, Capital Intensity, Leverage, Board Size, and Board Independence. Regressions also include a constant term. Refer to Table A1 for detailed variable definitions. Standard errors reported in parentheses are clustered at the headquarters state level. Note: ***, ** and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Dep. variable:	Commodity Hedging	
	[1]	[2]
Treated × Post-Act	0.016**	0.016**
	(0.006)	(0.006)
Size	0.016	0.015
	(0.010)	(0.010)
Additional Controls	No	Yes
Firm FE	Yes	Yes
Industry × Year Fixed Effects	Yes	Yes
Incorp. × Year Fixed Effects	Yes	Yes
Clustering	State	State
Obs.	7,015	7,015
R-2 (adjusted)	0.835	0.835

Table A10: **Pre-Reform Mean Difference and Distributional Tests for Treated and Control Firms.** This table reports the mean difference t-test p-value of firm characteristics for treated firms (California headquarters in 2017) and controls (non-California headquarters in 2017) in 2017 for the full sample (Panel A) and the matched sample (Panel B). Matching is conducted using a one-to-one propensity score matching estimator, where the treatment indicator equals 1 for firms headquartered in California (treated firms) and 0 otherwise. The propensity score is estimated based on Size, Gross Margin, Capital Intensity, Leverage, Board Size, and Board Independence. Refer to Table A1 for detailed variable definitions. Standard errors reported in parentheses are clustered at the headquarters state level. Note: ***, ** and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

	Panel A: Characteristics of Treated and Control Full Sample				**Panel B: Characteristics of Treated and Control Matched Sample**			
		Mean	Treated - Control	Mean Difference t-Test p-value		Mean	Treated - Control	Mean Difference t-Test p-value
Size	Treated	6.148	-0.556	<0.001	Treated	6.148	0.036	0.816
	Control	6.703			Control	6.111		
Gross Margin	Treated	-0.394	-0.284	<0.001	Treated	-0.394	-0.027	0.831
	Control	-0.110			Control	-0.367		
Capital Intensity	Treated	0.158	-0.128	<0.001	Treated	0.158	-0.001	0.940
	Control	0.286			Control	0.159		
Leverage	Treated	0.132	-0.059	<0.001	Treated	0.132	-0.009	0.456
	Control	0.191			Control	0.141		
Board Size	Treated	2.015	-0.083	<0.001	Treated	2.015	0.012	0.564
	Control	2.098			Control	2.003		
Board Independence	Treated	0.718	0.001	0.895	Treated	0.718	-0.003	0.716
	Control	0.717			Control	0.721		
Propensity Score	Treated	0.196	0.051	<0.001	Treated	0.196	<0.001	0.943
	Control	0.145			Control	0.197		

Table A11: **High-Default Risk Supplier Termination after the Board Gender Diversity Act: Alternative Proxies of High-Default Risk.** This table presents estimations from supplier-level regressions on default risk and interest coverage measures. The dependent variables are Industry Adjusted High-Default Risk Supplier Termination, Low-Interest Coverage Ratio, and Industry Adjusted Low-Interest Coverage Ratio. Treated is an indicator for firms headquartered in California (treated firms), and 0 for firms headquartered in other states (control firms) in 2017. Post-Act is an indicator equal to 1 for 2020–2021, and zero for 2018–2019. Controls include firm level Size, Gross Margin, Capital Intensity, Board Size and Board Independence, and supplier level Size, Gross Margin, and Capital Intensity. Regressions also include a constant term. Refer to Table A1 for detailed variable definitions. Standard errors reported in parentheses are clustered at the headquarters state level. Note: ***, ** and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Dep. variables:	Industry Adjusted High-Default Risk Supplier Termination	Low-Interest Coverage Ratio	Industry Adjusted Low-Interest Coverage Ratio
	[1]	[2]	[3]
Treated × Post-Act	0.025***	0.018***	0.027***
	(0.003)	(0.004)	(0.006)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Supplier Industry × Year Fixed Effects	Yes	Yes	Yes
Incorp. × Year Fixed Effects	Yes	Yes	Yes
Clustering	State	State	State
Obs.	9,322	7,998	7,998
R-2 (adjusted)	0.061	0.168	0.076

Table A12: **Supply Chain Risk Management after the Board Gender Diversity Act: Extended Sample.** This table presents estimations from purchase obligations, and supplier default-risk regressions for the extended sample 2016–2023. The dependent variables are Purchase Obligations, and High-Default Risk Supplier Termination. Treated is an indicator for firms headquartered in California (treated firms) and 0 for firms headquartered in other states (control firms) in 2017. Post-Act is an indicator equal to 1 for 2020–2023, and zero for 2016–2019. Post-Act (Y20–Y21) is an indicator equal to 1 for 2020-2021, and zero otherwise, while Post-Act (Y22–Y23) is an indicator equal to 1 for 2022-2023, and zero otherwise. Controls include Size, Gross Margin, Capital Intensity, and Leverage (except in columns 3 and 4). In columns 3 and 4, we also include the following supplier level controls: Size, Gross Margin, and Capital Intensity. Regressions also include a constant term. Refer to Table A1 for detailed variable definitions. Standard errors reported in parentheses are clustered at the headquarters state level. Note: ***, ** and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Dep. variables:	Purchase Obligations		High-Default Risk Supplier Termination	
	[1]	[2]	[3]	[4]
Treated × Post-Act	0.053***		0.014***	
	(0.011)		(0.003)	
Treated × Post-Act (Y20-Y21)		0.066***		0.015***
		(0.011)		(0.004)
Treated × Post-Act (Y22-Y23)		0.045***		0.013***
		(0.013)		(0.002)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Buyer Industry × Year Fixed Effects	Yes	Yes	No	No
Supplier Industry × Year Fixed Effects	No	No	Yes	Yes
Incorp. × Year Fixed Effects	Yes	Yes	Yes	Yes
Clustering	State	State	State	State
Obs.	12,498	12,498	21,200	21,200
R-2 (adjusted)	0.746	0.746	0.164	0.164

Table A13: **Supply Chain Risk Management after the Board Gender Diversity Act: Firm Clustered Standard Errors.** This table presents estimations from purchase obligations, supplier diversification, and supplier default-risk regressions. The dependent variables are Purchase Obligations, Log of Num. of Regions of Top Imported Product, and High-Default Risk Supplier Termination. Treated is an indicator for firms headquartered in California (treated firms) and 0 for firms headquartered in other states (control firms) in 2017. Post-Act is an indicator equal to 1 for 2020–2021, and zero for 2018–2019. Controls include Size, Gross Margin, Capital Intensity, Leverage (except in column 3), Board Size and Board Independence. In column 3, we also include the following supplier level controls: Size, Gross Margin, and Capital Intensity. Regressions also include a constant term. Refer to Table A1 for detailed variable definitions. Standard errors reported in parentheses are clustered at the firm level. Note: ***, ** and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Dep. variables:	Purchase Obligations	Log of Num. of Regions of Top Imported Product	High-Default Risk Supplier Termination
	[1]	[2]	[3]
Treated × Post-Act	0.031***	0.032**	0.022**
	(0.008)	(0.013)	(0.010)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Buyer Industry × Year Fixed Effects	Yes	Yes	No
Supplier Industry × Year Fixed Effects	No	No	Yes
Incorp. × Year Fixed Effects	Yes	Yes	Yes
Clustering	Firm	Firm	Firm
Obs.	7,015	7,721	10,322
R-2 (adjusted)	0.862	0.382	0.272

Table A14: **Supply Chain Risk Management after the Board Gender Diversity Act: PPMLHDFE Estimates.** This table presents Poisson Pseudo–Maximum Likelihood (Correia et al., 2020, 2025) regressions with high-dimensional fixed effects. The dependent variables are Purchase Obligations and High-Default Risk Supplier Termination. Treated is an indicator for firms headquartered in California (treated firms) and 0 for firms headquartered in other states (control firms) in 2017. Post-Act is an indicator equal to 1 for 2020–2021, and zero for 2018–2019. We report the marginal effect associated with the interaction term of interest, which is interpretable as the percentage change in the dependent variable of interest. Controls include Size, Gross Margin, Capital Intensity, Leverage (except in column 2), Board Size, and Board Independence. In column 2, we also include the following supplier level controls: Size, Gross Margin, and Capital Intensity. Regressions include a constant term. Standard errors in parentheses are clustered at the headquarters state level. Note: ***, ** and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Dep. variables:	Purchase Obligations	High-Default Risk Supplier Termination
	[1]	[2]
Treated × Post-Act	0.055***	0.009***
	(0.013)	(0.001)
Controls	Yes	Yes
Firm FE	Yes	Yes
Buyer Industry × Year Fixed Effects	Yes	No
Supplier Industry × Year Fixed Effects	No	Yes
Incorp. × Year Fixed Effects	Yes	Yes
Clustering	State	State
Obs.	7,015	10,322
Pseudo R-2	0.389	0.400

Table A15: **Supply Chain Risk Management after the Board Gender Diversity Act: Additional Control Variables** This table presents estimations from purchase obligations, supplier diversification, and supplier default-risk regressions. The dependent variables are Purchase Obligations, Log of Num. of Regions of Top Imported Product, and High-Default Risk Supplier Termination. Treated is an indicator for firms headquartered in California (treated firms), and 0 for firms headquartered in other states (control firms) in 2017. Post-Act is an indicator equal to 1 for 2020–2021, and zero for 2018–2019. Refer to Table A1 for detailed variable definitions. Standard errors reported in parentheses are clustered at the headquarters state level. Note: ***, ** and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Dep. variables:	Purchase Obligations	Log of Num. of Regions of Top Imported Product	High-Default Risk Supplier Termination
	[1]	[2]	[3]
Treated × Post-Act	0.030***	0.039***	0.027***
	(0.007)	(0.007)	(0.006)
Size	0.047**	0.030***	-0.002
	(0.023)	(0.011)	(0.007)
Gross Margin	0.000	-0.032	0.005
	(0.000)	(0.022)	(0.006)
Capital Intensity	0.125	-0.044	0.038
	(0.111)	(0.039)	(0.029)
Leverage	0.018	-0.027	
	(0.072)	(0.035)	
Board Size	-0.049	-0.044*	-0.005
	(0.063)	(0.023)	(0.018)
Board Independence	0.107	0.017	0.040
	(0.068)	(0.053)	(0.046)
CEO Age	-0.062	-0.055*	-0.015
	(0.065)	(0.031)	(0.026)
CEO Tenure	-0.008	0.003	0.001
	(0.012)	(0.006)	(0.005)
COO Age	0.002	0.075	0.059
	(0.069)	(0.045)	(0.040)
COO Tenure	0.005	-0.004	-0.006
	(0.005)	(0.004)	(0.003)
Supplier Size			-0.001
			(0.001)
Supplier Gross Margin			0.016
			(0.018)
Supplier Capital Intensity			-0.010
			(0.012)
Constant	0.308	0.521**	-0.143
	(0.310)	(0.210)	(0.251)
Firm FE	Yes	Yes	Yes
Buyer Industry × Year Fixed Effects	Yes	Yes	No
Supplier Industry × Year Fixed Effects	No	No	Yes
Incorp. × Year Fixed Effects	Yes	Yes	Yes
Clustering	State	State	State
Obs.	4,692	5,339	6,014
R-2 (adjusted)	0.852	0.409	0.310

Figure A1: Purchase Obligations

This figure presents the purchase obligations table from Ford Motor Co. 2020 annual report (top; source: https://www.sec.gov/Archives/edgar/data/37996/000003799621000012/f-20201231.htm) and Hershey Co. 2020 annual report (bottom; source: https://www.sec.gov/Archives/edgar/data/47111/000004711121000007/hsy-20201231.htm)

The table below summarizes our contractual obligations as of December 31, 2020 (in millions):

	Payments Due by Period				
	2021	**2022 - 2023**	**2024 - 2025**	**Thereafter**	**Total**
Company excluding Ford Credit					
On-balance sheet					
Long-term debt (a)	$ 716	$ 6,396	$ 4,590	$ 11,709	$ 23,411
Interest payments relating to long-term debt	1,482	2,693	2,017	9,916	16,108
Finance leases (b)	60	97	64	303	524
Operating leases	348	460	247	334	1,389
Pension funding (c)	185	375	370	—	930
Off-balance sheet					
Purchase obligations	1,626	1,429	682	370	4,107
Total Company excluding Ford Credit	4,417	11,450	7,970	22,632	46,469
Ford Credit					
On-balance sheet					
Long-term debt (a)	38,530	47,087	28,747	10,639	125,003
Interest payments relating to long-term debt	2,946	3,815	1,980	1,053	9,794
Operating leases	18	29	26	18	91
Off-balance sheet					
Purchase obligations	29	40	4	—	73
Total Ford Credit	41,523	50,971	30,757	11,710	134,961
Total Company	$ 45,940	$ 62,421	$ 38,727	$ 34,342	$ 181,430

(a) Excludes unamortized debt discounts/premiums, unamortized debt issuance costs, and fair value adjustments.
(b) Includes interest payments of $110 million.
(c) Amounts represent our estimate of contractually obligated contributions to the Ford-Werke plan. See Note 17 of the Notes to the Financial Statements for further information regarding our expected 2020 pension contributions and funded status.

As of December 31, 2020, we had entered into agreements for the purchase of raw materials with various suppliers. Subject to meeting our quality standards, the purchase obligations covered by these agreements were as follows as of December 31, 2020:

in millions	2021	2022	2023	2024	2025
Purchase obligations	$ 1,548.9	$ 309.7	$ 21.8	$ 1.5	$ 1.5

Figure A2: Supply Chain Risk Management and Female Directors

This figure plots the sample averages for our three dependent variables and the number of female directors for the treated firms. The dependent variables are Purchase Obligations (Panel A), Log of Num. of Regions of Top Imported Product (Panel B), and High-Default Risk Supplier Termination (Panel C). Refer to Table A1 for detailed variable definitions.

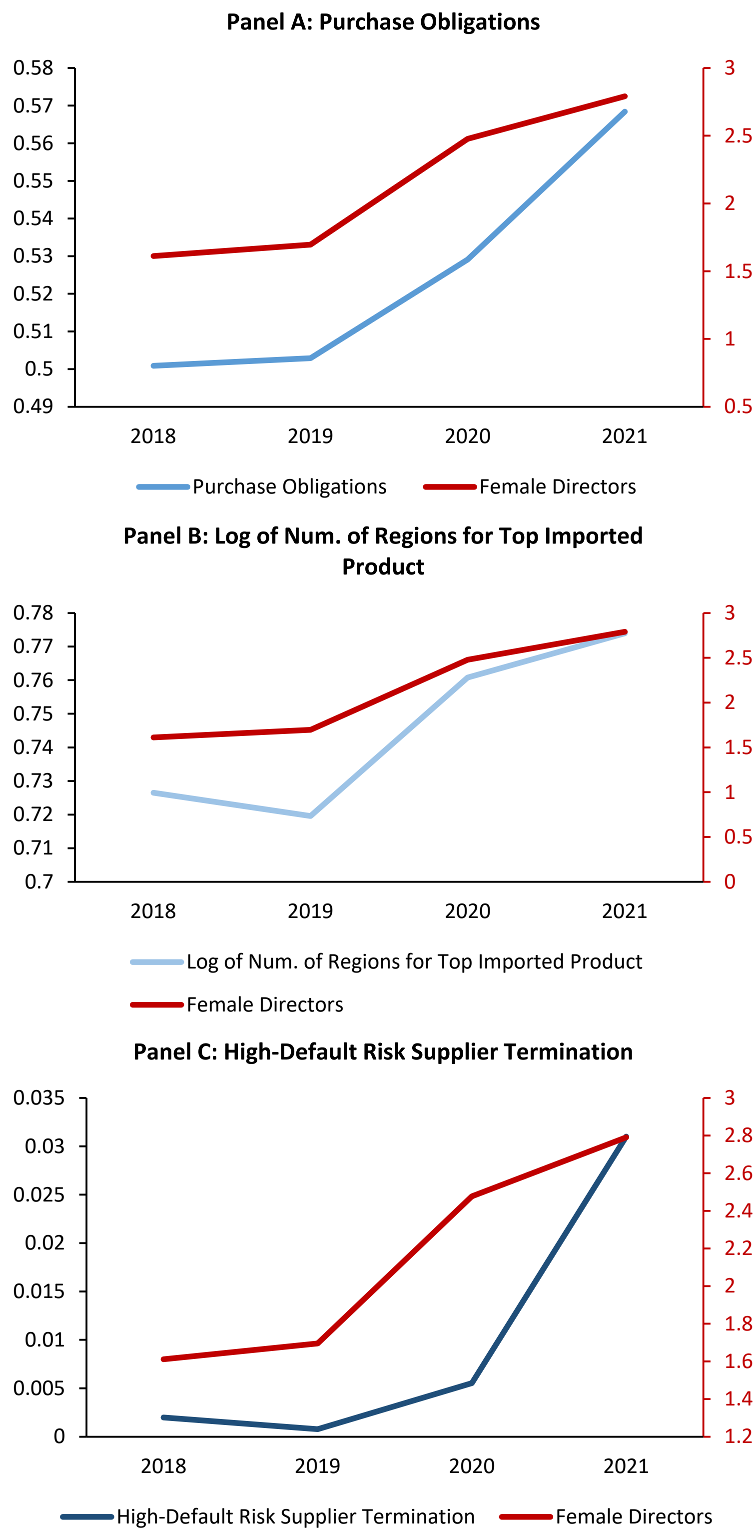

Figure A3: Supply Chain Risk Management before and after the Board Gender Diversity Act: Testing for Pre-Reform Trends

This figure plots the coefficients on the interactions of the Treated indicator with year dummies from yearly difference-in-difference commodity hedging regressions with pre-shock interactions to test for the parallel trend assumption. The dependent variable is Commodity Hedging. Treated is an indicator for firms headquartered in California (treated firms), and 0 for firms headquartered in other states (control firms) in 2017. The coefficients indicate the percentage change in each respective dependent variable for treated firms relative to control firms from 1 year prior to the treatment to 2 years after the treatment over the period 2018–2021 (with 2018 as the base case). Refer to Table A1 for detailed variable definitions. Ninety-five percent confidence intervals are also plotted.

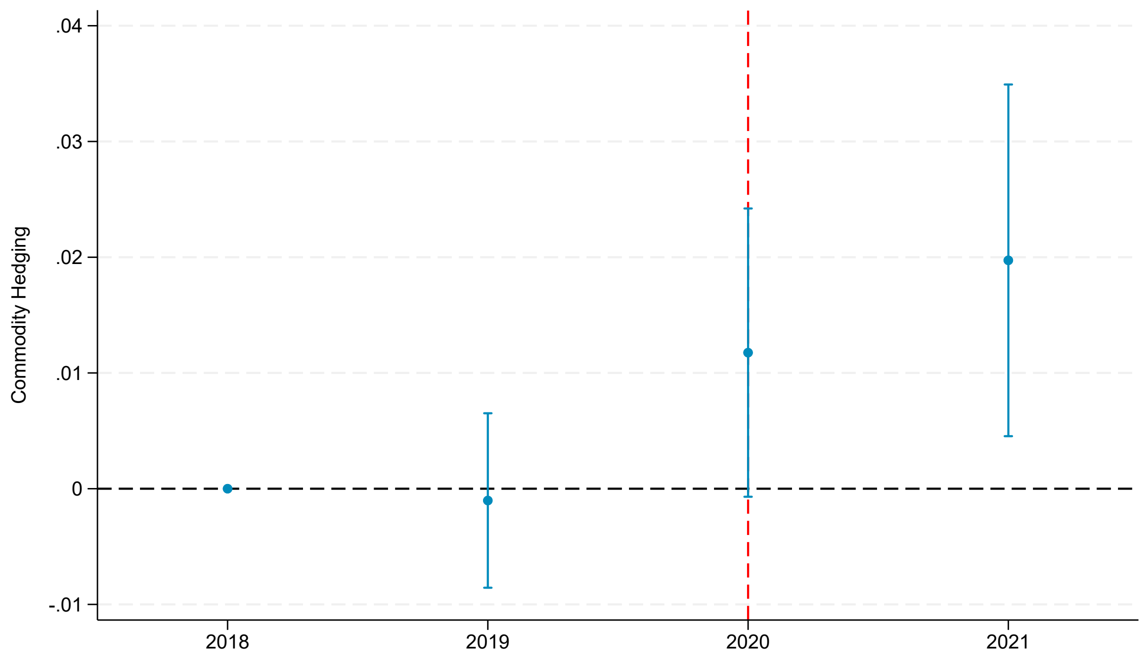

Figure A4: Propensity Score Distribution for Treated and Control Firms.

This figure presents the kernel density distributions of propensity scores for treated firms (California headquarters in 2017) and control firms (non-California headquarters in 2017). Panel A plots the distributions for the full sample prior to matching, while Panel B plots the distributions for the matched sample after propensity score matching. The propensity score is estimated based on Size, Gross Margin, Capital Intensity, Leverage, Board Size, and Board Independence. Refer to Table A1 for detailed variable definitions.