# Regulatory Costs and Vertical Integration: Evidence from Supply Chain Disclosure Regulations

**Abstract:** I study whether and how supply chain disclosure regulations shape corporate vertical boundaries. I employ a 2010 California corporate disclosure mandate designed to eradicate human trafficking and slavery in supply chains. This mandate elevates costs to firms that rely on supply chain parties, specifically reputational and litigation risk, other stakeholder pressure, and information acquisition and monitoring costs. As a result, to better control their supply chains, affected firms vertically integrate, primarily via acquiring supply chain parties. The effect is concentrated among firms facing greater stakeholder pressure (e.g., plaintiffs, consumers, NGOs, and shareholder activists), higher sourcing risk, and asset specificity. Also, following the regulation, affected firms increase overall vertical integration and reduce outsourcing to suppliers. Collectively, my findings suggest that supply chain disclosure regulations incentivize firms to expand their vertical boundaries.

**Keywords:** regulatory costs; vertical integration; supply chain; real effects of disclosure.
**JEL classification:** D22; G34; K38; L14; L23; M41
**Data availability:** All data are available from public sources identified in the paper.

*"By facilitating up-to-date, end-to-end supply chain information, vertical integration offers broad transparency to customers… This transparency is crucial to provide a secure product supply, product quality as well as safety to avoid labor-related reputational risks."*

*~ Harald Dutzler, Managing Director and Partner at PwC - Strategy& (2019)*

*"Vertical integration gives businesses a firm hold on their end-to-end supply chain… a transparent supply network has become a central element to running an ethical and sustainable business. Today, consumers and investors alike are becoming increasingly attuned to a business' operations behind-the-scenes. Retailers should expect scrutiny into their chains from an environmental, animal welfare and ethical perspective… Switching to a more vertically integrated model could act as a step towards becoming a more purpose-driven and stakeholder-focused organisation."*

*~ Elliott Goldstein, Managing Partner at The MBS Group (2021)*

## 1. Introduction

In this study, I examine whether and how supply chain disclosure regulations shape corporate vertical boundaries.[1] My research question is motivated by two separate streams of literature and recent policy attempts to promote supply chain transparency. First, setting firm boundaries along the supply chain as well as exerting sufficient control over the production processes is not only a fundamental economic question of the theory of the firm, but also a key organizational decision choice managers face. A set of theoretical and empirical studies seek to explain firms' vertical boundary decisions since Coase's (1937) seminal paper (e.g., Williamson 1975, 1979; Klein 2005; Tadelis 2002; Frésard et al. 2020). In a recent survey by HSBC (2020), 67% of businesses' top priority was to increase control of the supply chain, including via owning more of the supply chain (i.e., vertical integration). Second, recent work suggests that costs imposed by disclosure regulations induce changes in corporate actions, such as the deterrence effect of proprietary costs of disclosure on going public (Aghamolla and Thakor 2022; Glaeser and Omartian 2022; Yost 2023). One important development in disclosure regulations is a focus on supply chains. Supply chain disclosure regulations are emerging throughout the world, such as

[1] I use "vertical boundaries", "vertical integration", and "boundaries along the supply chain" interchangeably throughout the paper.

the trio of modern slavery acts in California, the United Kingdom, and Australia requiring companies to disclose their actions to eradicate human trafficking and modern slavery in supply chains, as well as conflict minerals legislations and supply chain due diligence regulations.[2]

For focal firms, supply chain disclosure regulations impose additional costs of relying on supply chain parties, such as litigation and reputational risk of supply chain parties' misbehavior, and costs of supply chain information acquisition and monitoring, thus shifting the cost-benefit tradeoffs of firms' vertical boundary decisions (i.e., relying on supplier-customer relationships vs vertically integrating within supply chains). Compared to relying on supplier-customer relationships that suffer incomplete contracting and misaligned incentives along diversified supply chains, vertically integrating and internalizing supply chains is a plausible way for firms to reduce bargaining frictions and align supply chain parties' practices with theirs (e.g., Coase 1937; Grossman and Hart 1986). Therefore, I hypothesize that facing increased costs of relying on supply chain parties due to supply chain disclosure regulations, firms are incentivized to vertically integrate to better control supply chains, including via acquiring supply chain parties (i.e., making vertical acquisitions).

Despite the above arguments, there are reasons why I may not observe the predicted outcome. For instance, instead of vertically integrating along the supply chain, firms may exert more efforts to better monitor supply chain parties, or switching to supply chain parties with better practices (e.g., Schiller 2018; Dai et al. 2021; She 2022; Bisetti et al. 2023). Also, firms may hesitate to make vertical acquisitions due to antitrust risk concerns, as vertical acquisitions have received increased scrutiny from antitrust authorities in recent years.

[2] Examples of conflict minerals legislations include Section 1502 of U.S. Dodd Frank Act and the EU Conflict Minerals Regulation 2014. Examples of supply chain due diligence regulations include the French Duty of Vigilance Act 2017 and the Norwegian Transparency Act 2021.

To test my hypothesis, I focus on the adoption of the California Transparency in Supply Chains Act of 2010 (the California Act hereafter), which mandates that companies disclose on their official websites their efforts to eradicate human trafficking and slavery within supply chains. To be subject to the law, a company must meet all three criteria: (1) identify itself as a retail seller or manufacturer in its tax returns; (2) meet the legal requirements for "doing business" in California; and (3) have annual worldwide gross receipts exceeding $100 million. The California Act elevates firms' exposure to several risks and costs: (i) litigation risk arising from the "legal responsibility for suppliers' treatment of workers", as evidenced by a series of class action lawsuits filed against firms accused of making misleading public statements on their anti-slavery efforts (Gibson Dunn 2010; Pickles and Zhu 2013); (ii) reputational costs when supply chain parties violate labor laws (e.g., Chen et al. 2023); (iii) pressure from other stakeholders such as anti-slavery NGOs and shareholder activists; and (iv) costs associated with supply chain information gathering and monitoring, due to incomplete contracting and the tight deadline to update practices and ensure compliance with this disclosure mandate.

I employ a difference-in-differences (DID) design, treating the adoption of the California Act as a quasi-natural exogenous shock and examining its impact on vertical acquisitions. To identify treated firms, using the Wayback Machine, I manually examine each firm's official website to determine whether it has posted a disclosure statement required by the California Act. I employ the Bureau of Economic Analysis (BEA) Input-Output (I/O) Accounts data and the Securities Data Company (SDC) Platinum data to identify vertical acquisitions (e.g., Fan and Lang 2000; Acemoglu et al. 2009). Using a fiscal firm-year panel of manufacturers and retailers from 2008 to 2014, the baseline DID tests reveal that affected firms exhibit an increased likelihood of pursuing vertical acquisitions following the California Act, compared with firms not subject to the

legislation. Economically, this represents a 33.8% increase in the likelihood of making vertical acquisitions, relative to the sample mean of 8.0%. After further classifying vertical acquisitions into upstream and downstream vertical acquisitions, I find the surge in vertical acquisitions is mainly driven by the increase in upstream vertical acquisitions, in line with the upstream supply chain being the main focus of the California Act.[3]

To delve into the potential channels through which the California Act encourages vertical acquisitions, I exploit the heterogeneity in focal firms' stakeholder pressure and other vertical integration incentives. First, I expect firms with higher litigation risk to be more responsive, as firms have faced increased class action lawsuits resulting from the California Act. Second, I predict that the effect is concentrated among consumer-oriented firms, which bear greater reputational damages from, e.g., consumer backlash, when supply chain parties misbehave (e.g., Chen et al. 2023). Third, I expect to observe the effect particularly for firms facing greater pressure from activist groups including anti-trafficking NGOs and shareholder activists, which, as anecdotal evidence suggests, exert pressure on focal firms to modify labor practices within their supply chains. Fourth, I predict that the effect is stronger among firms sourcing from countries or industries with severe labor violations, as these firms bear higher costs of supply chain disclosure. Finally, I expect the effect to be stronger among firms with higher asset specificity, as vertical integration is particularly useful in risk management for these firms (e.g., Bonaime et al. 2018). Consistent with my prediction, I find that the effect on vertical acquisitions is concentrated among firms with greater stakeholder pressure and stronger vertical integration incentives.

To alleviate concerns about confounding factors specific to firms subject to the California Act—such as more acquisition opportunities for firms doing business in California, or other

[3] Upstream vertical acquisitions refer to the acquisition of a supplier by its customer, whereas downstream vertical acquisitions refer to the acquisition of a customer by its supplier.

potential spurious correlations, I perform two falsification tests. First, I examine non-vertical acquisitions, which also capture acquisition opportunities but are less likely to be driven by the California Act. Second, I examine pseudo-regulation years. Both tests yield no significant results.

My analyses, so far, focus on vertical acquisitions. Firms can also achieve vertical integration via other avenues, such as directly investing in in-house manufacturing facilities and purchasing product lines of upstream firms, most of which are unobservable to researchers. To explore the possibility of vertical integration via other approaches, I turn to three firm-year level measures of overall vertical integration, which reflect to what extent a firm is vertically integrated across its supply chain: (i) a vertical integration score based on product description text (Frésard et al. 2020); (ii) value-add ratio capturing the value added to the product by the focal firm (e.g., Tucker and Wilder 1977; Chen 2017); and (iii) managerial discussion on increasing vertical integration in conference calls. Consistent with my hypothesis, I find that relative to control firms, treated firms increase overall vertical integration within their supply chains after the California Act, exhibiting a higher vertical integration score, higher value-added ratio, and more discussion about increasing vertical integration in their conference calls.

Next, I examine the flip side of vertical integration – production outsourcing, to test the conjecture that accompanied by enhanced vertical integration within supply chains, firms rely less on outsourcing to suppliers. Consistent with my prediction, I find evidence of a reduction in the purchases from suppliers and production outsourcing amount for affected firms following the California Act, relative to control firms. This suggests that affected firms scale back their production outsourcing to suppliers. To further enrich my inferences, I explore other corporate outcomes related to vertical integration, specifically the number of business segments. I find that affected firms possess more business segments, likely as a result of increased vertical integration.

The underlying assumption in my study is that the California Act imposes costs on focal firms. To validate this assumption, first, I document a notable increase in public attention to human trafficking in California, and in media coverage of litigation related to supply chain human trafficking in California, following the passage of the California Act. Second, investigating market reactions, I find that affected firms' investors negatively react to the passage and implementation of this law, while investors in unaffected firms show no significant reaction.

Additionally, I employ an alternative definition of treatment status based on firms' business activities in California and their sales. Specifically, in line with the requirements of this mandate, I define treated firms as manufacturing and retail firms that have annual sales exceeding $100 million and do business in California. Using this alternative definition of treated firms yields consistent evidence that firms subject to the California Act are subsequently more likely to pursue vertical acquisitions. To further address concerns that confounding factors unique to firms subject to the California Act—such as more acquisition opportunities or other concurrent regulatory activities—may drive the results, I employ a triple-differences design. Specifically, I focus solely on non-financial firms doing business in California. Using non-large (i.e., annual sales below $100 million) manufacturing and retail firms, as well as large firms in other industries, as benchmarks, I find that large manufacturing and retail firms exhibit an increased probability of making vertical acquisitions following the California Act, consistent with my baseline findings.

My study contributes to three main branches of the literature. First, my study bridges the research gap between disclosure regulations and firms' *vertical* boundaries. One emerging stream of literature focuses on the effects of disclosure regulations on firms' *horizontal* boundaries, in particular, market entry and exit decisions, such as shutting down dangerous mine facilities (Christensen et al. 2017) and reducing drilling productivity in foreign countries (Rauter 2020).

Another stream of literature examines how regulations, not disclosure regulations specifically, impact firms' *vertical* boundaries (Katsiardis 2020; Moon and Sertsios 2023).[4] To the best of my knowledge, my study is among the first that documents the (causal) effect of disclosure regulations on *vertical* boundaries of the firm. My results provide novel evidence that supply chain disclosure regulations potentially incentivize firms to expand their boundaries along the supply chain.

Second, my study contributes to the literature on the effects of costs arising from disclosure regulations on corporate outcomes, including market value (Blacconiere and Patten 1994; Patten and Nance 1998), stock liquidity (Bushee and Leuz 2005), investment efficiency (Jayaraman and Wu 2019), public lisiting decisions (Aghamolla and Thakor 2022; Glaeser and Omartian 2022; Yost 2023), and reputational capital (Karpoff et al. 2005; Andreicovici et al. 2023). I complement these studies by documenting an unintended consequence of disclosure regulations: costs imposed by disclosure regulations affect how firms evaluate their vertical integration decisions. Broadly, my paper adds to the emerging but still limited literature on the real effects of non-financial disclosure (e.g., Christensen et al. 2017; Roychowdhury et al. 2019; Rauter 2020; Christensen et al. 2021). My study is related to She (2022), who finds that firms enhance supply chain due diligence following the California Act. I focus on firm boundaries instead of monitoring and provide evidence that supply chain disclosure incentivizes firms to expand vertical boundaries.

Third, my paper adds to the literature on vertical integration and the organization of production. Theoretical studies have developed to analyze the costs and benefits of firms' make-or-buy decisions (e.g., Williamson 1975, 1979; Klein 2005; Tadelis 2002; Phua et al. 2011), and empirical literature has been growing recently, such as the stage of industry evolution (Argyres

[4] Moon and Sertsios (2023) find that firms facing higher labor protection in foreign countries replace their integrated operations with arm's-length relations in those nations. Katsiardis (2020) documents how a regulatory cap on the size of for-hire trucking sector in Greece induced firms to operate larger, more underutilized commercial vehicle fleets.

and Bigelow 2010), technology intensity (Acemoglu et al. 2010), and output prices (Alfaro et al. 2016). I contribute to this strand of research by showing one important determinant – the costs induced by enhanced supply chain transparency.

## 2. Institutional Background and Hypothesis Development

### *2.1 The California Transparency in Supply Chains Act of 2010*

Adopted in October 2010, the California Act (SB 657, Civil Code Section 1714.43) is one of the first pieces of legislation focused on modern slavery and human trafficking in supply chains in the world. The California Act requires companies to "disclose information regarding their efforts to eradicate human trafficking and slavery within their supply chains on their website or, if a company does not have a website, through written disclosures."[5] Specifically, the California Act requires companies, at a minimum, to disclose their efforts to address human rights issues within their supply chains in five key areas: evaluation and verification of product supply chains, audits of suppliers, certification requirements for direct suppliers, internal accountability standards and procedures, and relevant training for employees and management. Even if a company has not made any efforts in these areas, it must disclose that it has taken no action. Appendix B provides four examples of California Statements that companies disclose in compliance with the California Act. California enacted this legislation to give consumers visibility into human right issues in businesses to inform their purchasing decisions. In addition, the California Act encourages businesses to be proactive about responsible sourcing.

The California Act specifies three key criteria all of which a company must satisfy to be subject to the law: (1) the company identifies itself as a retail seller or manufacturer in its tax returns; (2) the company satisfies the legal requirements for "doing business" in California; (3) the

[5] See more details at the website of the State of California Department of Justice: https://oag.ca.gov/SB657.

company has annual worldwide gross receipts exceeding $100 million. To ensure firms' compliance with the disclosure requirements of the California Act, the California Attorney General can seek injunctive relief against firms if firms do not comply. The California Attorney General notified all companies it determined to be subject to the California Act through a document entitled "Informational Letter to Companies", as well as issued a resource guide to help companies develop their disclosure. In addition, the California Act expressly states that it does not limit any remedies that may be available for a violation of any other state or federal law. For instance, consumers have initiated lawsuits pointing to the California Act disclosure statements as a basis for alleged liability under California consumer protection statutes (Hirose 2018).

*2.2 Hypothesis Development*

Supply chain disclosure regulations, in general, and the California Act, in particular, potentially exert a series of regulatory costs on focal firms relying on supply chain parties. First, as interest groups can access and use firms' supply chain disclosure to exert public pressure on focal firms to modify their practices, focal firms face increased litigation risk and activist intervention. Specifically, by giving customers and other interest groups access to firms' anti-slavery efforts in supply chains, the California Act elevates focal firms' litigation risk arising from the "legal responsibility for suppliers' treatment of workers" and has triggered a series of class action lawsuits filed against firms accused of making misleading public statements on their anti-slavery efforts (e.g., Gibson Dunn 2010; Pickles and Zhu 2013; Marculewicz et al. 2015).[6] In the case of deficient supply chain disclosure, focal firms face potential intervention from activist

[6] Gibson Dunn (2010) comments that after the California Act, "Companies seeking to influence suppliers' practices will also want to be mindful of the possibility of litigation asserting that the company's efforts made it a 'joint employer' with legal responsibility for suppliers' treatment of workers."

groups including NGOs and shareholder activists.[7] Second, as one supply chain party's misbehavior may reflect poorly on another party and lead to reputational damages (e.g., consumer boycotts) (Chen et al. 2023), the California Act provides great visibility for consumers into human right issues and potentially inflates reputational costs when supply chain parties violate labor laws (Pickles and Zhu 2013).[8] Last, focal firms face considerable costs of gathering supply chain information and monitoring supply chain parties through supply chain contracts, audits, and assurance, due to highly diversified supply chains across multiple geographies, misaligned incentives among supply chain parties, and incomplete contracting (e.g., Jenson and Meckling 1976; Gietzmann 1996; Sodhi and Tang 2019; Kraft and Zheng 2021), as well as a short period of time the California Act gave firms to update supply chain practices and ensure compliance.[9] Thus, the California Act shifts the cost-benefit tradeoffs of firms' relying on supply chain parties versus vertically integrating within the supply chain, specifically, making vertical integration more attractive to focal firms.

Increasing vertical integration is a plausible response to the California Act. First, supply chain contracts are inherently incomplete, creating challenges for focal firms to effectively monitor supply chain parties (e.g., Coase 1937; Grossman and Hart 1986). By vertically integrating and internalizing the supply chain, focal firms can eliminate bargaining frictions and align labor practices with theirs. Second, vertical integration leads to lower costs to be incompliance with

[7] For instance, KnowTheChain, an NGO committed to helping address forced labor risk within global supply chains, argued that Amphenol was not compliant with either the UK Modern Slavery Act or the California Act and gave the company an overall score of only 9 out of 100 in its *2018 Benchmarking Report on Forced Labor in the /CT Sector*. And shareholders raised a proxy statement requiring Amphenol to enhance its supply chain transparency to help investors "gauge if the company is sufficiently addressing this serious risk to the company and to workers." (https://www.sec.gov/Archives/edgar/data/820313/000104746919002292/a2238401zdef14a.htm)

[8] A group of pet food purchasers argued that "they were misled by Nestle's failure to disclose the use of slave labor in its supply chain, and would not have purchased the pet food had they known the truth." (https://labourexploitation.org/news/lawsuits-giving-some-bite-to-mandatory-reporting-on-slavery-in-supply-chains/)

[9] To update practices and comply with the California Act, firms have around 15 months (i.e., between when the California Act was signed into law, October 2010, and when it became effective, January 1, 2012).

supply chain disclosure, as the California Act mainly focuses on firms' supply chains rather than their own operations. Third, assuming focal firms' were at the equilibirum condition between relying on supply chain parties versus vertically integrating within supply chains prior to the enactment, then the higher costs of supply chain relationships induced by the California Act ought to make veritcal integration more attractive. Therefore, I predict that facing increased costs of relying on supply chain parties that arise from the California Act, focal firms face greater incentives to vertically integrate to better control supply chains, including via acquiring supply chain parties (i.e., making vertical acquisitions). Formally, I state my hypothesis as below:

**H:** *Firms affected by the California Act subsequently conduct more vertical acquisitions and become more vertically integrated, compared to unaffected firms*

Notwithstanding the above arguments, there are reasons why I may not observe the predicted outcome. For instance, instead of vertically integrating the supply chain, which is a costly corporate decision, firms may primarily respond to the California Act in other ways including enhancing due diligence to better monitor supply chain parties, or switching to supply chain parties with better labor practices (Dai et al. 2021; She 2022; Bisetti et al. 2023). Also, firms could be hesitant about making vertical acquisitions due to antitrust risk concerns (Comanor 1967; Blair and Kaserman 1978). Vertical acquisitions, although historically treated with leniency by antitrust authorities, have received increased scrutiny in recent years.[10] Thus, whether the California Act incentivizes firms to enhance vertical integration is ultimately an empirical question.

## 3. Sample and Data

[10] For instance, the U.S. Department of Justice (DOJ) litigated a vertical merger case in 2017 to block AT&T/DirecTV's proposed acquisition of Time Warner, arguing that the proposed vertical merger was anticompetitive. In December 2023, the U.S. Federal Trade Commission (FTC) and DOJ jointly released new merger guidelines focusing on potential anticompetitive effects of vertical acquisitions.

*3.1 Sample Construction*

My sample period ranges from fiscal years 2008-2014, covering a seven-year time window centering around the passage of the California Act. I start with all Compustat fiscal firm-years between 2008-2014 and only keep manufacturing and retail firms (SIC codes 2000-3999, 5200-5999, two-digit NAICS codes 31-33, 44-45), since the California Act only targets retail sellers and manufacturers. Then I exclude firm-years with missing control variables for my main analyses. To ensure that my results are not affected by the change in firm composition, I keep only firms with observations in both the pre- and post-regulation periods. My final sample consists of 16,587 fiscal firm-years from 2008-2014, representing 2,619 unique firms. Table 1 summarizes the main sample selection process.

*3.2 Definition of Treated Firms*

The California Franchise Tax Board provides the California Attorney General with an official list of firms subject to the California Act every year. However, this list is not publicly available due to the inclusion of confidential taxpayer information. Thus, to identify firms subject to the California Act, I scrutinize firms' public disclosure in compliance with the California Act (She 2022). Given the mandatory nature of this disclosure requirement and the California Attorney General's actions to ensure the disclosure compliance—such as sending information letters to affected firms and issuing guidance—this is a reasonable method for identifying affected firms.

I start with the universe of manufacturing and retail firms in Compustat for fiscal years 2008-2014. For each firm, using the Wayback Machine, I manually examine its official website to determine whether it has posted a disclosure statement required by the California Act as of the end of 2014. If a firm provides a California Transparency Act Statement on its official website, I categorize this firm as a treated firm (*Treat* = 1). Based on this approach, my main sample consists

of 680 unique treated firms and 1,939 unique control firms, with the largest number of treated firms headquartered in California (~132).

*3.3 Definition of Vertical Acquisitions*

I obtain acquisition data from the SDC Platinum, excluding buybacks, exchange offers, recapitalizations, as well as rumored acquisitions. To identify vertical acquisitions, I rely on the BEA I/O Accounts data following prior literature (e.g., Fan and Lang 2000; Fan and Goyal 2006; Acemoglu et al. 2009). The BEA I/O Accounts data provides information on the total inputs by industry required in order to deliver one dollar of industry output to final users. Specifically, I construct a measure of vertical relatedness coefficient between any two industries as follows. First, I calculate the amount of output required from industry *i* to produce one dollar's worth of industry *j*'s output ($v_{ij}$). Then I calculate its corollary (amount of output required from industry *j* to produce one dollar of output in industry *i* ($v_{ji}$)). The vertical relatedness coefficient ($V_{ij}$) is the maximum of these two metrics (i.e., $v_{ij}$ and $v_{ji}$). I use the 2012 BEA I/O Accounts data, as the BEA updates the data every five years and year 2012 roughly splits my sample period into two halves.[11]

In main analyses, I set the threshold of vertical relatedness coefficient at 1% to classify vertical acquisitions and require that the acquiring firm and the target firm do not share the same SIC industry code, consistent with prior studies (e.g., Fan and Goyal 2006; Garfinkel and Hankins 2011; Kedia et al. 2011).[12] Using this methodology, I classify 1,883 acquisitions as vertical acquisitions in my main sample, accounting for 22.9% of total acquisitions (~6,325 total acquisitions). The ratio of vertical acquisitions to total acquisitions is comparable to the figure in prior studies, such as 21.6% in Kedia et al. (2011). I construct two proxies for vertical acquisitions:

[11] Since the BEA uses the I/O industry codes in its 2012 I/O Accounts data, I rely on the concordance tables provided by the BEA to match the six-digit NAICS codes with the I/O industry codes.

[12] As reported in Table 12 Panel E, my main inferences are consistent when I use alternative vertical relatedness coefficient thresholds (e.g., >=0.1%, >=3%) to classify vertical acquisitions.

(1) *Vertical Dummy* is an indicator variable equal to one if the firm makes vertical acquisitions in the current fiscal year, and zero otherwise; and (2) *Vertical Num Ln* is the natural log of one plus the number of vertical acquisitions made by the firm in the current fiscal year.

*3.4 Summary Statistics*

Table 2 presents the summary statistics for my main sample. The mean value of *Vertical Dummy* is 0.080, indicating that 8.0% of firm-years make vertical acquisitions. The mean value of *Vertical Num Raw* is 0.114, denoting that, on average, each firm-year makes 0.114 vertical acquisitions. The mean values of my key independent variables of interest, *Treat* and *Post*, are 0.277 and 0.550, respectively, suggesting a relatively balanced sample during the pre- and post-regulation periods.

## 4. Main Analyses

*4.1 Baseline Tests: Effect of the California Act on Vertical Acquisitions*

I use the following baseline ordinary least squares (OLS) model with a difference-in-differences (DID) design to examine the effect of the California Act on vertical acquisitions:

$$Vertical\ Acq_{i,t} = \alpha + \beta_1 Treat_i \times Post_t + \beta_k Controls_{i,t} + \delta_i + \gamma_t \ or\ \gamma_{ind \times t} + \epsilon_{i,t} \quad (1)$$

The dependent variable, *Vertical Acq*$_{i,t}$, captures firm *i*'s vertical acquisition activities during fiscal year *t*, proxied by two variables, including an indicator variable, *Vertical Dummy*, and a logarithmic variable, *Vertical Num Ln*. *Treat*$_i$ is an indicator variable for treated firms, and *Post*$_t$ is an indicator variable equal to one for observations in the year of or after the adoption of the California Act (i.e., 2011-2014), and zero for the period from 2008 to 2010. Following prior literature (e.g., Lin et al. 2018; Frésard et al. 2020), I include a set of control variables that are associated with firms' vertical acquisition activities, including firm size (*Size*), firm age (*Age*), tangibility (*PPE*), financial leverage (*Leverage*), profitability (*ROA*), cash holdings (*Cash*), the

presence of net losses (*Loss*), and sales growth (*Sales Growth*). I also control for the firm's R&D intensity (*R&D*) since vertical integration activities are a function of the technology and R&D possibilities (Acemoglu et al. 2010). I include firm fixed effects to control for any unobservable firm-specific, time-invariant characteristics that might affect vertical acquisition activities. I also include fiscal year or two-digit SIC industry × fiscal year fixed effects, to control for any unobservable general time trends or time-varying, industry-level characteristics that might impact vertical acquisitions. Finally, I cluster standard errors by headquarters state to account for the within-state correlation of residuals across firm-years, as treated firms are largely based on headquarters (She 2022).[13]

Table 3 tabulates the results of estimating the baseline model in Eq. (1). In column 1 using *Vertical Dummy* as the dependent variable and including only firm and fiscal year fixed effects as control variables, the coefficient on *Treat* × *Post* is positive and significant (coef.= 0.025; t-stat.= 2.94). Column 2 controls for additional firm characteristics and shows that the coefficient on *Treat* × *Post* remains positive and significant (coef.= 0.025; t-stat.= 2.96). Column 3 includes firm and two-digit SIC industry × fiscal year fixed effects as well as firm-level control variables, and shows similar inferences (coef.= 0.027; t-stat.= 3.20). The results in columns 1-3 suggest that compared to firms not subject to the California Act, firms affected by this legislation are more likely to make vertical acquisitions following the adoption of the California Act. In terms of the economic magnitude, the effect represents a 33.8% relative increase in the likelihood of making vertical acquisitions, relative to the sample mean of 8.0%.[14] Columns 4-6 show similar results for *Vertical*

[13] In untabulated analysis, my main inferences are similar if I cluster standard errors by firm or by two-digit SIC industry.
[14] Based on column 3 of Table 3, the economic magnitude is calculated as follows: 0.027 ÷ 0.080 = 33.8%.

*Num Ln*, indicating that affected firms make more vertical acquisitions after the adoption of the California Act, relative to unaffected firms.

*4.2 Parallel Trend Assumption*

To test the parallel trend assumption (Angrist and Pischke 2008), I conduct an event-time analysis to examine the dynamic treatment effect of the California Act on vertical acquisitions, by estimating the following OLS model:

$$\begin{aligned} Vertical\ Acq_{i,t} = \alpha &+ \beta_1 Treat_i \times Year\ t-3_t + \beta_2 Treat_i \times Year\ t-2_t \\ &+ \beta_3 Treat_i \times Year\ t_t + \beta_4 Treat_i \times Year\ t+1_t \\ &+ \beta_5 Treat_i \times Year\ t+2_t + \beta_6 Treat_i \times Year\ t+3_t \\ &+ \beta_k Controls_{i,t} + \delta_i + \gamma_{ind \times t} + \epsilon_{i,t} \end{aligned} \quad (2)$$

*Year t-3* to *Year t+3* are year indicators relative to the treatment year (i.e., 2011). *Year t-1* is omitted from this model as it serves as the benchmark period. Figure 1 Panel A (B) plots the coefficients of the regression results of estimating Eq. (2) and includes 90% confidence intervals with standard errors clustered by headquarters state, using *Vertical Dummy* (*Vertical Num Ln*) as the dependent variable. As Figure 1 illustrates, there is no significant difference between treated and control firms in vertical acquisition activities before the California Act (years *t-3* to *t-1*). Following the California Act, relative to control firms, treated firms start to make significantly more vertical acquisitions. The results in Figure 1 support the parallel trend assumption in the pre-regulation period. Overall, the results in Table 3 and Figure 1 provide plausibly causal evidence that the California Act induces affected firms to make vertical acquisitions.

*4.3 Cross-Sectional Tests: The Influence of Stakeholder Pressure*

After demonstrating that the California Act encourages focal firms to make vertical acquisitions, next I explore the potential mechanisms. Specifically, I examine the heterogeneity in firms' vertical integration incentives and posit that the positive impact is concentrated among firms

facing higher pressure from stakeholders such as consumers, NGOs, and shareholder activists (Bateman and Bonanni 2019). First, as firms have faced increased class action lawsuits typically initiated by consumers directly citing the California Act (e.g., Marculewicz et al. 2015), I expect the effect to be concentrated among firms facing higher litigation risk. I use two proxies for ex-ante litigation risk. The first proxy is the firm-year level measure of litigation risk (*KS Litigation Risk*), based on Kim and Skinner (2012)'s Table 7 Model 3. The second measure of ex-ante litigation risk is the number of EDGAR views of the firm's filings by plaintiffs' law firms (*Plaintiff-Lawyer Views*), developed by Kartapanis and Yust (2022). I partition my main sample into two subsamples based on firms' litigation risk measures and tabulate the results in Table 4 Panel A.[15] As Table 4 Panel A presents, the effect of the California Act on vertical acquisitions is mainly present among firms facing high ex-ante litigation risk (columns 2 and 4). Overall, the results in Table 4 Panel A support the litigation risk channel.

Firms are concerned about their supply chain parties' opportunistic behavior, given the reputational damages they bear when suppliers' misbehavior becomes public (Chen et al. 2023). Recent literature suggests that consumer-orientated firms face higher reputation costs, for example, from consumer backlash (e.g., Hanlon and Slemrod 2009; Graham et al. 2014). With enhanced supply chain transparency, I expect consumer-oriented firms view supply chain relationships as more costly and risky, and therefore find vertical integration more attractive. Therefore, in my second cross-sectional analysis, I examine whether consumer-oriented firms respond more to the California Act by making vertical acquisitions. I use two measures of reputational costs. The first measure is the firm-level advertising expense scaled by sales (*Advertising Exp*), following Hanlon and Slemrod (2009). The second measure of reputational costs is based on the six-digit NAICS

[15] For brevity, the results of cross-sectional tests controlling for firm and industry × fiscal year fixed effects or using *Vertical Num Ln* as the dependent variable are not tabulated, although they are consistent.

industry-level percentage of output sold to Personal Consumption Expenditure (PCE) (*PCE Score*), where the PCE is a final use item in the I/O Accounts that captures the value of the goods and services purchased by households, such as food and cars (Delgado and Mills 2017). Consistent with Delgado and Mills (2017), I classify industries with *PCE Score* higher than 0.333 as consumer-facing industries. As Table 4 Panel B shows, the effect of the California Act on vertical acquisitions is mainly concentrated among consumer-oriented firms – firms with higher value of *Advertising Exp* (column 2) or *PCE Score* (column 4).

Third, anecdotal evidence suggests that activist groups such as NGOs and shareholder activists could exert pressure on focal firms to modify labor practices in their supply chains. Thus, I expect the effect on vertical acquisitions to be particularly present among firms facing greater pressure from these activist groups. To explore the role of anti-trafficking NGOs, I create an industry-level measure of NGO coverage (*NGO*), defined as the proportion of firms within each two-digit SIC industry that are covered by KnowTheChain—a prominent anti-trafficking NGO dedicated to addressing forced labor risk in global supply chains. To examine the influence of shareholder activists, I focus on high social norm foreign institutional investors and construct a firm-year level measure of high social norm foreign institutional ownership (*Prosocial Shareholder*) following Dyck et al. (2019), who find that foreign institutional investors from high social norm countries are active and successful in pushing U.S. firms to improve their environmental and social performance.[16] The cross-sectional results in Table 4 Panel C reveal that increased vertical acquisition activities for treated firms relative to control firms following the California Act are concentrated among firms with higher potential anti-trafficking NGO coverage

[16] U.S. institutional investors started to actively push firms' environmental and social practices after my sample period. For instance, in 2017, BlackRock and Vanguard voted to require Exxon Mobil to produce a report on climate change.

(column 2) and socially responsible institutional ownership (column 4). These findings align with my argument that pressure exerted by activist groups serve as one of the plausible mechanisms.

*4.4 Cross-Sectional Tests: The Influence of Other Vertical Integration Incentives*

To further understand the mechanisms underlying the effect of the California Act on vertical acquisitions, I explore the cross-sectional variation in other vertical integration incentives. First, firms involved in potential labor issues in supply chains are likely to bear higher costs and therefore more responsive. To assess firms' exposure to supply chain labor issues, I construct two measures: one that captures the intensity of firms' outsourcing to *countries* with labor issues, and another that captures the intensity of firms' outsourcing to *industries* with labor issues. To construct the first proxy, I obtain data on firms' sourcing countries from Hoberg and Moon (2017, 2019) and a list of countries with forced or child labor from the U.S. Department of Labor. Then for each two-digit SIC industry, I calculate the median of the total frequency of purchases from countries with high labor risk, and use it as an industry-level measure of country sourcing risk (*Sourcing Ctr Risk*), following She (2022). To construct my second proxy capturing the intensity of firms' outsourcing to industries with labor concerns, I start with the FactSet Revere Supply Chain Relationships (FactSet Revere) and Compustat Segment to identify focal firms' suppliers and Violation Tracker to identify industries with high labor violations.[17] Then I calculate focal firms' frequency of relationships with suppliers from industries with high labor violations (*Sourcing Ind Risk*). Using these two measures of supply chain sourcing risk related to labor issues, I split the sample and present the results in Table 5 Panel A. The results suggest that the effect of the California Act on vertical acquisitions is only present among firms sourcing from countries or industries with labor violations (columns 2 and 4).

[17] FactSet Revere collects firms' supply chain relationship information from 10-K filings and voluntary disclosure including investor presentations, company websites, press releases, and media coverage.

Second, I conduct another cross-sectional test exploiting the heterogeneity in firms' overall risk management incentives. Prior work suggests that vertical integration is particularly useful for risk management when asset specificity is high, as the benefits of vertical integration as a hedge against uncertain cash flows increase with firms' asset specificity (e.g., Klein et al. 1978; Williamson 1979; Garfinkel and Hankins 2011; Bonaime et al. 2018). As the California Act increases firms' perceived risk, I expect its effect on vertical acquisitions to be more pronounced for focal firms with higher asset specificity. I obtain the data on a firm-year level measure of asset redeployability developed by Kim and Kung (2016) and Kim (2018), with lower asset redeployability denoting higher asset specificity. I multiply this measure by negative one (*Firm Asset Specificity*), so that a higher value indicates higher asset specificity (i.e., lower asset redeployability). The cross-sectional results in Table 5 Panel B suggest that increased vertical acquisition activities for treated firms relative to control firms following the California Act are concentrated among firms with higher asset specificity (column 2), for which conducting vertical acquisitions is a more useful tool of risk management. Overall, the results in Table 5 suggest that the vertical integration effect of the California Act is concentrated among firms that bear higher costs of disclosing supply chain information.

*4.5 Effect of the California Act on Upstream vs Downstream Vertical Acquisitions*

Next, I classify vertical acquisitions into upstream and downstream acquisitions, where upstream (downstream) acquisitions involve the acquisition of a supplier (customer) firm, defined by the industry relation to the focal firm. I expect the positive effect of the California Act to hold especially for upstream acquisitions, as the California Act mainly focuses on human rights issues in suppliers. With respect to downstream acquisitions, the effect remains unclear ex-ante. On one hand, one may anticipate no impact on downstream acquisitions because (1) the downstream

supply chain is not the main focus of this legislation; and (2) retailers, one of the two target groups of this legislation, already reside at the end of the supply chain and may not be involved in further downstream industries. On the other hand, firms sometimes also disclose efforts to address human rights risk in downstream supply chains in California Statements.[18] Moreover, following decisions to pursue upstream vertical acquisitions, firms may make downstream vertical acquisitions to enhance organizational integration, streamline operations, and achieve cost efficiencies across entire supply chains (e.g., Larsson and Finkelstein 1999; Cording et al. 2008).

I construct two measures of upstream vertical acquisitions: (1) *Up Vertical Dummy* is an indicator variable equal to one if the firm makes upstream vertical acquisitions in the current fiscal year, and zero otherwise; and (2) *Up Vertical Num Ln* is the natural log of one plus the number of upstream vertical acquisitions made by the firm in the current fiscal year. Similarly, I also construct two measures of downstream vertical acquisitions (*Down Vertical Dummy* and *Down Vertical Num Ln*). To test the effect of the California Act on upstream and downstream vertical acquisitions, I estimate a modified Eq. (1) using *Up Vertical Dummy*, *Up Vertical Num Ln*, *Down Vertical Dummy*, and *Down Vertical Num Ln* as dependent variables and tabulate the results in Table 6. The results suggest that the positive effect of the California Act on vertical acquisitions is mainly driven by upstream vertical acquisitions.

*4.6 Falsification Tests*

To mitigate the concern that potential confounding factors specific to firms subject to the California Act—such as more acquisition opportunities for firms doing business in California, are

[18] For instance, Bayer AG's California Act Statement states that "We identified the human rights that could be most significantly negatively impacted through our activities and business relations in the upstream and downstream value chains (salient human rights)..." Future Foam's California Act Statement says that "Future Foam's Vision is part of its day-to-day business operations and a message that it shares not only with its employees but with members of its direct, upstream and downstream supply chain."

driving the results, I perform a falsification test using non-vertical acquisitions. While non-vertical acquisitions also capture the intensity of overall acquisition activities, these acquisitions are unlikely to be inspired by the California Act. I identify non-vertical acquisitions as acquisitions with zero vertical relatedness coefficient or ones where the acquirer and the target operate in the same industry and construct two corresponding measures (*Non-Vertical Dummy* and *Non-Vertical Num Ln*). I estimate a modified Eq. (1) using *Non-Vertical Dummy* and *Non-Vertical Num Ln* as dependent variables, and tabulate the results in Table 7 Panel A. Across all columns, the coefficients on *Treat* × *Post* are insignificant, revealing no effect of the California Act on non-vertical acquisitions.

To further ensure other spurious correlations in my data are not driving the results, I conduct a placebo test by assuming 2007 as the regulation year and focusing on a seven-year time window centering around 2007.[19] I estimate Eq. (1) after replacing *Post* with *Pseudo Post*, which is an indicator variable equal to one for years 2007-2010, and display the results in Table 7 Panel B. The coefficients on *Treat* × *Pseudo Post* are statistically indistinguishable from zero, denoting no effect of the pseudo regulation on vertical acquisitions. Overall, the results in Table 7 indicate that my main findings are unlikely to be driven by other unobservable variables.

*4.7 Effect of the California Act on Overall Vertical Integration*

In this subsection, I utilize three firm-year level measures of overall vertical integration, to capture the extent to which a firm is vertically integrated along its supply chain. The main advantage of measures of overall vertical integration is that they capture the full picture of firms' vertical integration activities (Bourveau et al. 2024). A firm can vertically integrate along its supply chain via multiple avenues beyond making vertical acquisitions, such as directly investing

[19] In untabulated analysis, I assign year 2005 or 2006 as the alternative pseudo-regulation year, respectively, and find no significance.

in upstream manufacturing plants and purchasing product lines of upstream firms, most of which are usually unobservable to researchers.

The first measure, *Vertical Integration Score*, is a text-based vertical integration score developed by Frésard et al. (2020) and reflects the link between firms' 10-K product descriptions and product vocabularies from the BEA I/O tables. The second measure, *Value-Added Ratio*, is extensively used in the management and economics literature to measure vertical integration (e.g., Tucker and Wilder 1977; Maddigan 1981; Chen 2017), and defined as value added created by the focal firm (based on the income approach) scaled by value added created by the focal firm and its suppliers (proxied by sales).[20, 21]

The third measure, *Vertical Calls*, is the number of conference calls where managers talk about vertical integration in a given firm-year. Specifically, I focus on narratives in the presentation parts of conference calls – significant information events to the market (e.g., Frankel et al. 1999; Bowen et al. 2002; Matsumoto et al. 2011). Voluntary disclosure of vertical integration captures not only firms' vertical integration activities that have occurred, but also firms' plans to pursue future vertical integration activities.[22] I focus on the presentation parts of conference calls, because unlike the Q&A sections, the presentation parts are more likely to reflect what managers consider as a meaningful summary of the firm's existing and future activities. I use a list of keywords related

[20] In the income approach, corporate value added is the summation of depreciation and amortization, pension and retirement expenses, staff expenses, interest expenses, rental expenses, and finished goods inventories. As staff expenses are missing for most observations in Compustat, following recent studies (e.g., Hartman-Glaser et al. 2019; Schlingemann and Stulz 2022), I impute missing staff expense using the product of the number of employees and the median of the ratio of staff expense to employees within the same Fama-French 17 industry. In untabulated analysis, my results are consistent when I use annual average three-digit NAICS wage obtained from the U.S. Bureau of Labor Statistics to impute missing staff expenses, following Chen (2017).

[21] To address concerns that factors other than vertical integration, especially changes in profitability and taxation rules, may affect the results from the income approach to computing value added, I exclude net income and income taxes from the numerator and the denominator (e.g., Tucker and Wilder 1977; Maddigan 1981; Chen 2017).

[22] For instance, Methode Electronics Inc., Q2 2012 Earnings Call, Dec 08, 2011: "We see the opportunity for meaningful improvement in our margins once the vertical integration project is complete… We believe this vertical integration will not only enhance quality, mitigate supply risk but also improve our gross margins on the production of center consoles. We are on track in attempt to complete the integration of the operation by the end of fiscal 2012."

to vertical integration (see Appendix A) to track managers' discussion of vertical integration during each conference call's presentation part.

Table 8 presents the results of estimating a modified Eq. (1) using *Vertical Integration Score*, *Value-Added Ratio*, and *Vertical Calls* as dependent variables. The coefficients on *Treat* × *Post* are significantly positive across all columns, and insensitive to different fixed effects structures. Figure 2 presents the dynamic treatment effect, by estimating a modified Eq. (2), and the results support the parallel trend assumption. Overall, the results in Table 8 and Figure 2 indicate that the California Act induces firms to vertically integrate along supply chains.

*4.8 Effect of the California Act on Production Outsourcing*

In this subsection, I examine the flip side of vertical integration – production outsourcing. If firms become more vertically integrated along their supply chains, it is possible that they reduce outsourcing to suppliers. I construct two proxies for production outsourcing. The first proxy is the firm's total purchases from its suppliers scaled by cost of goods sold in the current fiscal year (*Purchase*). I obtain the data on purchases from suppliers from Compustat Segment (e.g., Cohen and Frazzini 2008; Cen et al. 2017).[23] The second proxy is the estimated firms' production outsourcing amount (*Outsourcing*) based on a stochastic Cobb-Douglas production function following Kovach et al. (2023).[24] The detailed estimation procedure is described in Appendix A. Columns 1-2 (3-4) of Table 9 present the results of estimating a modified Eq. (1) using *Purchase* (*Outsourcing*) as the dependent variable. The significantly negative coefficients on *Treat* × *Post* across all columns denote that affected firms reduce purchases from their suppliers and outsourcing

[23] The U.S. Statement of Financial Accounting Standards (SFAS) 14 and SFAS 131 require firms to disclose major customers that contribute more than 10% of their annual revenue in 10-K filings, while on the customer side, there are no mandatory requirements for firms to disclose suppliers. Thus, suppliers in Compustat Segment are limited to a subset of public suppliers.

[24] *Outsourcing* is an imperfect measure of actual production outsourcing, as it assumes an optimal production behavior at the industry-level and that any deviations from it indicate outsourcing. In untabulated analysis, the results are consistent when I use outsourcing amount scaled by total assets or cost of goods sold as the dependent variable.

amount after the California Act. The parallel trend assumption is also supported by Figure 3. Overall, Table 9 and Figure 3 provide supporting evidence that firms subject to the California Act reduce production outsourcing, solidifying my main inferences.

## 5. Additional Analyses

### *5.1 Validation Tests: Regulatory Costs of the California Act*

An underlying assumption in my study is that the California Act imposes regulatory costs on affected firms, such as elevated litigation risk and pressure from other stakeholders. Although this assumption is supported by anecdotal evidence and cross-sectional tests in Sections 4.3 and 4.4, in this subsection, I conduct a series of tests to validate this assumption.

First, I provide some descriptive evidence by showing Google Search Trends of the term "human trafficking" in California. As Appendix C Panel A illustrates, there is a surge in public attention on human trafficking issues in California, following the passage of the California Act. Further, I hand collect newspaper articles from LexisNexis about supply chain human trafficking litigation in California and plot the data in Appendix C Panel B. The figure in Appendix C Panel B suggests an overall increasing trend in the media coverage of litigation on supply chain human trafficking in California, following the adoption of the California Act.

Second, I explore the market reaction to the two final legislative events resulting in the passage and implementation of the California Act: the official passage date by the California Senate (August 30, 2010) and the date when this legislation was signed into law (September 30, 2010) (Birkey et al. 2018). As the univariate tests in Table 10 Panel A and the regression tests in Table 10 Panel B show, affected firms' investors respond negatively to the passage and implementation of the California Act, while investors in unaffected firms show no significant reaction. These results suggest that investors realized and incorporated the potential costs of the

new legislation. Overall, the results in Appendix C and Table 10 provide support for the assumption that the California Act induces costs to affected firms.

*5.2 Alternative Identification Approaches Based on an Alternative Definition of Treated Firms*

In this subsection, I employ an alternative definition of treatment status. Specifically, based on the requirements of the California Act, I identify firms that are subject to and meaningfully affected by the California Act as those categorized as "doing business in California", have annual sales of at least $100 million prior to the legislation, and operate in either the manufacturing or retail industries. I classify a firm as "doing business in California" if it meets at least one of these conditions: (1) it is headquartered or incorporated in California; (2) it has one or more factories in California, as identified by toxic emission records in the EPA's Toxic Release Inventory (TRI) database (e.g., Yost and Yu 2023); (3) its mention of "California" in Items 1, 2, 6, and 7 of the 2010 10-K represents more than 20% of state and country references.[25]

*5.2.1 Difference-in-Differences Design*

Using this alternative definition of treatment status, I reestimate the baseline difference-in-differences specification in Eq. (1), after replacing *Treat* with *Treat Alt*. The results presented in Table 11 Panel A are consistent with my main inferences, suggesting that firms subject to the California Act are more likely to make vertical acquisitions following this regulation, relative to unaffected firms.

*5.2.2 Triple-Differences Design*

As affected firms do business in California, one potential concern is that some factors unique to California firms, such as more acquisition activities, or other regulatory activities instead of the California Act, may drive the results. To further address this concern, in this subsection, I

[25] In untabulated analysis, my inferences remain consistent when setting the threshold as 10, 30, 40, or 50 percent.

employ a triple-differences design focusing exclusively on non-financial firms that do business in California. The specification of the triple-differences design is as follows:

$$Vertical\ Acq_{i,t} = \alpha + \beta_1 Treat\ Ind_i \times Large_i \times Post_t + \beta_2 Treat\ Ind_i \times Post_t + \beta_3 Large_i \times Post_t + \beta_k Controls_{i,t} + \delta_i + \gamma_t\ or\ \gamma_{ind \times t} + \epsilon_{i,t} \quad (3)$$

*Treat Ind*$_i$ is an indicator variable for affected industries, i.e., manufacturing or retail industries. *Large*$_i$ is an indicator variable for firms with sales at least $100 million before the California Act. Other variables are defined in the same way as in Eq. (1). *Treat Ind*$_i$ × *Large*$_i$, *Treat Ind*$_i$, *Large*$_i$, and *Post*$_t$ are absorbed by firm and fiscal year fixed effects. The three-way interaction between *Treat Ind*, *Large*, and *Post* capture the incremental effect of large manufacturing and retail firms' vertical acquisitions after the California Act, using non-large manufacturing and retail firms and large firms in other industries as the benchmark. Since all firms included in this sample do business in California, the concerns regarding California-specific confounders (e.g., acquisition opportunities, other governmental activities) will be mitigated. Table 11 Panel B tabulates the results of estimating Eq. (3). The significantly positive coefficients on *Treat Ind* × *Large* × *Post* in all four columns (e.g., coef.= 0.026; t-stat.= 3.86 in column 2) suggest that large manufacturing and retail firms doing business in California make more vertical acquisitions after the California Act. The coefficients on *Large* × *Post* are not distinguishable from zero, indicating that large firms that do business in California but belong to industries unaffected by the California Act do not alter their vertical acquisition activities.

*5.3 Matching Analyses*

To further mitigate concerns that my inferences are driven by underlying discrepancies between treated firms and control firms, I exploit two commonly used matching methods: entropy balancing matching and propensity score matching (PSM) (Hainmueller 2012; McMullin and Schonberger 2020, 2022). I use entropy balancing approach to reweight my treated and control

samples by matching firms on all control variables with 0.01 tolerance. To conduct propensity score matching, I first estimate a probit regression using *Treat* as the dependent variable and all control variables as independent variables. Then I rely on K-nearest-neighbor matching (K = 5) with replacement within 0.01 caliper. I tabulate the regression results using the matched samples in Table 12 Panel A. The coefficients on *Treat* × *Post* remain significantly positive across two matching approaches, strengthening my main inferences.

*5.4 Other Robustness Tests*

According to the requirements of the California Act, firms that do business in California but have annual sales below the $100 million threshold are not subject to this legislation, and therefore are also included in the control group in my main sample. To alleviate the concern that these smaller firms in the control group may not be a good counterfactual, I limit my sample to firms within a small bandwidth of $100 million sales threshold, since they share more similarities. Columns 1-2 (3-4) of Table 12 Panel B present the results of focusing on firms with sales ranging from $25-175 ($50-150) million, consisent with my main findings.

To further rule out concerns that my results are contaminated by some unobservable factors in California in which a negligible portion of treated firms (~19%) are headquartered, I test the robustness of my results keeping treated and control firms headquartered in states that potentially share more similarities economically: (i) top 20 states with highest GDP in 2010, the year before the adoption of the California Act;[26] and (ii) all non-California states. Table 12 Panel C shows the results consistent with my main inferences. Alternatively, to control for time- and industry-varying,

[26] Top 20 states with highest GDP in 2010 include: California, Texas, New York, Florida, Illinois, Pennsylvania, Ohio, New Jersey, Virginia, North Carolina, Georgia, Massachusetts, Michigan, Washington, Maryland, Indiana, Minnesota, Missouri, Tennessee, and Colorado (in the descending order of GDP). Data are obtained from the U.S. BEA.

state-level characteristics that might drive the results, I additionally include state × fiscal year or state × industry × fiscal year fixed effects and display the results in Table 12 Panel D.

In addition, I explore alternative vertical relatedness coefficient thresholds of classifying vertical acquisitions (e.g., 0.1%, 3%). As the results in Table 12 Panel E suggest, my inferences are not sensitive to these alternative thresholds. In untabulated robustness tests, first, although my main analyses support the parallel trend assumption, there still exist some concerns that the global financial crisis impacted treated and control firms differently before the California Act. I alleviate these concerns by restricting my sample to the period from fiscal year 2009 onwards. Furthermore, I use the raw number of vertical acquisitions as an alternative dependent variable in Poisson and negative binomial regression models, considering that the linear regression model assumption of normally distributed error terms may be violated as the number of acquisitions is a count variable (e.g., Huizinga and Voget 2009; Arikan and Stulz 2016). Overall, the consistent evidence across a basket of robustness tests reassures my main inferences.

*5.5 Effect of the California Act on Other Vertical Integration Outcomes: Number of Business Segments*

In this subsection, I explore other vertical integration outcomes to further corroborate my findings. As a result of enhanced vertical integration, firms may develop and possess new businesses. To test this supposition, I construct a firm-year level measure of the number of business segments reported in Compustat Segment. I estimate Eq. (1) using the natural log of one plus the number of business segments (*Business Seg Num Ln*) as the dependent variable and tabulate the results in Table 13. The significantly positive coefficients on *Treat* × *Post* are in line with my prediction that firms affected by the California Act possess more business segments. These results complement my previous analyses on vertical acquisitions, overall vertical integration, and

production outsourcing, by suggesting that firms exhibit enhanced vertical integration in multiple dimensions.

## 7. Conclusions

This study investigates whether and how supply chain disclosure regulations shape firms' vertical boundaries. I employ a disclosure regulation enacted in California that requires firms to disclose their efforts to combat labor law violations in their supply chains. This disclosure regulation elevates the costs of relying on supply chain parties, including litigation risk, reputational costs, other stakeholder pressure, and costs of supply chain information acquisition and monitoring. I hypothesize that affected firms are incentivized to vertically integrate to better control their supply chains, including via making vertical acquisitions.

Difference-in-differences analyses demonstrate that affected firms are more likely to make vertical acquisitions following the disclosure regulation, relative to firms not subject to the California Act. The surge in vertical acquisitions is largely driven by the spree in upstream vertical acquisitions. The effect is concentrated among firms facing greater stakeholder pressure (from plaintiffs, consumers, anti-trafficking NGOs, and shareholder activists), firms sourcing from countries or industries with labor abuses, and firms with higher asset specificity.

Besides making vertical acquisitions, relative to control firms, treated firms become overall more vertically integrated across supply chains and, correspondingly, reduce their production outsourcing and reliance on suppliers following the California Act.

Furthermore, validation tests provide support to the costs imposed by this legislation, as reflected by increased public attention towards human trafficking, greater media coverage of supply chain human trafficking litigation, as well as negative market reactions to treated firms

surrounding the passage and implementation of this law. In addition, I find that treated firms possess more business segments following the new regulation.

Collectively, my findings suggest that supply chain disclosure regulations incentivize firms to expand their vertical boundaries to gain more control over supply chains. My study contributes to multiple streams of literature, including (1) the effects of disclosure regulations on corporate boundaries, filling the void in how disclosure shapes *vertical* boundaries of the firm; (2) the effects of costs induced by disclosure regulations on corporate outcomes, and broadly, the real effects of non-financial disclosure; and (3) vertical integration and the organization of production.

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**Appendix A**
Variable definitions

This table provides a detailed description of the procedures used to compute each variable used in the analyses. Data are obtained through the Securities Data Company (SDC) Platinum, U.S. Bureau of Economic Analysis (BEA), U.S. Environmental Protection Agency (EPA), U.S. Bureau of Labor Statistics (BLS), U.S. Department of Labor, Exhibit 21 of Form 10-K, FactSet Revere Supply Chain Relationships, Violation Tracker, S&P Capital IQ, LexisNexis, Wayback Machine, Compustat, and CRSP. All continuous variables are winsorized at the 1st and 99th percentiles of their distributions.

Primary dependent variables:

| Variable | Definition |
|---|---|
| *Vertical Dummy* | An indicator variable equal to one if the firm makes vertical acquisitions in the current fiscal year, and zero otherwise. A vertical acquisition is defined as an acquisition in which the vertical relatedness coefficient between the acquirer's industry and the target's industry is equal to or higher than 1%, and the acquirer and the target are not in the same SIC industry. The measure of vertical relatedness between any two industries is constructed based on the 2012 BEA Input-Output (I/O) Accounts data. For each I/O industry pair *i-j*, the amount of output required from industry *i* to produce one dollar's worth of industry *j*'s output ($v_{ij}$) and its corollary (amount of output required from industry *j* to produce one dollar of output in industry *i* ($v_{ji}$)) are calculated. The vertical relatedness coefficient of the industry pair *i-j* ($V_{ij}$) is maximum of these two metrics (i.e., $v_{ij}$ and $v_{ji}$). The crosswalk table of BEA I/O industry codes and NAICS codes and the crosswalk table of SIC codes and NAICS codes are used for the matching. The BEA I/O Accounts data are obtained from the BEA's website: https://www.bea.gov/industry/inputoutput-accounts-data. |
| *Vertical Num Ln* | The natural log of one plus the number of vertical acquisitions the firm makes in the current fiscal year. |
| *Vertical Integration Score* | Text-based firm-year level measure of vertical integration developed by Frésard et al. (2020). The vertical integration score indicates the potential of the given firm's products to be vertically related to the other products sold by the same firm. |
| *Value-Added Ratio* | The firm's income components scaled by sales for the current fiscal year. Income components include depreciation and amortization, pension and retirement expenses, staff expenses, interest expenses, rental expenses, and finished goods inventories. Sales exclude net income and income taxes. |
| *Vertical Calls* | The number of vertical integration-related conference calls hosted by the firm in the current fiscal year. A vertical integration-related conference call is defined as a conference call mentioning at least one of the keywords on vertical integration in its presentation part: "vertical integration", "vertically integrated", "acquire suppliers", "vertical acquisitions", "firm boundary", "in-house production", "in-house manufacturing", "reduce outsourcing", "outsource less", and their variations. |
| *Purchase* | The firm's purchases from its suppliers scaled by COGS in the current fiscal year. Data on purchases from suppliers is obtained from Compustat Segment. This number is multiplied by 100 for ease of interpretation. |
| *Outsourcing* | The natural log of the firm's production outsourcing amount in the current fiscal year. The production outsourcing amount is estimated based on a stochastic production function following Kovach et al. (2023). Specifically, the following stochastic Cobb-Douglas production function is estimated: $$ln(COGS_{i,t}) = ln(A_{ind,t}) + \beta_1 ln(PPE_{i,t}) + \beta_2 ln(EMP_{i,t}) - u_{i,t} + v_{i,t}$$ where $u_{i,t}$ is a non-negative technical inefficiency term, assumed to follow a half-normal distribution, and its variance is modeled as a linear function of intangible assets and the most recent three years' investments into R&D and capital expenditures. $A_{ind,t}$ is an industry-specific technology factor. A separate regression of the equation above is performed for each year within industry-clustered standard errors, with each regression having a separate $A_{ind,t}$ intercept for each two-digit SIC manufacturing industry (SIC codes 2000-3999). *Outsourcing* is calculated as the summation of $ln(A_{ind,t})$ and $v_{i,t}$. |

Primary independent and control variables:

| Variable | Definition |
|---|---|
| *Treat* | An indicator variable equal to one if the firm provides a California Transparency Act Statement on its official website, and zero otherwise. |
| *Post* | An indicator variable equal to one from fiscal year 2011 onwards, and zero otherwise. |
| *Size* | The natural log of the firm's book value of assets at the prior fiscal year-end. |
| *Age* | The natural log of the firm's age. The firm's age is computed as the number of years since the firm first entered Compustat. |
| *R&D* | The firm's research and development expense in the current fiscal year scaled by total assets at the prior fiscal year-end. |
| *PPE* | The firm's net property, plant, and equipment scaled by total assets at the prior fiscal year-end. |
| *Leverage* | The firm's long-term debt and short-term debt scaled by total assets at the prior fiscal year-end. |
| *ROA* | The firm's net income for the current fiscal year scaled by total assets at the prior fiscal year-end. |
| *Cash* | The firm's cash and short-term investments scaled by total assets at the prior fiscal year-end. |
| *Loss* | An indicator variable equal to one if the firm's net income for the current fiscal year is negative, and zero otherwise. |
| *Sales Growth* | The growth rate of the firm's sales in the current fiscal year relative to sales in the prior fiscal year. |

Additional dependent variables:

| Variable | Definition |
|---|---|
| *Up Vertical Dummy* | An indicator variable equal to one if the firm makes upstream vertical acquisitions in the current fiscal year, and zero otherwise. Upstream vertical acquisitions are defined in a similar way to vertical acquisitions except that the vertical relatedness coefficient is only based on the amount of output required from the target firm's industry to produce one dollar's worth of the acquiring firm's (i.e., the focal firm's) industry's output. |
| *Up Vertical Num Ln* | The natural log of one plus the number of upstream vertical acquisitions the firm makes in the current fiscal year. |
| *Down Vertical Dummy* | An indicator variable equal to one if the firm makes downstream vertical acquisitions in the current fiscal year, and zero otherwise. Downstream vertical acquisitions are defined in a similar way to vertical acquisitions except that the vertical relatedness coefficient is only based on the amount of output required from the acquiring firm's (i.e., the focal firm's) industry to produce one dollar's worth of the target firm's industry's output. |
| *Down Vertical Num Ln* | The natural log of one plus the number of downstream vertical acquisitions the firm makes in the current fiscal year. |
| *Non-Vertical Dummy* | An indicator variable equal to one if the firm makes non-vertical acquisitions in the current fiscal year, and zero otherwise. Non-vertical acquisitions are defined as acquisitions either (1) with the vertical relatedness coefficient equal to 0; or (2) where the acquirer and the target are in the same SIC industry. |
| *Non-Vertical Num Ln* | The natural log of one plus the number of non-vertical acquisitions the firm makes in the current fiscal year. |
| *CAR* | The firm's cumulative abnormal return over days [-1, +1] around the event date, adjusted by Fama-French three factors. |
| *Business Seg Num Ln* | The natural log of one plus the number of the firm's business segments in the current fiscal year. |

Additional independent variables:

| Variable | Definition |
|---|---|
| *KS Litigation Risk* | The firm-year level measure of litigation risk, based on Kim and Skinner (2012) Table 7 Model 3. |
| *Plaintiff-Lawyer Views* | The total number of EDGAR views of the firm's filings by plaintiffs' law firms in the current fiscal year. Data are obtained from Kartapanis and Yust (2022). |
| *Advertising Exp* | The firm's advertising expense scaled by sales in the current fiscal year. |
| *PCE Score* | The percentage of output sold to Personal Consumption Expenditure (PCE) at six-digit NAICS industry level. Data are obtained from Delgado and Mills (2017). |
| *NGO* | The proportion of firms covered by KnowTheChain within each two-digit SIC industry. |
| *Prosocial Shareholder* | The firm's high social norm foreign institutional ownership in the current fiscal year, following Dyck et al. (2019). |
| *Sourcing Ctr Risk* | The median of the total frequency of purchases from countries with high labor risk within each two-digit SIC industry. Data are obtained from Hoberg and Moon (2017, 2019). |
| *Sourcing Ind Risk* | The total frequency of relationships with suppliers from industries with high labor risk. Industries with high labor risk are industries with labor violations in the highest tercile. |
| *Firm Asset Specificity* | Firm-year level measure of asset redeployability developed by Kim and Kung (2016). This measure is multiplied by negative one so that a higher value indicates higher asset specificity (i.e., lower asset redeployability). |
| *Pseudo Post* | An indicator variable equal to one from fiscal year 2007 onwards, and zero otherwise. |
| *Treat Alt* | An indicator variable equal to one if a firm meets all of the following criteria: it is classified as "doing business in California," it reported sales of at least $100 million during 2008-2010, and it operates in either the manufacturing or retail industry, and zero otherwise. A firm is classified as "doing business in California" if it meets at least one of these conditions: (1) it is headquartered or incorporated in California; (2) it has one or more factories in California, as identified by toxic emission records in the EPA's Toxic Release Inventory (TRI) database; (3) its mention of "California" in Items 1, 2, 6, and 7 of the 2010 10-K represents more than 20% of state and country references. |
| *Treat Ind* | An indicator variable equal to one if the firm belongs to manufacturing or retail industries (SIC codes 2000-3999, 5200-5999, two-digit NAICS codes 31-33, 44-45), and zero otherwise. |
| *Large* | An indicator variable equal to one if the firm has sales of at least $100 million in 2008-2010, and zero otherwise. |

**Appendix B**
Examples of California Transparency Act Statement

**Example 1: Cisco Systems Inc (NYSE: CSCO)**

Excerpts from "Cisco Statement on the Prevention of Modern Slavery and Human Trafficking":

We source from a global network of suppliers and partners. Hundreds of suppliers provide parts that go into our products, and then manufacturing partners assemble and test finished products; provide logistical services; and collect, refurbish, and/or recycle products at the end of their useful life. The major elements of our materials supply chain are briefly described below. Our Supplier List provides more insight on the global suppliers with which we partner.

Verification: We evaluate and address risks of human trafficking and slavery through conformance to the Code and using a risk-based approach. When new suppliers are onboarded, Cisco assesses for modern slavery risks, which includes an assessment of whether the supplier employs vulnerable workers (for example, foreign migrant workers and young workers). If risks are identified, we follow up to determine if impacts need to be addressed prior to scaling business with the supplier.

Audits: We conduct third-party supplier audits using the VAP, or equivalent, or review audit reports through the RBA's audit sharing system and conduct unannounced audits as necessary. The audit process includes on-site inspections, document reviews, and worker and management interviews.

Certification: Suppliers must agree to comply with the Code as well as international standards and applicable laws and regulations when they enter into master purchasing agreements or equivalent terms and conditions with Cisco. This creates legally enforceable obligations, including in cases where the law is silent or allows practices that violate Cisco policies. We require suppliers to acknowledge the Code at the onset of the relationship.

Accountability: Non-conformance with the Code is taken very seriously. Cisco works with suppliers to develop corrective action plans, identify the root cause of the non-conformance, and strives to ensure that corrective actions are implemented in the shortest possible timeline. Corrective actions may include the immediate return of passports or facilitating reimbursement of paid recruitment fees within 90 days of discovery. Corrective actions are followed by preventative actions to ensure that non-conformances do not reoccur and to reduce future risk. Such actions may include ensuring the facility has a policy in place and workers are aware of the policy, and that contracts are clear and in a language workers can understand. Multiple teams collaborate to hold suppliers accountable and to ensure actions are completed by specified deadlines.

Training: Our strategy focuses on capability building for our suppliers and employees. We regularly engage suppliers across the globe to train on Code fundamentals. This helps us build awareness, propagate best practices, and focus on improvement. For suppliers, the contributions we make to RBA workshops and training content are mutually beneficial, ensuring understanding of policies and standards.

**Example 2: Alamo Group (NYSE: ALG)**

Excerpts from "California Transparency in Supply Chains Act Disclosure":

Currently, we do not: (1) engage in verification of product supply chains to evaluate or address risks of human trafficking and slavery; (2) conduct audits of suppliers to evaluate supplier compliance with anti-slavery and human trafficking standards; (3) require our suppliers to certify that they comply with anti-slavery and human trafficking laws in the country or countries in which they do business; (4) other than as set forth in our Code, maintain internal accountability standards and procedures for employees or contractors for failing to meet anti-slavery and human trafficking standards; or (5) provide company employees or management who have direct responsibility for supply chain management with training on anti-slavery and human trafficking laws.

**Example 3: Chevron Corporation (NYSE: CVX)**

Excerpts from "California Transparency in Supply Chains Act Disclosure":

Verification: Chevron engages in various activities to identify, assess, and manage supplier risk. Chevron's business units conduct health, safety, and environment (HSE) risk assessments prior to awarding supply contracts. Chevron does not outsource this process. This risk assessment process may include forced labor risks on a case-by-case basis at the discretion of the relevant business units. Chevron also communicates annually with the executive leadership of its largest suppliers.

Auditing: Through Chevron's Contractor Operational Excellence Management (COEM) process, business unit HSE audit teams work with suppliers identified as having high OE business risk-which includes potential social and community risk and may include forced labor risk-to increase accountability and continually improve their performance.

Certification: Chevron's current standard contract provisions require contractors, suppliers, and service providers to comply with all applicable laws, which includes laws regarding slavery and human trafficking of the country or countries in which they are doing business.

Accountability: Chevron maintains robust internal accountability standards and procedures for employees or contractors failing to meet company standards, including Chevron's Human Rights Policy. Non-compliance with our policies can result in discipline, up to and including termination.

Training: Training on Chevron's Human Rights Policy is provided to the individuals and functions we assess to be most likely to encounter issues related to human rights in higher-risk locations. Chevron's suite of human rights training, which addresses slavery and human trafficking issues, includes awareness-raising for employees and contractors, computer-based training for employees targeting key functions and regions, and ad hoc, location-specific training.

**Example 4: ITT Inc (NYSE: ITT)**

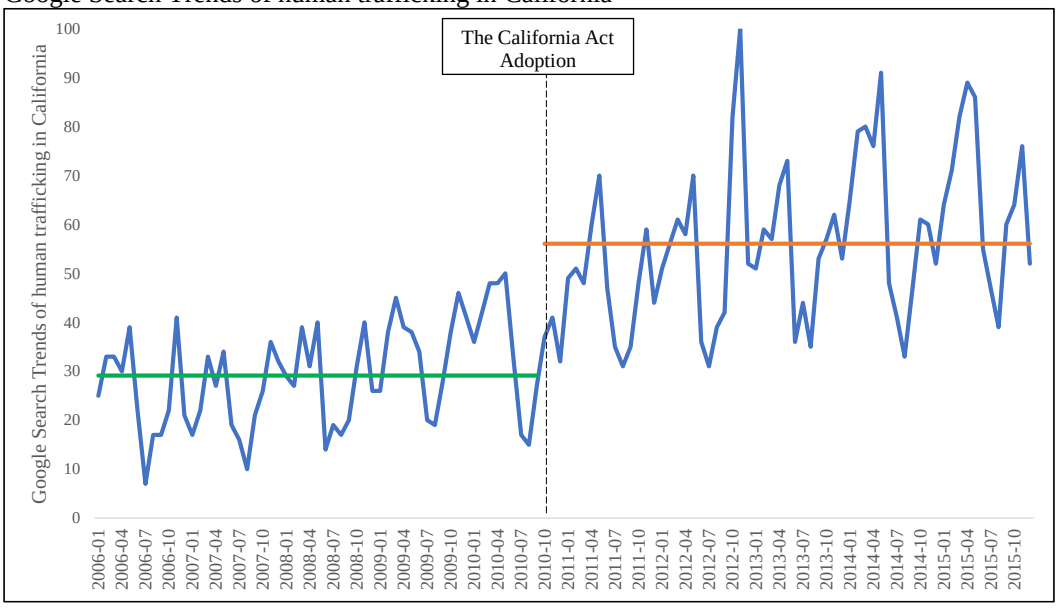
Excerpts from "California Transparency in Supply Chains Act Disclosure Statement":

1. Except as may be required by the FARs, ITT does not currently conduct third party verification of its supply chain to evaluate and address the risks of human trafficking and slavery.
2. Except as may be required by the FARs, ITT does not currently conduct supplier audits to specifically evaluate compliance with company standards on human trafficking and slavery.
3. ITT expects its suppliers to comply with the laws in the countries where they are doing business. Except as may be required by the FARs, ITT does not currently require supplier certification that specifically addresses slavery and human rights.
4. ITT maintains accountability standards and procedures for employees or contractors failing to meet legal requirements and company standards. ITT's Ethics and Compliance organization has an externally available helpline and web line for reporting concerns of any kind, as well as an ombudsman program that promotes reporting potential violations of law and company policy. Every report of potential misconduct is investigated, and outcomes are reported to ITT management.
5. ITT offers training on slavery and human trafficking to company employees and managers who have direct responsibility for supply chain management as part of its overall compliance program.

**Appendix C**
Google Search Trends and media coverage around the adoption of the California Act

The figure in Panel A below plots the Google Search Trends of the term "human trafficking" in California during years 2006-2015. The blue line represents the monthly Google Search Trends. The green line and orange line represent the average Google Search Trends before and after October 2010. The figure in Panel B below plots the number of news articles about litigation on supply chain human trafficking in California during years 2000-2022. I identify news articles of interest from LexisNexis, which contain keywords from all of the following keyword groups: (1) "trafficking" or "slavery" or "human right" or "forced labor" or "forced labour" or "child labor" or "child labour"; (2) "litigation" or "litigate" or "lawsuit" or "class-action" or "plaintiff"; (3) "supply chain" or "supplier" or "import"; and (4) "California".

Panel A: Google Search Trends of human trafficking in California




Panel B: Media coverage of litigation on supply chain human trafficking in California

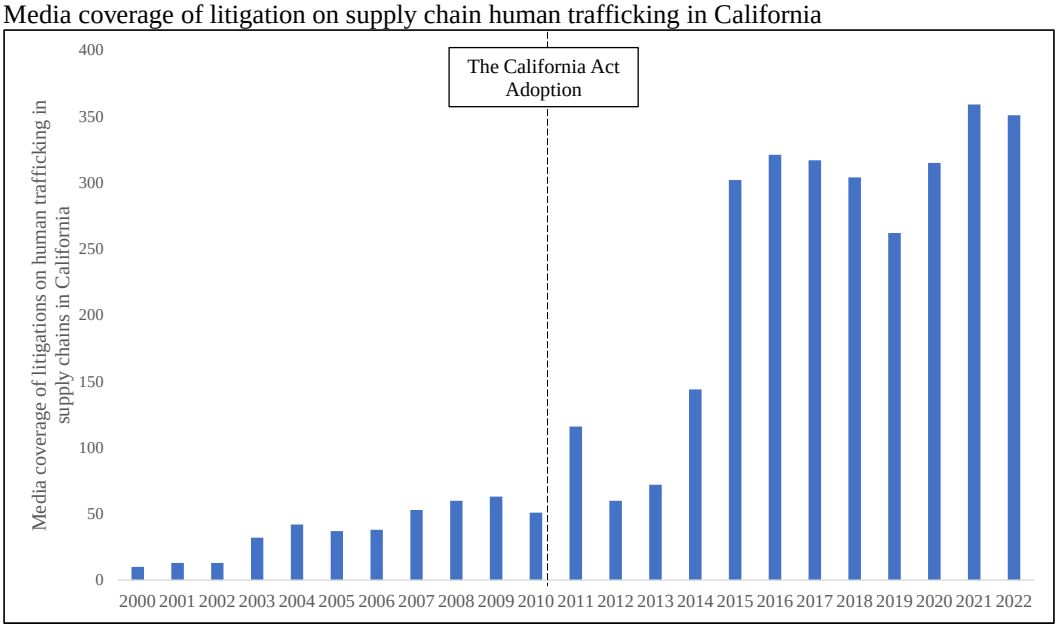
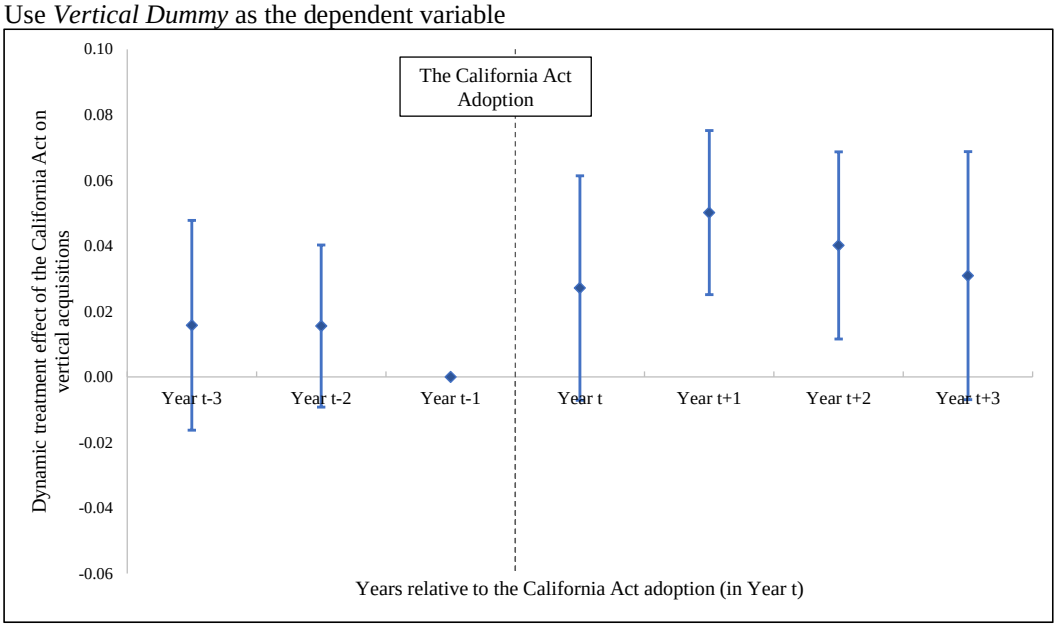


**Figure 1**
Dynamic treatment effect of the California Act on vertical acquisitions

The figure in Panel A (B) below reports the coefficients of an ordinary least squares regression investigating the effects of the California Act on vertical acquisitions in event time, using *Vertical Dummy* (*Vertical Num Ln*) as the dependent variable. Formally, I estimate $Vertical\ Acq_{i,t} = \alpha + \beta_1\ Treat_i \times Year\ t\text{-}3_t + \beta_2\ Treat_i \times Year\ t\text{-}2_t + \beta_3\ Treat_i \times Year\ t_t + \beta_4\ Treat_i \times Year\ t\text{+}1_t + \beta_5\ Treat_i \times Year\ t\text{+}2_t + \beta_6\ Treat_i \times Year\ t\text{+}3_t + \beta_k Controls + \delta_i + \gamma_{ind \times t} + \epsilon_{i,t}$, where $\delta_i$ and $\gamma_{ind \times t}$ represent firm and industry × fiscal year fixed effects, respectively. In each panel, *Year t-3* (*Year t-2*, *Year t*, *Year t+1*, *Year t+2*, *Year t+3*) is an indicator variable equal to one for fiscal year 2008 (2009, 2011, 2012, 2013, 2014), and zero otherwise. Each point estimate is accompanied by a 90% confidence interval calculated based on standard errors clustered at the headquarters state level. Note that *Year t-1* has a coefficient of zero and no confidence interval because it serves as the benchmark period. All variables are defined in Appendix A.

Panel A: Use *Vertical Dummy* as the dependent variable




Panel B: Use *Vertical Num Ln* as the dependent variable

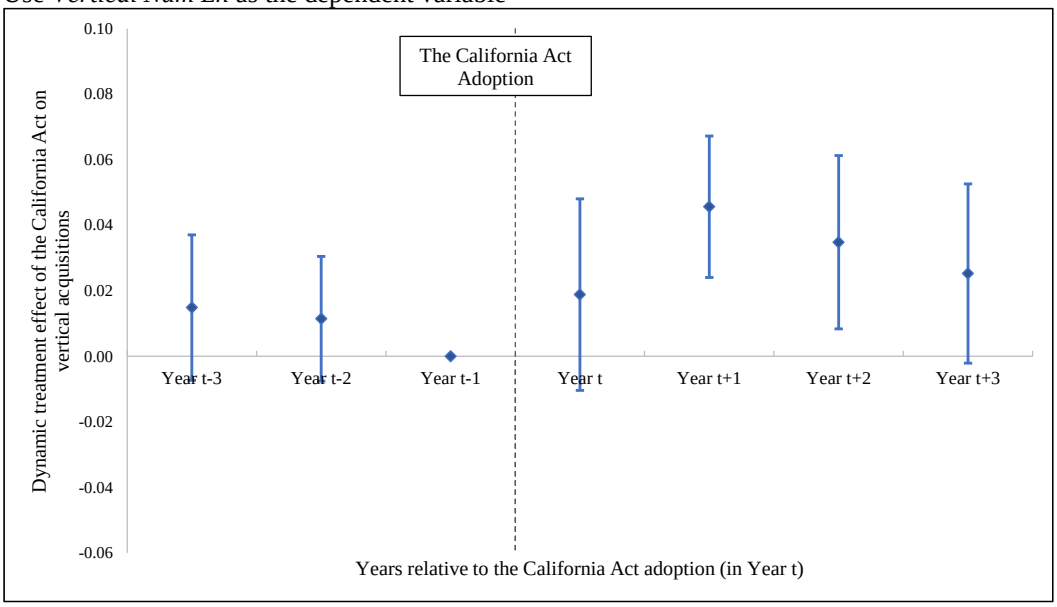
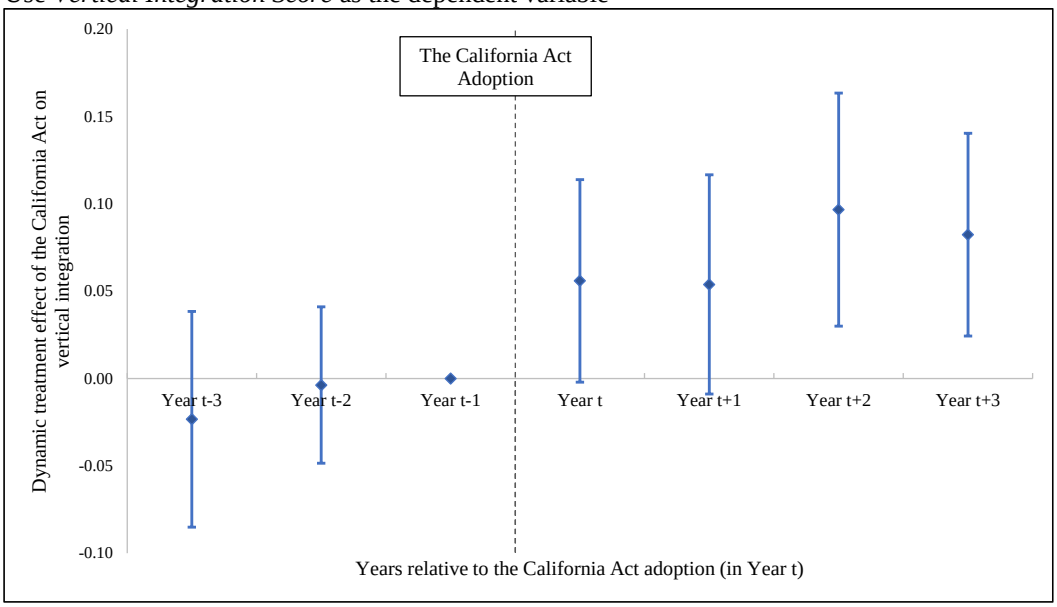


**Figure 2**
Dynamic treatment effect of the California Act on overall vertical integration

The figure in Panel A (B, C) below reports the coefficients of an ordinary least squares regression investigating the effects of the California Act on overall vertical integration in event time, using *Vertical Integration Score* (*Value-Added Ratio*, *Vertical Calls*) as the dependent variable. Formally, I estimate $Vertical\ Integration_{i,t} = \alpha + \beta_1\ Treat_i \times Year\ t\text{-}3_t + \beta_2\ Treat_i \times Year\ t\text{-}2_t + \beta_3\ Treat_i \times Year\ t_t + \beta_4\ Treat_i \times Year\ t\text{+}1_t + \beta_5\ Treat_i \times Year\ t\text{+}2_t + \beta_6\ Treat_i \times Year\ t\text{+}3_t + \beta_k Controls + \delta_i + \gamma_{ind \times t} + \epsilon_{i,t}$, where $\delta_i$ and $\gamma_{ind \times t}$ represent firm and industry × fiscal year fixed effects, respectively. *Year t-3* (*Year t-2*, *Year t*, *Year t+1*, *Year t+2*, *Year t+3*) is an indicator variable equal to one for fiscal year 2008 (2009, 2011, 2012, 2013, 2014), and zero otherwise. Each point estimate is accompanied by a 90% confidence interval calculated based on standard errors clustered at the headquarters state level. Note that *Year t-1* has a coefficient of zero and no confidence interval because it serves as the benchmark period. All variables are defined in Appendix A.

Panel A: Use *Vertical Integration Score* as the dependent variable




Panel B: Use *Value-Added Ratio* as the dependent variable

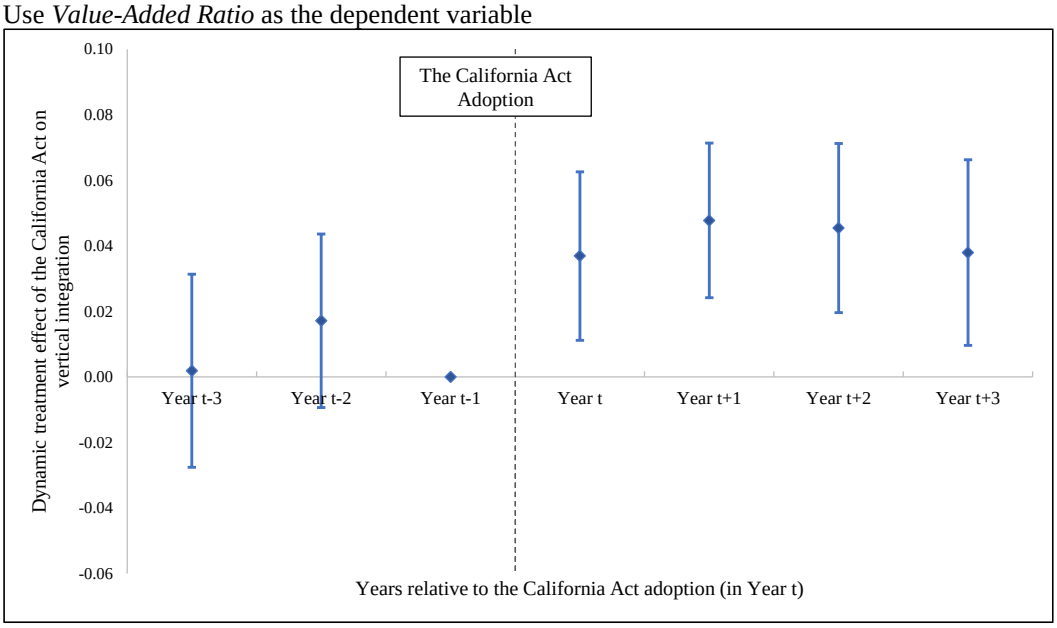


**Figure 2 (continued)**

Panel C: Use *Vertical Calls* as the dependent variable

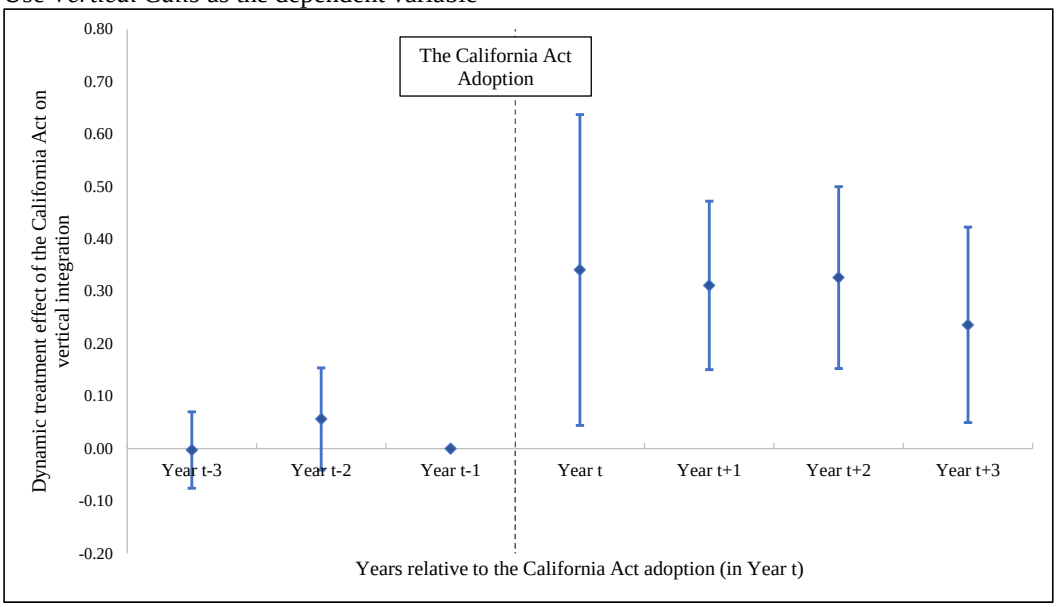
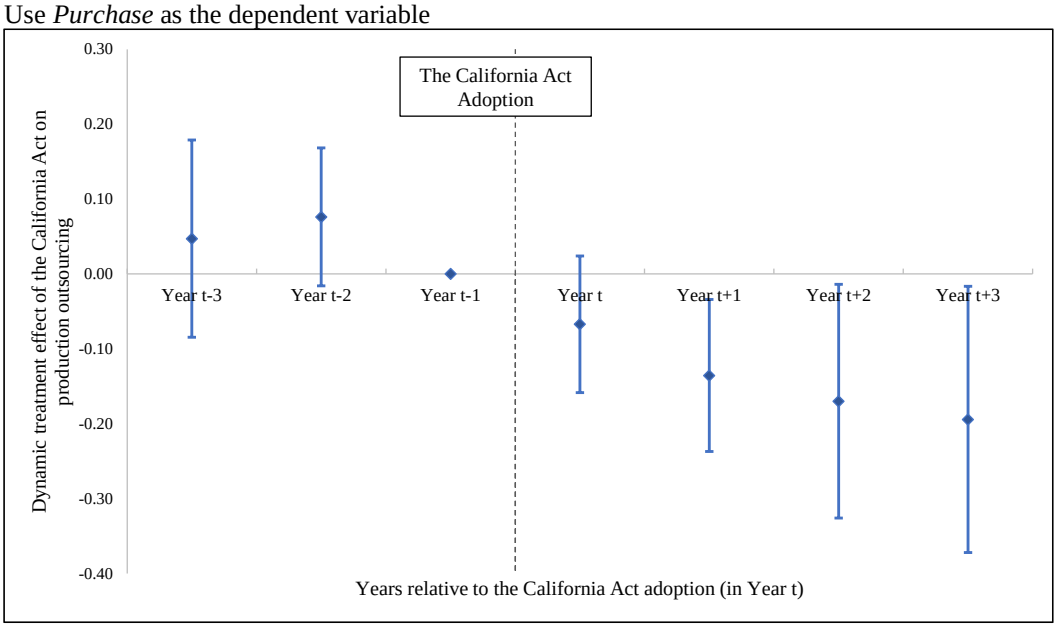


**Figure 3**
Dynamic treatment effect of the California Act on production outsourcing

The figure in Panel A (B) below reports the coefficients of an ordinary least squares regression investigating the effects of the California Act on production outsourcing in event time, using *Purchase* (*Outsourcing*) as the dependent variable. Formally, I estimate $Production\ Outsourcing_{i,t} = \alpha + \beta_1\ Treat_i \times Year\ t\text{-}3_t + \beta_2\ Treat_i \times Year\ t\text{-}2_t + \beta_3\ Treat_i \times Year\ t_t + \beta_4\ Treat_i \times Year\ t\text{+}1_t + \beta_5\ Treat_i \times Year\ t\text{+}2_t + \beta_6\ Treat_i \times Year\ t\text{+}3_t + \beta_k Controls + \delta_i + \gamma_{ind \times t} + \epsilon_{i,t}$, where $\delta_i$ and $\gamma_{ind \times t}$ represent firm and industry × fiscal year fixed effects, respectively. *Year t-3* (*Year t-2*, *Year t*, *Year t+1*, *Year t+2*, *Year t+3*) is an indicator variable equal to one for fiscal year 2008 (2009, 2011, 2012, 2013, 2014), and zero otherwise. Each point estimate is accompanied by a 90% confidence interval calculated based on standard errors clustered at the headquarters state level. Note that *Year t-1* has a coefficient of zero and no confidence interval because it serves as the benchmark period. All variables are defined in Appendix A.

Panel A: Use *Purchase* as the dependent variable




Panel B: Use *Outsourcing* as the dependent variable

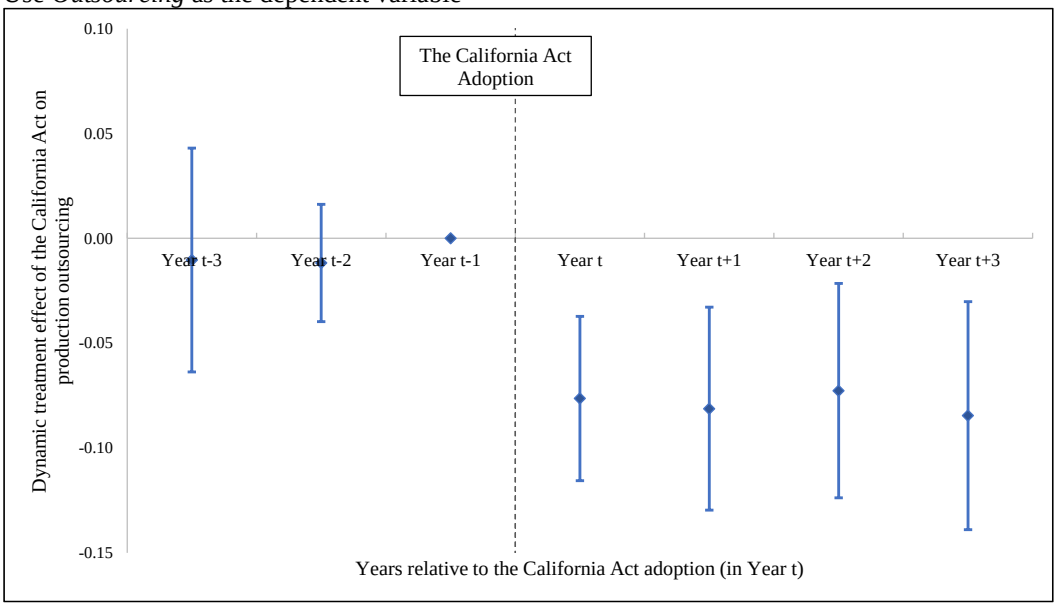


**Table 1**
Sample selection

This table presents the selection procedure of the main sample during the fiscal years 2008 to 2014.

| Description | No. of firm-years dropped | No. of firm-years remaining |
|---|---|---|
| All fiscal firm-years covered by Compustat North America over 2008-2014 | | 78,547 |
| Exclude non-manufacturing and non-retail firms | (55,135) | 23,412 |
| Exclude firm-years with missing control variables | (3,881) | 19,531 |
| Exclude firms without observations in both the pre- and post-regulation periods | (2,944) | 16,587 |
| Final sample of firm-years | | **16,587** |
| Final sample of unique firms | | **2,619** |

**Table 2**
Summary statistics

This table presents descriptive information for the sample and variables of interest. The sample consists of fiscal firm-years with the necessary data for the vertical acquisition tests during the fiscal years 2008 to 2014. Details of variable construction are contained in Appendix A.

| Variables | N | Mean | SD | P25 | P50 | P75 |
|---|---|---|---|---|---|---|
| Primary dependent variables: | | | | | | |
| *Vertical Dummy* | 16,587 | 0.080 | 0.271 | 0.000 | 0.000 | 0.000 |
| *Vertical Num Raw* | 16,587 | 0.114 | 0.469 | 0.000 | 0.000 | 0.000 |
| *Vertical Num Ln* | 16,587 | 0.067 | 0.240 | 0.000 | 0.000 | 0.000 |
| Primary independent variables: | | | | | | |
| *Treat* | 16,587 | 0.277 | 0.448 | 0.000 | 0.000 | 1.000 |
| *Post* | 16,587 | 0.550 | 0.497 | 0.000 | 1.000 | 1.000 |
| *Size* | 16,587 | 5.814 | 2.574 | 4.036 | 5.846 | 7.575 |
| *Age* | 16,587 | 2.546 | 0.476 | 2.398 | 2.708 | 2.833 |
| *R&D* | 16,587 | 0.087 | 0.177 | 0.000 | 0.018 | 0.090 |
| *PPE* | 16,587 | 0.221 | 0.186 | 0.077 | 0.168 | 0.320 |
| *Leverage* | 16,587 | 0.263 | 0.467 | 0.011 | 0.164 | 0.325 |
| *ROA* | 16,587 | -0.134 | 0.658 | -0.093 | 0.029 | 0.084 |
| *Cash* | 16,587 | 0.222 | 0.230 | 0.049 | 0.138 | 0.319 |
| *Loss* | 16,587 | 0.390 | 0.488 | 0.000 | 0.000 | 1.000 |
| *Sales Growth* | 16,587 | 0.121 | 0.595 | -0.077 | 0.038 | 0.169 |

**Table 3**
Effect of the California Act on vertical acquisitions

This table presents the results examining the effect of the California Act on vertical acquisitions, with columns 1-3 (4-6) using *Vertical Dummy* (*Vertical Num Ln*) as the dependent variable. Columns 1, 2, 4, and 5 include firm and fiscal year fixed effects, and columns 3 and 6 include firm and industry × fiscal year fixed effects. The sample consists of fiscal firm-year observations from 2008-2014. All variables are defined in Appendix A. The *t*-statistics are reported below coefficient estimates in parentheses and are calculated based on standard errors clustered by headquarters state. *, **, *** indicate statistics significance at the 0.10, 0.05, and 0.01 levels, respectively, using a two-tailed *t*-test.

| Dependent variable: | | *Vertical Dummy* | | | *Vertical Num Ln* | | |
|---|---|---|---|---|---|---|---|
| | Pr. Sign | (1) | (2) | (3) | (4) | (5) | (6) |
| *Treat × Post* | + | 0.025*** | 0.025*** | 0.027*** | 0.021*** | 0.021*** | 0.023*** |
| | | (2.94) | (2.96) | (3.20) | (2.76) | (2.75) | (3.15) |
| *Size* | | | 0.003 | 0.003 | | 0.003 | 0.003 |
| | | | (1.12) | (1.07) | | (1.22) | (1.36) |
| *Age* | | | 0.031** | 0.035** | | 0.025** | 0.027*** |
| | | | (2.10) | (2.36) | | (2.37) | (2.72) |
| *R&D* | | | 0.001 | 0.003 | | 0.001 | 0.002 |
| | | | (0.19) | (0.35) | | (0.22) | (0.38) |
| *PPE* | | | -0.060** | -0.062** | | -0.045** | -0.047** |
| | | | (-2.25) | (-2.17) | | (-2.13) | (-2.00) |
| *Leverage* | | | -0.004 | -0.004 | | -0.004 | -0.004 |
| | | | (-1.29) | (-1.43) | | (-1.46) | (-1.53) |
| *ROA* | | | -0.005*** | -0.005*** | | -0.004*** | -0.004*** |
| | | | (-3.39) | (-3.26) | | (-3.51) | (-3.46) |
| *Cash* | | | 0.038*** | 0.039*** | | 0.025** | 0.026*** |
| | | | (2.67) | (2.86) | | (2.50) | (2.69) |
| *Loss* | | | -0.019*** | -0.017*** | | -0.016*** | -0.014*** |
| | | | (-2.99) | (-2.90) | | (-3.05) | (-2.88) |
| *Sales Growth* | | | 0.006** | 0.005** | | 0.005** | 0.004** |
| | | | (2.27) | (2.24) | | (2.53) | (2.46) |
| Firm FE | | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | | Yes | Yes | No | Yes | Yes | No |
| Industry × Year FE | | No | No | Yes | No | No | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes | Yes | Yes |
| No. of observations | | 16587 | 16587 | 16563 | 16587 | 16587 | 16563 |
| Adj. R-Squared | | 0.213 | 0.215 | 0.217 | 0.283 | 0.285 | 0.288 |

**Table 4**
Cross-sectional analyses: The influence of stakeholder pressure

This table presents the results examining the influence of stakeholder pressure on the effect of the California Act on vertical acquisitions, using *Vertical Dummy* as the dependent variable. Panel A shows the cross-sectional results of litigation risk, proxied by *KS Litigation Risk* and *Plaintiff-Lawyer Views*. Panel B shows the cross-sectional results of reputational costs, proxied by *Advertising Exp* and *PCE Score*. Panel C shows the cross-sectional results of activist pressure, proxied by *NGO* and *Prosocial Shareholder*. All specifications include firm and fiscal year fixed effects. Sample sizes vary based on availability of cross-sectional variables. All variables are defined in Appendix A. The *t*-statistics are reported below coefficient estimates in parentheses and are calculated based on standard errors clustered by headquarters state. *, **, *** indicate statistics significance at the 0.10, 0.05, and 0.01 levels, respectively, using a two-tailed *t*-test.

Panel A: Litigation risk

| Dependent variable: | | *Vertical Dummy* | | | |
|---|---|---|---|---|---|
| Partition variable: | | *KS Litigation Risk* | | *Plaintiff-Lawyer Views* | |
| Subsample: | | Low | High | Low | High |
| | Pr. Sign | (1) | (2) | (3) | (4) |
| *Treat × Post* | 0, + | 0.016 | 0.053*** | 0.015 | 0.029** |
| | | (1.20) | (3.45) | (1.18) | (2.54) |
| Controls | | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year FE | | Yes | Yes | Yes | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes |
| No. of observations | | 5201 | 5214 | 7932 | 6944 |
| Adj. R-Squared | | 0.191 | 0.242 | 0.205 | 0.221 |

Panel B: Reputational costs

| Dependent variable: | | *Vertical Dummy* | | | |
|---|---|---|---|---|---|
| Partition variable: | | *Advertising Exp* | | *PCE Score* | |
| Subsample: | | Low | High | Low | High |
| | Pr. Sign | (1) | (2) | (3) | (4) |
| *Treat × Post* | 0, + | -0.001 | 0.038** | 0.016 | 0.046** |
| | | (-0.07) | (2.35) | (1.53) | (2.48) |
| Controls | | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year FE | | Yes | Yes | Yes | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes |
| No. of observations | | 3904 | 3899 | 10552 | 4569 |
| Adj. R-Squared | | 0.261 | 0.168 | 0.233 | 0.141 |

Panel C: Activist pressure

| Dependent variable: | | *Vertical Dummy* | | | |
|---|---|---|---|---|---|
| Partition variable: | | *NGO* | | *Prosocial Shareholder* | |
| Subsample: | | Low | High | Low | High |
| | Pr. Sign | (1) | (2) | (3) | (4) |
| *Treat × Post* | 0, + | 0.018* | 0.031*** | 0.013 | 0.030** |
| | | (1.74) | (2.84) | (0.65) | (2.25) |
| Controls | | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year FE | | Yes | Yes | Yes | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes |
| No. of observations | | 9141 | 7446 | 5934 | 5969 |
| Adj. R-Squared | | 0.251 | 0.173 | 0.277 | 0.171 |

**Table 5**
Cross-sectional analyses: The influence of other vertical integration incentives

This table presents the results examining the influence of other vertical integration incentives on the effect of the California Act on vertical acquisitions, using *Vertical Dummy* as the dependent variable. Panel A shows the cross-sectional results of supply chain sourcing risk, proxied by *Sourcing Ctr Risk* and *Sourcing Ind Risk*. Panel B shows the cross-sectional results of asset specificity, proxied by *Firm Asset Specificity*. All specifications include firm and fiscal year fixed effects. Sample sizes vary based on availability of cross-sectional variables. All variables are defined in Appendix A. The *t*-statistics are reported below coefficient estimates in parentheses and are calculated based on standard errors clustered by headquarters state. *, **, *** indicate statistics significance at the 0.10, 0.05, and 0.01 levels, respectively, using a two-tailed *t*-test.

Panel A: Supply chain sourcing risk

| Dependent variable: | | *Vertical Dummy* | | | |
|---|---|---|---|---|---|
| Partition variable: | | *Sourcing Ctr Risk* | | *Sourcing Ind Risk* | |
| Subsample: | | Low | High | Low | High |
| | Pr. Sign | (1) | (2) | (3) | (4) |
| *Treat* × *Post* | 0, + | 0.013 | 0.035*** | 0.006 | 0.033** |
| | | (1.27) | (3.15) | (0.37) | (2.35) |
| Controls | | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year FE | | Yes | Yes | Yes | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes |
| No. of observations | | 7870 | 8633 | 5518 | 5205 |
| Adj. R-Squared | | 0.254 | 0.196 | 0.162 | 0.169 |

Panel B: Asset specificity

| Dependent variable: | | *Vertical Dummy* | |
|---|---|---|---|
| Partition variable: | | *Firm Asset Specificity* | |
| Subsample: | | Low | High |
| | Pr. Sign | (1) | (2) |
| *Treat* × *Post* | 0, + | 0.018 | 0.032** |
| | | (1.60) | (2.12) |
| Controls | | Yes | Yes |
| Firm FE | | Yes | Yes |
| Year FE | | Yes | Yes |
| S.E. clustered by hq. state | | Yes | Yes |
| No. of observations | | 7905 | 7879 |
| Adj. R-Squared | | 0.229 | 0.211 |

**Table 6**
Effect of the California Act on upstream vs downstream vertical acquisitions

This table presents the results examining the effect of the California Act on upstream and downstream vertical acquisitions. Panel A shows the results focusing on upstream vertical acquisitions, with columns 1-2 (3-4) using *Up Vertical Dummy* (*Up Vertical Num Ln*) as the dependent variable. Panel B shows the results focusing on downstream vertical acquisitions, with columns 1-2 (3-4) using *Down Vertical Dummy* (*Down Vertical Num Ln*) as the dependent variable. In each panel, columns 1 and 3 include firm and fiscal year fixed effects, and columns 2 and 4 include firm and industry × fiscal year fixed effects. The sample consists of fiscal firm-year observations from 2008-2014. All variables are defined in Appendix A. The *t*-statistics are reported below coefficient estimates in parentheses and are calculated based on standard errors clustered by headquarters state. *, **, *** indicate statistics significance at the 0.10, 0.05, and 0.01 levels, respectively, using a two-tailed *t*-test.

Panel A: Upstream vertical acquisitions

| Dependent variable: | | *Up Vertical Dummy* | | *Up Vertical Num Ln* | |
|---|---|---|---|---|---|
| | Pr. Sign | (1) | (2) | (3) | (4) |
| *Treat* × *Post* | + | 0.026*** | 0.028*** | 0.019*** | 0.020*** |
| | | (3.70) | (3.90) | (2.78) | (3.15) |
| Controls | | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year FE | | Yes | No | Yes | No |
| Industry × Year FE | | No | Yes | No | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes |
| No. of observations | | 16587 | 16563 | 16587 | 16563 |
| Adj. R-Squared | | 0.178 | 0.181 | 0.241 | 0.245 |

Panel B: Downstream vertical acquisitions

| Dependent variable: | | *Down Vertical Dummy* | | *Down Vertical Num Ln* | |
|---|---|---|---|---|---|
| | Pr. Sign | (1) | (2) | (3) | (4) |
| *Treat* × *Post* | ? | 0.005 | 0.006 | 0.006 | 0.007 |
| | | (0.75) | (0.99) | (1.15) | (1.33) |
| Controls | | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year FE | | Yes | No | Yes | No |
| Industry × Year FE | | No | Yes | No | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes |
| No. of observations | | 16587 | 16563 | 16587 | 16563 |
| Adj. R-Squared | | 0.178 | 0.181 | 0.241 | 0.245 |

**Table 7**
Falsification tests

This table presents the results of falsification tests. Panel A shows the results examining the effect of the California Act on non-vertical acquisitions, with columns 1-2 (3-4) showing the results using *Non-Vertical Dummy* (*Non-Vertical Num Ln*) as the dependent variable. Panel B shows the results examining the effect of the pseudo regulation on vertical acquisitions, with columns 1-2 (3-4) showing the results using *Vertical Dummy* (*Vertical Num Ln*) as the dependent variable. In each panel, columns 1 and 3 include firm and fiscal year fixed effects, and columns 2 and 4 include firm and industry × fiscal year fixed effects. The sample in Panel A (B) consists of fiscal firm-year observations from 2008-2014 (2004-2010), with fiscal year 2011 (2007) as the policy year. All variables are defined in Appendix A. The *t*-statistics are reported below coefficient estimates in parentheses and are calculated based on standard errors clustered by headquarters state. *, **, *** indicate statistics significance at the 0.10, 0.05, and 0.01 levels, respectively, using a two-tailed *t*-test.

Panel A: Effect of the California Act on non-vertical acquisitions

| Dependent variable: | | *Non-Vertical Dummy* | | *Non-Vertical Num Ln* | |
|---|---|---|---|---|---|
| | Pr. Sign | (1) | (2) | (3) | (4) |
| *Treat* × *Post* | 0 | 0.004 | 0.002 | 0.001 | -0.002 |
| | | (0.28) | (0.17) | (0.13) | (-0.16) |
| Controls | | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year FE | | Yes | No | Yes | No |
| Industry × Year FE | | No | Yes | No | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes |
| No. of observations | | 16587 | 16563 | 16587 | 16563 |
| Adj. R-Squared | | 0.264 | 0.263 | 0.306 | 0.306 |

Panel B: Effect of the pseudo regulation on vertical acquisitions

| Dependent variable: | | *Vertical Dummy* | | *Vertical Num Ln* | |
|---|---|---|---|---|---|
| | Pr. Sign | (1) | (2) | (3) | (4) |
| *Treat* × *Pseudo Post* | 0 | 0.005 | 0.005 | 0.004 | 0.004 |
| | | (0.59) | (0.54) | (0.57) | (0.53) |
| Controls | | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year FE | | Yes | No | Yes | No |
| Industry × Year FE | | No | Yes | No | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes |
| No. of observations | | 19149 | 19104 | 19149 | 19104 |
| Adj. R-Squared | | 0.185 | 0.189 | 0.253 | 0.257 |

**Table 8**
Effect of the California Act on overall vertical integration

This table presents the results examining the effect of the California Act on overall vertical integration. Columns 1-2 (3-4, 5-6) present the results using *Vertical Integration Score* (*Value-Added Ratio*, *Vertical Calls*) as the dependent variable. Columns 1, 3, and 5 include firm and fiscal year fixed effects, and columns 2, 4, and 6 include firm and industry × fiscal year fixed effects. The sample consists of fiscal firm-year observations from 2008-2014. Sample sizes vary based on availability of dependent variables. All variables are defined in Appendix A. The *t*-statistics are reported below coefficient estimates in parentheses and are calculated based on standard errors clustered by headquarters state. *, **, *** indicate statistics significance at the 0.10, 0.05, and 0.01 levels, respectively, using a two-tailed *t*-test.

| Dependent variable: | | *Vertical Integration Score* | | *Value-Added Ratio* | | *Vertical Calls* | |
|---|---|---|---|---|---|---|---|
| | Pr. Sign | (1) | (2) | (3) | (4) | (5) | (6) |
| *Treat* × *Post* | + | 0.062* | 0.080** | 0.050** | 0.036** | 0.288*** | 0.317*** |
| | | (1.99) | (2.37) | (2.46) | (2.60) | (3.14) | (3.15) |
| Controls | | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | | Yes | No | Yes | No | Yes | No |
| Industry × Year FE | | No | Yes | No | Yes | No | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes | Yes | Yes |
| No. of observations | | 10994 | 10980 | 16021 | 16001 | 13539 | 13517 |
| Adj. R-Squared | | 0.893 | 0.893 | 0.857 | 0.865 | 0.242 | 0.239 |

**Table 9**
Effect of the California Act on production outsourcing

This table presents the results examining the effect of the California Act on production outsourcing, with columns 1-2 (3-4) using *Purchase* (*Outsourcing*) as the dependent variable. Columns 1 and 3 include firm and fiscal year fixed effects, and columns 2 and 4 include firm and industry × fiscal year fixed effects. The sample consists of fiscal firm-year observations from 2008-2014. Sample sizes vary based on availability of dependent variables. All variables are defined in Appendix A. The *t*-statistics are reported below coefficient estimates in parentheses and are calculated based on standard errors clustered by headquarters state. *, **, *** indicate statistics significance at the 0.10, 0.05, and 0.01 levels, respectively, using a two-tailed *t*-test.

| Dependent variable: | | *Purchase* | | *Outsourcing* | |
|---|---|---|---|---|---|
| | Pr. Sign | (1) | (2) | (3) | (4) |
| *Treat* × *Post* | - | -0.179** | -0.173** | -0.105*** | -0.100*** |
| | | (-2.31) | (-2.36) | (-3.82) | (-3.83) |
| Controls | | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year FE | | Yes | No | Yes | No |
| Industry × Year FE | | No | Yes | No | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes |
| No. of observations | | 16453 | 16429 | 13999 | 13999 |
| Adj. R-Squared | | 0.599 | 0.598 | 0.926 | 0.926 |

**Table 10**
Validation tests: Regulatory costs of the California Act

This table presents the results of validation tests on regulatory costs of the California Act, in particular, the market reaction to the passage and implementation of the California Act. Panel A presents the univariate tests. Panel B presents the regression tests using *CAR* as the dependent variable and including control variables and industry fixed effects. All variables are defined in Appendix A. The *t*-statistics are reported below coefficient estimates in parentheses and are calculated based on standard errors clustered by headquarters state. *, **, *** indicate statistics significance at the 0.10, 0.05, and 0.01 levels, respectively, using a two-tailed *t*-test.

Panel A: Average market reaction to the California Act

| Event date: | 30-Aug-2010 | | | 30-Sep-2010 | | |
|---|---|---|---|---|---|---|
| | Treated Firms | Control Firms | Difference | Treated Firms | Control Firms | Difference |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *CAR* | -0.005*** | 0.002 | -0.007*** | -0.003** | 0.002 | -0.005** |
| | (-3.59) | (1.40) | (-3.49) | (-2.33) | (1.28) | (-2.47) |
| No. of observations | 584 | 1054 | | 586 | 1058 | |

Panel B: Market reaction to the California Act

| Dependent variable: | | *CAR* | |
|---|---|---|---|
| Event date: | | 30-Aug-2010 | 30-Sep-2010 |
| | Pr. Sign | (1) | (2) |
| *Treat* | - | -0.005*** | -0.006** |
| | | (-2.81) | (-2.66) |
| Controls | | Yes | Yes |
| Industry FE | | Yes | Yes |
| S.E. clustered by hq. state | | Yes | Yes |
| No. of observations | | 1636 | 1642 |
| Adj. R-Squared | | 0.035 | 0.017 |

**Table 11**
Alternative identification approaches based on an alternative definition of treated firms

This table presents the results examining the effect of the California Act on vertical acquisitions, using alternative identification approaches, using sales and operations in California to define treated firms. Panel A presents the results using a difference-in-differences design and the same main sample as Table 3. Panel B presents the results using a triple-differences design, based on a firm-year level sample comprised of non-financial firms doing business in California. In each panel, the dependent variable is *Vertical Dummy* in columns 1-2, and the dependent variable is *Vertical Num Ln* in columns 3-4. Columns 1 and 3 include firm and fiscal year fixed effects, and columns 2 and 4 include firm and industry × fiscal year fixed effects. The sample consists of fiscal firm-year observations from 2008-2014. All variables are defined in Appendix A. The *t*-statistics are reported below coefficient estimates in parentheses and are calculated based on standard errors clustered by headquarters state. *, **, *** indicate statistics significance at the 0.10, 0.05, and 0.01 levels, respectively, using a two-tailed *t*-test.

Panel A: Difference-in-differences design

| Dependent variable: | | *Vertical Dummy* | | *Vertical Num Ln* | |
|---|---|---|---|---|---|
| | Pr. Sign | (1) | (2) | (3) | (4) |
| *Treat Alt × Post* | + | 0.011** | 0.012** | 0.012*** | 0.012*** |
| | | (2.01) | (2.38) | (3.13) | (3.47) |
| Controls | | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year FE | | Yes | No | Yes | No |
| Industry × Year FE | | No | Yes | No | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes |
| No. of observations | | 16587 | 16563 | 16587 | 16563 |
| Adj. R-Squared | | 0.236 | 0.236 | 0.302 | 0.303 |

Panel B: Triple-differences design

| Dependent variable: | | *Vertical Dummy* | | *Vertical Num Ln* | |
|---|---|---|---|---|---|
| | Pr. Sign | (1) | (2) | (3) | (4) |
| *Treat Ind × Large × Post* | + | 0.018** | 0.026*** | 0.018*** | 0.023*** |
| | | (2.09) | (3.86) | (3.38) | (3.52) |
| *Treat Ind × Post* | | -0.010 | | -0.009* | |
| | | (-1.37) | | (-1.87) | |
| *Large × Post* | | 0.006 | -0.003 | 0.002 | -0.004 |
| | | (1.28) | (-0.43) | (0.49) | (-0.52) |
| Controls | | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year FE | | Yes | No | Yes | No |
| Industry × Year FE | | No | Yes | No | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes |
| No. of observations | | 4369 | 4334 | 4369 | 4334 |
| Adj. R-Squared | | 0.194 | 0.187 | 0.270 | 0.267 |

**Table 12**
Robustness tests

This table presents the results of robustness tests examining the effect of the California Act on vertical acquisitions, using *Vertical Dummy* as the dependent variable. Panel A shows the results for matched samples. Panel B shows the results focusing on a small bandwidth around $100 million sales threshold. Panel C shows the results keeping firms headquartered in selected states. Panel D shows the results further controlling for state-level related fixed effects. Panel E shows the results using alternative thresholds of classifying vertical acquisitions. In Panel A, columns 1-2 show the results after entropy balancing the sample of control firm-years to match the distribution of the sample of treated firm-years, with 0.01 tolerance, and columns 3-4 show the results using a K-nearest-neighbor (K = 5) propensity score matched sample with replacement within 0.01 caliper. In Panel B, columns 1-2 (3-4) show the results keeping firms with sales in $25-175 million ($50-150 million). In Panel C, columns 1-2 show the results keeping firms headquartered in the top 20 states with highest GDP in 2010, while columns 3-4 show the results keeping firms headquartered in non-California states. In Panel D, column 1 includes firm and state × fiscal year fixed effects, column 2 includes firm, state × fiscal year, and industry × fiscal year fixed effects, and column 3 includes firm and state × industry × fiscal year fixed effects. In Panel E, columns 1-2 (3-4) show the results using 0.1% (3%) as the threshold of classifying vertical acquisitions. All variables are defined in Appendix A. The *t*-statistics are reported below coefficient estimates in parentheses and are calculated based on standard errors clustered by headquarters state. *, **, *** indicate statistics significance at the 0.10, 0.05, and 0.01 levels, respectively, using a two-tailed *t*-test.

Panel A: Matching analyses

| Dependent variable: | | *Vertical Dummy* | | | |
|---|---|---|---|---|---|
| Matching method: | | Entropy Balanced Matching | | Propensity Score Matching | |
| | Pr. Sign | (1) | (2) | (3) | (4) |
| *Treat* × *Post* | + | 0.028*** | 0.031*** | 0.025*** | 0.026*** |
| | | (2.94) | (3.20) | (2.70) | (2.86) |
| Controls | | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year FE | | Yes | No | Yes | No |
| Industry × Year FE | | No | Yes | No | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes |
| No. of observations | | 16587 | 16563 | 10913 | 10890 |
| Adj. R-Squared | | 0.204 | 0.212 | 0.202 | 0.202 |

Panel B: Small bandwidth around $100 million sales threshold

| Dependent variable: | | *Vertical Dummy* | | | |
|---|---|---|---|---|---|
| Sales range: | | $25-175 Million | | $50-150 Million | |
| | Pr. Sign | (1) | (2) | (3) | (4) |
| *Treat* × *Post* | + | 0.023** | 0.025*** | 0.019** | 0.024*** |
| | | (2.40) | (2.72) | (2.11) | (2.70) |
| Controls | | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year FE | | Yes | No | Yes | No |
| Industry × Year FE | | No | Yes | No | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes |
| No. of observations | | 4617 | 4583 | 3141 | 3119 |
| Adj. R-Squared | | 0.109 | 0.098 | 0.116 | 0.105 |

**Table 12 (continued)**

Panel C: Keep firms headquartered in selected states

| Dependent variable: | | *Vertical Dummy* | | | |
|---|---|---|---|---|---|
| Selected states: | | Top 20 States w/ Highest GDP | | Non-CA | |
| | Pr. Sign | (1) | (2) | (3) | (4) |
| *Treat* × *Post* | + | 0.028*** | 0.028*** | 0.028*** | 0.031*** |
| | | (3.17) | (3.06) | (2.98) | (3.15) |
| Controls | | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year FE | | Yes | No | Yes | No |
| Industry × Year FE | | No | Yes | No | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes |
| No. of observations | | 10610 | 10588 | 14328 | 14308 |
| Adj. R-Squared | | 0.172 | 0.174 | 0.207 | 0.209 |

Panel D: Control for state-level related fixed effects

| Dependent variable: | | *Vertical Dummy* | | |
|---|---|---|---|---|
| | Pr. Sign | (1) | (2) | (3) |
| *Treat* × *Post* | + | 0.024** | 0.028*** | 0.028*** |
| | | (2.66) | (3.03) | (3.18) |
| Controls | | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes |
| Industry × Year FE | | No | Yes | No |
| State × Year FE | | Yes | Yes | No |
| State × Industry × Year FE | | No | No | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes |
| No. of observations | | 16538 | 16514 | 14812 |
| Adj. R-Squared | | 0.214 | 0.216 | 0.207 |

Panel E: Alternative thresholds of classifying vertical acquisitions

| Dependent variable: | | *Vertical Dummy* | | | |
|---|---|---|---|---|---|
| Vertical relatedness threshold: | | >=0.1% | | >=3% | |
| | Pr. Sign | (1) | (2) | (3) | (4) |
| *Treat* × *Post* | + | 0.025** | 0.026*** | 0.014** | 0.015** |
| | | (2.60) | (2.78) | (2.41) | (2.64) |
| Controls | | Yes | Yes | Yes | Yes |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year FE | | Yes | No | Yes | No |
| Industry × Year FE | | No | Yes | No | Yes |
| S.E. clustered by hq. state | | Yes | Yes | Yes | Yes |
| No. of observations | | 16587 | 16563 | 16587 | 16563 |
| Adj. R-Squared | | 0.272 | 0.272 | 0.198 | 0.199 |

**Table 13**
Effect of the California Act on other vertical integration outcomes: Number of business segments

This table presents the results examining the effect of the California Act on other vertical integration outcomes, specifically, the number of business segments. The dependent variable is *Business Seg Num Ln*. Column 1 includes firm and fiscal year fixed effects, and column 2 includes firm and industry × fiscal year fixed effects. The sample consists of fiscal firm-year observations from 2008-2014. All variables are defined in Appendix A. The *t*-statistics are reported below coefficient estimates in parentheses and are calculated based on standard errors clustered by headquarters state. *, **, *** indicate statistics significance at the 0.10, 0.05, and 0.01 levels, respectively, using a two-tailed *t*-test.

| Dependent variable: | | *Business Seg Num Ln* | |
|---|---|---|---|
| | Pr. Sign | (1) | (2) |
| *Treat* × *Post* | + | 0.027** | 0.034*** |
| | | (2.14) | (2.84) |
| Controls | | Yes | Yes |
| Firm FE | | Yes | Yes |
| Year FE | | Yes | No |
| Industry × Year FE | | No | Yes |
| S.E. clustered by hq. state | | Yes | Yes |
| No. of observations | | 16587 | 16563 |
| Adj. R-Squared | | 0.855 | 0.855 |