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Coupling Labor Codes of Conduct and Supplier Labor Practices: The Role of Internal Structural Conditions

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Abstract. In response to media exposés and activist group pressure to eliminate exploitive working conditions, multinational companies have pushed their suppliers to adopt labor codes of conduct and improve their labor practices to meet the standards set forth in these codes. Yet little is known about the extent to which suppliers are improving their labor practices to conform to codes of conduct, especially in organizations in which legitimacy structures like codes compete with productivity-driving incentive structures. We theorize that the presence of particular internal structures will affect the extent to which suppliers' labor practices will become more tightly aligned—or coupled—with their formal commitments to adhere to labor codes. Specifically, we theorize high-powered productivity incentives to be associated with less coupling, and being certified to management system standards and having workers' unions to be associated with more coupling. We also argue that these efficiency and managerial structures will moderate each other's relationship to coupling, and that certification and unions will each increase the other's positive association with coupling. Using social audit data on 3,276 suppliers in 55 countries, we find evidence that supports our hypotheses. Our focus on the internal structural composition of suppliers extends the decoupling literature by theorizing and demonstrating conditions under which suppliers' core organizational functions are likely to be buffered from change by legitimacy structures. Furthermore, our findings suggest important strategic considerations for managers selecting supplier factories and provide key insights for the design of transnational sustainability governance regimes.

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Suppliers to global value chains face multiple, intense, and conflicting pressures from their institutional environment. Foremost are the formidable efficiency demands of the global value chain to produce ever more cheaply and rapidly (Bartley 2005, Gereffi 2005). The product-cost economics of global production have pushed low-value-added segments of generic services and volume production to suppliers in the Global South, which compete principally on labor costs and operate with very low margins (Gereffi and Christian 2009). Global buyers' demanding sourcing practices magnify these efficiency pressures (Anner et al. 2013, Locke 2013). Meeting efficiency demands is the core organizational imperative of global suppliers, and they structure their organizations accordingly, resulting in a "race to the bottom" in labor practices (Bartley 2005, Gereffi 2005), commonly resulting in sweatshop conditions (Anner et al. 2013).

Suppliers also face increasingly forceful and potentially contradictory legitimacy demands to improve workplace conditions. These demands come primarily from multinational buyers that are, themselves, subject to myriad institutional pressures to raise labor standards in their supply chains (Okhmatovskiy and David 2011, Distelhorst et al. 2016). High-profile catastrophes like the Rana Plaza building collapse that killed more than 1,000 factory workers in Bangladesh have attracted worldwide attention to hazardous supply chain working conditions, spawning private political activism and increasing reputational pressure on global brands to improve them (Bartley and Child 2014). Shareholder resolutions demanding supply chain due diligence and observance of international human rights norms are commanding higher levels of support each proxy season. Increasingly, MNCs face domestic and international legal obligations to monitor and report on conditions in their supply chains and to adhere to the voluntary commitments they make to improve supply chain working conditions.

MNCs have responded to these legitimacy pressures, in large part, by pressuring their suppliers to adopt

organizational structures, policies, and procedures to improve working conditions. The most common of these are labor codes of conduct and monitoring programs. Codes of conduct are contractual provisions drafted by buyers that set forth standards governing working conditions like wages, hours, child labor, discrimination, and occupational health and safety (Locke 2013). Codes typically are based on the core labor standards articulated by the International Labor Organization, and buyers require suppliers to agree to adhere to them as a condition of doing business. Monitoring programs deploy private social auditors to inspect suppliers and assess their adherence to codes of conduct. Social auditing of suppliers is pervasive, with hundreds of thousands of audits conducted on behalf of individual firms and multi-stakeholder initiatives each year (Gould 2005), driving an $80 billion social auditing industry (AFL-CIO 2013).

Although suppliers adopt buyers' codes of conduct as a condition of doing business, codes are unlike core contractual terms like price, quantity, and quality in that codes seek to satisfy institutional legitimacy demands rather than to promote transactional efficiency. Brands impose codes to protect their reputations and preserve their legitimacy, not to improve productive efficiency (Lamin and Zaheer 2012, Locke 2013). While brands seek the reputational cover that codes provide, their behavior betrays ambivalence about whether they want suppliers to rigorously implement code provisions. For instance, although codes of conduct require suppliers to observe maximum hours limitations, many buyers continue to make sourcing demands that are nearly impossible to meet without excessive overtime (Locke 2013). Similarly, although codes require compliance with minimum wage standards, brands continue to squeeze suppliers on margins, eroding their ability to pay minimum wages (Locke 2013). Perhaps most tellingly, the requirements of codes of conduct are rarely enforced by the brands that impose them. While violations of the code constitute a contractual breach that would justify terminating the business relationship, buyers rarely exercise this power (Locke 2013, Bader 2015, Starmanns 2017). As Locke (2013, p. 32) observed, "It is an open secret that few brands ever exit factories, even when they are found not to be in compliance with the codes of conduct and that most compliance officers have less influence than their purchasing or sourcing colleagues when deciding whether to place (or continue) an order with a noncompliant factory."

Buyer ambivalence about codes of conduct raises the possibility that suppliers may decouple these formal policies from their labor practices to meet efficiency demands. Decoupling can occur on two dimensions. First, legitimacy structures like codes might be decoupled from organizational practices altogether, meaning that "they are unimplemented or routinely violated" (Bromley and Powell 2012, p. 489). This is the traditional conception of decoupling, in which organizations adopt structures symbolically to shield their internal practices from outside scrutiny and gain legitimacy with external stakeholders without disrupting the pursuit of internal, organizational imperatives (Thompson 1967, Meyer and Rowan 1977, Pfeffer and Salancik 1978). Second, decoupling can occur when legitimacy structures are largely implemented within an organization despite a lack of a clear integration with that organization's core goals. Under these circumstances, the organizational core may be internally buffered from influence by seemingly incompatible legitimacy structures (Bromley and Powell 2012). This conception of decoupling has developed more recently to accommodate the insight that it is increasingly difficult to completely decouple policy from practice in highly rationalized institutional environments, and yet some organizational structures nonetheless fail to meaningfully impact core organizational activities because they are marginalized internally.

While these two dimensions of decoupling have been elaborated theoretically, existing empirical studies have focused largely on the first. Many studies address the coupling and decoupling of organizational structures and practices, but there is a "general dearth of research on buffering between internal practices" (Bromley and Powell 2012, p. 499). We extend this literature by investigating how different configurations of internal organizational structures are related to the buffering of legitimacy structures (i.e., labor codes) to protect the organizational core. Specifically, we investigate the internal structural conditions under which suppliers' labor practices are likely to be more tightly aligned—or coupled—with the formal commitments they have made to adhere to labor codes of conduct. Our focus on internal structural conditions acknowledges that legitimacy structures like codes of conduct do not exist in a vacuum; they coexist with an elaborate ecosystem of organizational structures adopted by suppliers to meet the competing demands of their institutional environments (Meyer and Rowan 1977; Bromley and Powell 2012). For instance, many suppliers adopt "efficiency structures" in the form of incentives to spur productivity and meet efficiency demands. Suppliers might also adopt "managerial structures" like certified management systems to meet market demands for operational resilience and consistency or institutional demands for environmental sustainability or observance of human rights. Institutional pressures have led some suppliers to institute managerial structures that provide formal channels for worker participation, such as unions and joint planning procedures. We investigate the association between such organizational structures and the extent to which suppliers couple their labor practices with the standards contained in codes of conduct. We highlight that some organizational structures can act as a buffer—a

protective barrier that shields core production activities from potentially threatening changes by legitimacy structures—while other organizational structures are associated with less buffering and thus tighter coupling of legitimacy structures and organizational practices.

We examine these relationships on a proprietary data set obtained from a large social auditing firm that contains 8,323 audits of 3,276 suppliers in 55 countries conducted between 2012 and 2015. All of these suppliers have adopted labor codes of conduct and are subject to routine auditing, but they differ in their adoption of other types of organizational structures to advance efficiency and other managerial goals. We find that suppliers with high-powered incentive structures lag in improving labor practices and adhering to codes of conduct, suggesting that these structures act as a buffer to protect core production activities in factories that are highly motivated by efficiency imperatives. In contrast, we find tighter coupling of codes and practices at suppliers that adopt certified management systems and unions, managerial structures that provide mechanisms for dialogue across the organization that make it more difficult to isolate legitimacy structures (such as codes) from production activities (such as labor practices). Furthermore, we find important interactions between these internal structures. On the one hand, we demonstrate that managerial structures attenuate the negative association between efficiency structures and improvement. On the other hand, we find that the converse is also true: efficiency structures attenuate the positive relationship between legitimacy structures and improvement. Finally, the presence in one supplier of multiple managerial structures—in our study, unions and certification—hastens improvement, suggesting that they are complements and not substitutes.

Our focus on the internal structural composition of organizations is an important contribution to the decoupling literature. First, it moves beyond the traditional focus on the coupling effects of external institutional factors. This is a particularly important extension, because many suppliers operate in institutional environments that lack significant pressure to comply with labor standards (James et al. 2018). We build on a handful of studies that qualitatively investigate intraorganizational processes of coupling and decoupling (Boiral 2007, Hallett 2010, Overdevest 2010, Tilcsik 2010, Bartley and Egels-Zandén 2016). Second, we also extend the decoupling literature by examining how multiple and potentially conflicting organizational structures are related to the coupling of legitimacy structures and organizational practices. Our approach allows us to elaborate the underdeveloped theoretical concept of internal buffering to encompass the interaction of legitimacy structures and other organizational structures rather than their mutual isolation. This innovation is crucial to understanding coupling processes in a world in which organizations are subject to complex demands that they often address by adopting multiple and competing formal organizational structures. Third, our investigation of the organizational incentive structures that operationalize environmental efficiency demands is a novel and important attempt to address the relationship between legitimacy and efficiency imperatives that lies at the core of the decoupling literature. Conventionally, efficiency demands are assumed to be a given condition of the environment in which business firms operate. Our study investigates how these organizations operationalize efficiency demands as incentive structures and how these structures can act as a buffer protecting the core productive activities of the firm from legitimacy structures perceived to threaten them.

Coupling Legitimacy Structures and Organizational Practices

The existing literature describes two ways that legitimacy structures can be decoupled from organizational practices. First, legitimacy structures can be adopted symbolically to appease external stakeholders (Thompson 1967, Meyer and Rowan 1977, Pfeffer and Salancik 1978) while remaining "unimplemented or routinely violated" (Bromley and Powell 2012, p. 489). In our context, this would mean that suppliers agree to code-of-conduct requirements requested by buyers but do not take concrete steps to implement them. The bulk of theoretical and empirical research on decoupling, particularly those studies focused on legal compliance (Sutton and Dobbin 1996, Short and Toffel 2010), addresses this type of "policy–practice" decoupling. Insights from this literature suggest that legitimacy structures adopted by suppliers are likely to be decoupled from their practices for three principal reasons. First, organizational structures adopted in response to legitimacy demands tend to be implemented symbolically and decoupled from organizational practices that advance the technical or efficiency-related demands of production work (Meyer and Rowan 1977, Bromley and Powell 2012). Second, decoupling is particularly likely in less-elaborated institutional environments, where efficiency demands are strong and institutional pressures to implement legitimacy structures are weak (Meyer and Rowan 1977), as they are in the emerging economies in which many suppliers are located. Third, the implementation of legitimacy-related structures requires organizational resources that many suppliers operating on extremely tight margins lack (Bromley and Powell 2012, Lim and Tsutsui 2012).

Consistent with these general propositions, the bulk of studies finding coupling between legitimacy structures and organizational compliance with legitimacy demands have attributed it to coercive institutional pressures like state power and civil society political mobilization (Dobbin and Kelly 2007, Seidman 2007,

Short and Toffel 2010, Lim and Tsutsui 2012, Toffel et al. 2015). For instance, studies of suppliers' compliance with labor standards have focused on the coupling effect of pressures from the institutional environment, including consumer pressure (O'Rourke 2003, Gereffi 2005, Vogel 2008, Toffel et al. 2015); pressure from civil society actors like activists, nongovernmental organizations (NGOs), and the press (Seidman 2007, Vogel 2008, Anner 2012, Anner et al. 2013, Distelhorst et al. 2015, Toffel et al. 2015, Bartley and Egels-Zandén 2016, James et al. 2018); and pressures from the state (Bartley 2011, Distelhorst et al. 2015, Toffel et al. 2015, Amengual and Chirot 2016). While this prevailing theoretical framework contains important and cautionary lessons about the acute threat of decoupling in less-elaborated institutional environments, it provides little insight into when coupling is possible and how it might vary across firms operating in these environments.

A second, alternative conception of decoupling has emerged in the institutional literature based on the observation that the type of "policy–practice" decoupling described above may not be as rampant as traditionally predicted. Bromley and Powell (2012) argue that in highly rationalized institutional environments, legitimacy structures are likely to be at least somewhat coupled with organizational practices. This is because it is very difficult to divorce formal policy from on-the-ground practice completely "in an increasingly managerial world that emphasizes evaluation, standardization, and benchmarking" (Bromley and Powell 2012, p. 485). In highly rationalized environments, legitimacy structures are likely to "have real organizational consequences" (Bromley and Powell 2012, p. 496) in the sense that staff and resources are devoted to their operation. However, those consequences may not extend to mitigating the harms that prompted the adoption of the legitimacy structure. Even if environmental rationalization promotes concrete implementation of legitimacy structures, those structures may nonetheless be prevented from fundamentally changing practices that are central to the organization's core mission. The organizational core will be "internally buffered" (Bromley and Powell 2012), or protected, from the impact of legitimacy structures that are at odds with it. The existing literature argues that internal buffering is accomplished by isolating the technical core of the organization from potentially threatening organizational structures (Binder 2007, Bromley and Powell 2012).

These insights suggest that codes of conduct will be implemented to some degree rather than entirely decoupled from supplier practices, because global value chains are highly rationalized institutional environments. Organizations comprising global value chains furnish rules of conduct and continuously monitor compliance through routine monitoring by buyers and social auditors. Organizations in the global institutional environment, including NGOs, activists, governments, and intergovernmental organizations, likewise have embraced managerial tools like codes and monitoring to improve labor conditions in global supply chains (Utting 2005, Nolan 2014, LeBaron and Lister 2015). This is precisely the type of hyper-rationalized environment in which complete decoupling of policy from practice may be untenable. In fact, numerous studies document that audited factories tend to improve compliance with labor standards on average over time as measured by audit scores (Locke et al. 2007, Shea et al. 2010, Nadvi et al. 2011, Ang et al. 2012, Locke et al. 2013, Toffel et al. 2015).

Yet, codes may nonetheless fail to improve supplier labor practices if they are internally buffered by other organizational structures to protect core productive activities. Neither existing research on decoupling nor the rationalization thesis explain why some suppliers improve more than others under similar institutional conditions. This suggests the need to investigate the internal composition of supplier organizations to identify structural conditions under which supplier labor practices are internally buffered from the potentially threatening changes demanded by codes of conduct. Specifically, we investigate the extent to which core production activities like labor practices are internally buffered from improvement in labor practices to better adhere to labor codes under different constellations of internal organizational structures. Further, we challenge the prevailing view in the literature of buffering as the isolation of some organizational structures from others and investigate interactions between different structures and their relationship to coupling outcomes. In so doing, our study provides critical empirical insights and theoretical tools to explain variation in the coupling of organizational legitimacy structures in the absence of commonly studied external pressures such as strong state regulation and robust civil society.

We define legitimacy structures as being more tightly coupled when they are associated with *changes* in organizational practices that more closely align practices with institutional demands. In our context, that means *improvement* in compliance with codes of labor conduct. We provide this definition at the outset, because the existing literature has been vague in defining coupling. Many claim to identify coupling or decoupling outcomes at a static point in time and do not examine relationships between organizational structure and organizational change (e.g., Westphal and Zajac 2001, Zajac and Westphal 2004, Lim and Tsutsui 2012). While coupling may mean different things in different contexts, we contend that organizational change is the touchstone for identifying coupling between legitimacy structures and compliance with normatively based institutional legitimacy demands, because such demands are typically made to spur improvements in organizational behavior that falls short of some normative ideal.

Organizational Structures and the Coupling of Codes with Practices

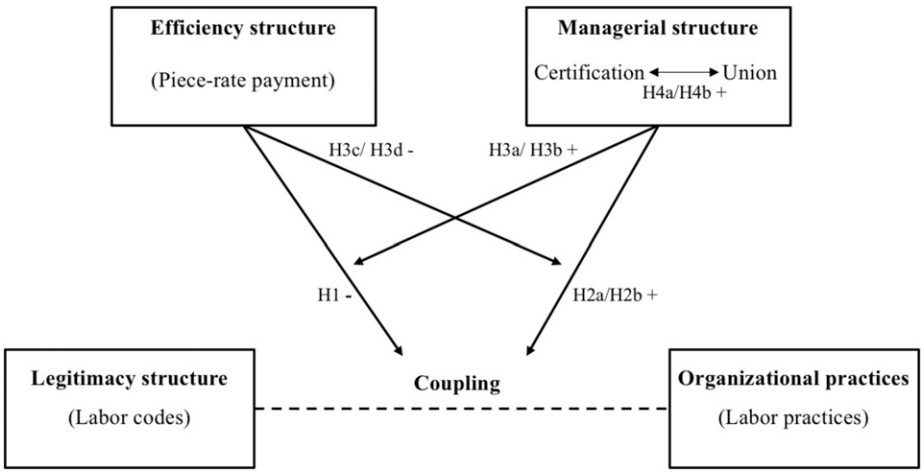
Below, we theorize that the degree to which suppliers couple their labor practices with legitimacy structures like codes of conduct is related to the presence of other structures in these organizations. Specifically, we consider one efficiency-driving structure (high-powered productivity incentives) and two managerial structures (certified management systems and unions). We argue that codes will be less tightly coupled with labor practices when they compete with high-powered productivity incentive structures; in such a circumstance, these efficiency structures will act as a buffer between core production activities and the intrusive changes code adherence would require. Such buffering will inhibit the improvement of labor practices to adhere to labor codes. Conversely, codes and practices will be more tightly coupled, and buffering will be less pronounced, in suppliers with managerial structures oriented toward improving organizational processes and fostering dialogue across the organization (that is, certified management systems and unions), because the presence of such managerial structures makes it more difficult to isolate legitimacy structures (such as codes) from production activities (such as labor practices). We also investigate how the interaction between managerial structures and efficiency structures relates to the coupling of codes and labor practices. We argue that, on one hand, managerial structures that can help organizations reconcile legitimacy and efficiency imperatives will attenuate the negative relationship between efficiency structures and code and practice coupling. On the other hand, efficiency structures attenuate the positive relationship between managerial structures and coupling. Finally, we hypothesize that the two managerial structures we study, certified management systems and unions, complement one another by providing, respectively, diverse channels for cross-organizational communications and inputs from multiple parties in that dialogue. We illustrate our theoretical framework in Figure 1.

While we hypothesize associations between (and among) various internal organizational structures and the extent to which legitimacy structures will be coupled with organizational practices, we do not make any claims about the causal mechanisms driving these relationships. For example, internal organizational structures such as the managerial structures we examine might provide mechanisms that drive changes in organizational practices, or organizations might be more likely to adopt such structures if they already have the will and capacity to achieve the changes sought by external stakeholders. Our data do not allow us to discern with confidence whether such structures are signals or mechanisms of organizational improvement. It is an important first step to identify organizational structural conditions under which code compliance is likely to improve, regardless of the causal mechanisms, because these conditions provide a useful set of decision heuristics for reputation-conscious brand managers selecting which suppliers to work with and for regulators and activists selecting which suppliers to target for monitoring and enforcement.

Efficiency Structures and Code Coupling

The economics of outsourced transactions create a buyer-driven global supply chain characterized by razor-thin pricing margins and buyers' volatile and time-sensitive ordering practices (Gereffi 2005). These efficiency imperatives exist not only in suppliers' institutional environments; they are also baked into the organizational structure of many suppliers in the form of productivity incentives. In response to the global value chain's intense efficiency demands, some suppliers adopt incentive structures, ranging from cash bonuses to gift prizes, to promote low-cost, high-volume production (Bartley 2005, Gereffi 2005, Anner et al. 2013, Locke et al. 2013). Some

Figure 1. The Role of Internal Structural Conditions in the Coupling of Labor Codes and Practices



rely on high-powered incentives like piece-rate (or piecework) payment, compensating workers for each unit produced. This incentive structure aims to align workers' incentives with the employer's by giving workers a direct, financial benefit for each incremental improvement in productivity (Williamson 1985, Lazear 2000).

When multiple organizational structures reflecting different logics coexist within an organization, the structure closest to the organization's core tasks and operations is likely to dominate other structures, potentially undermining the aims of the more peripheral structures (Thornton et al. 2012, Besharov and Smith 2014). In the supply chain context, labor codes of conduct are likely to be seen not merely as peripheral, but as potentially incompatible with core organizational productivity imperatives and production activities. The core imperative of suppliers to global value chains is efficient production. Traditionally, suppliers try to meet efficiency demands by cutting labor costs, but policies like codes of conduct that demand adherence to specified labor standards directly threaten this source of competitive advantage. Core production activities are therefore likely to be buffered from codes of conduct that demand changes in labor practices.

High-powered productivity incentives act as a buffer against such changes by structuring the actions of both managers and workers in ways that are likely to protect labor productivity at the expense of improved labor practices. Suppliers that use high-powered productivity incentives tend to be particularly devoted to meeting high, short-term productivity goals (Holmstrom and Milgrom 1991, Prendergast 1999, Dohmen and Falk 2011) and are therefore likely to focus on maintaining or enhancing worker productivity rather than on mitigating the negative social effects of production on workers. Specifically, managers at piece-rate suppliers are unlikely to invest substantial resources to improve labor practices if these investments conflict with short-term productivity goals. In addition, workers at piece-rate suppliers may be more reluctant to adopt operational practices that would improve compliance with labor standards but reduce productivity. For instance, some health and safety procedures—such as wearing personal protection equipment (e.g., masks and steel-mesh gloves), participating in emergency training, and using machine guards—can slow the pace of work. Ethnographic research on logging workers shows that piece-rate workers refuse to accept the small but certain economic loss caused by adhering to health and safety procedures but will accept what they perceive as the low probability of being injured on the job, even though that could trigger substantial income loss (Patterson 2007). Research also shows that piece-rate workers are more reluctant to take breaks (Lilley et al. 2002), which may make them more susceptible to mistakes and injuries, and may, in itself, violate some labor codes of conduct. Just as incentives to cut corners to produce more quickly are associated with inferior labor practices, they are also likely to hinder workers' engagement in practices that would improve those conditions. We therefore hypothesize the following:

Hypothesis 1. *Labor codes of conduct will be less tightly coupled to labor practices in suppliers with high-powered productivity incentive structures than in other suppliers.*

Managerial Structures and Code Coupling

Although efficiency structures are likely to act as a buffer between labor codes of conduct and improvements in labor practices, the presence of other types of managerial structure might strengthen that relationship or might signal that the supplier has reasonably tightly coupled its practices to codes. Specifically, we posit that there will be less internal buffering (and more coupling) of legitimacy structures in organizations with managerial structures that bridge the gap between production activities and other organizational activities perceived to threaten them. Below, we examine two of the most commonly advocated and adopted managerial structures in the global supply chain: certification to management systems and unions. We focus on the practices associated with these structures; specifically, suppliers' development of organizational processes designed to facilitate intraorganizational dialogue.

Certified Management Systems. A management system is "the way in which an organization manages the inter-related parts of its business in order to achieve its objectives."[1] Many standard-setting organizations supply standards to help firms develop management systems to achieve particular objectives such as quality control (e.g., ISO 9001), environmental management (e.g., ISO 14001), food safety (e.g., HACCP), and labor standards management (e.g., SA8000, ISO 26000). Firms that implement a management system standard can seek certification from a third-party auditor attesting that they adhere. Studies have reached conflicting conclusions about the credibility of certification as a signal of superior practices (e.g., Vinodkumar and Bhasi 2011) and the efficacy of management systems in improving labor practices (e.g., Seidman 2007, Lo et al. 2014).

We investigate a different question: whether certified management systems are associated with tighter coupling between labor codes of conduct and supplier labor practices. We argue that they will be, because they foster the development of organizational processes that promote dialogue across different units of the organization, making it more difficult to isolate organizational activities from one another. As such, they can mitigate the buffering of legitimacy structures to protect efficiency imperatives. Intraorganizational communication processes focusing on internal audits, review meetings, and implementation of corrective actions involving multiple units are at the

heart of most certified management system standards. For instance, a leading standard focused on process quality requires firms to "continually improve . . . through the use of . . . audit results, analysis of data, corrective and preventive action and management review" (International Organization for Standardization 2000, p. 13). Similarly, a leading standard focusing on labor practices in global supply chains requires companies to "conduct routine internal audits," "hold periodic meetings to review progress and identify potential actions to strengthen implementation," and ensure that "corrective and preventive actions . . . are effectively implemented" (Social Accountability International 2016, p. 126).

These procedures require dynamic input from multiple units, connecting organizational actors from top management to frontline production, logistics, and back-office operations. Facilitating communication across different units of the organization has the potential to mitigate internal buffering of certain structures by making it more difficult to isolate organizational activities from one another. For example, internal audits and review meetings led by management can reveal flawed core production processes, such as the inappropriate labeling and storage of hazardous chemicals or semi-finished products. The implementation of corrective actions such as the institution of proper procedures and employee training to label and store goods involves multiple units including frontline production, logistics, and human resources. These processes thus enhance interunit dialogues, which can reduce the isolation of core production procedures from labor codes of conduct and mitigate workplace injury risks. Thus, we hypothesize the following:

Hypothesis 2a. *Labor codes of conduct will be more tightly coupled to labor practices in suppliers certified to management system standards than in noncertified suppliers.*

Worker Participation Structures. Contemporary Western management theories emphasize the significance of participatory management and employee empowerment in managing large bureaucratic organizations (Drucker 1974, Wagner 1994, Collins 1997). Distinct from traditional top-down management approaches, participatory management aims to balance the involvement of managers and workers in decision making or problem solving. Instituting worker participation channels such as communication platforms and employee hotlines has become a hallmark of rationalized Western management best practices (Drucker 1974, Wagner 1994, Collins 1997).

Leading multinational brands increasingly require suppliers to deploy participatory management practices to promote manager–worker dialogue, from joint planning procedures to unions. Target states in its supplier code of corporate responsibility that it "expects suppliers to productively engage workers and value them as critical assets to sustainable business success. This includes respecting the rights of workers to freely associate, engage in worker participation groups and submit individual grievances without fear of retaliation" (Target 2018). Reebok (now a part of Adidas) required its suppliers to develop worker empowerment programs that train workers on their legal rights, provide channels for communication with both management and factory monitors about concerns, and foster collective worker representation (Yu 2009).

Among these worker participation practices, unions have been the most important formal channel for worker participation in management processes. To date, scholars, particularly those studying the Americas and the European Union, have focused on unions' political role in rectifying power imbalances between workers and employers (Reilly et al. 1995, Rodriguez-Garavito 2005, Morantz 2009). However, unions play a different role in many of the developing countries where supply chain factories are located. First, workers in many such countries are routinely denied bottom-up representation of their choosing (Anner 2012, Anner and Liu 2016, Bartley and Egels-Zandén 2016). Second, employers that permit unions often do so merely to curry political favor with the authoritarian state rather than to give workers any meaningful voice (Brown and O'Rourke 2007, Friedman and Lee 2010). In countries such as China and Vietnam, unions are considered extensions of the government rather than independent representatives of workers' interests (Anner and Liu 2016), raising serious questions about whether they will be associated with improvements in labor standards.

Yet, by focusing on the relative political impotence of unions in certain environments, these accounts have neglected other important managerial functions unions can play in suppliers. In fact, unions can play an effective *communication* role that facilitates dialogue between managers and workers and enables workers to help improve production processes and rectify issues. First, unions can provide an additional communication channel for workers to bring hazards to management's attention, one that is often safer and more effective than doing so directly. Many workplace hazards would not be known to managers absent communication with affected workers. For example, in some Chinese factories, unions have input on monitoring occupational health and safety conditions by having a union member serve as a labor protection investigator on the shop floor (Chen and Chan 2004). Such practices facilitate employee reports of health and safety concerns. Research has also found that unions put forth proposals to remedy unsafe and hazardous conditions (Chen and Chan 2004) and

cooperate directly with management to monitor and correct those conditions (Reilly et al. 1995, Walters 2006).

Second, in many factories, unions provide a vehicle for communicating information about occupational health and safety to workers. Indeed, research has shown that in unionized factories, workers are more aware of dangerous practices (Gillen et al. 2002). In China, studies have found that unions are often tasked with educating employees on workplace conditions and workers' well-being, which can help train frontline workers to identify and to protect themselves from occupational hazards (Dong et al. 2004, Nissen et al. 2008). By engaging and educating workers, unions can assist in improving production processes and in identifying and rectifying workplace issues, thus improving labor practices. For these reasons, we hypothesize the following:

Hypothesis 2b. *Labor codes of conduct will be more tightly coupled to labor practices in suppliers with workers' unions than in suppliers without workers' unions.*

Interactions Among Efficiency and Managerial Structures

The existing literature suggests that internally buffered structures will be isolated from the technical core of the organization (Bromley and Powell 2012) or from one another (Binder 2007). This claim is in some tension with research on institutional complexity and institutional scholarship demonstrating that organizational structures can be mutually constituting. Studies have demonstrated, for instance, that organizational structures based on very different logics can coexist within organizations and, under certain conditions, can become intertwined (Besharov and Smith 2014). Neoinstitutional scholars have similarly demonstrated that organizational conceptions of efficiency and compliance with legal norms can shape one another (Dobbin and Sutton 1998). Thus, particularly in organizations with managerial structures that emphasize improving organizational processes and fostering interunit dialogue, one would expect mutual influence among organizational structures rather than isolation. We hypothesize above that efficiency structures will buffer the internal impact of legitimacy structures like codes of conduct that seek to change labor practices in ways that could undermine productivity and conversely that managerial structures like certification and unions will be associated with tighter coupling of codes and labor practices. But what is the relationship of efficiency and managerial structures to one another? And how does their interaction relate to such coupling?

Managerial Structures Mitigate Buffering by Efficiency Structures. We argue that managerial structures will attenuate the negative relationship between efficiency structures and the coupling of labor codes and practices. Research suggests that multiple organizational structures reflecting different logics can become compatible with each other, especially when they are aligned in realizing organizational goals (e.g., Binder 2007, Besharov and Smith 2014). In our context, the looser coupling between labor practices and labor codes associated with efficiency structures is particularly likely to be tempered when a process improvement approach and intra-organizational dialogue fostered by managerial structures can help the organization reconcile legitimacy and efficiency demands. Specifically, we posit that both certification and unions can help alleviate the perceived conflict between codes of conduct and production efficiency, especially in the presence of structures that emphasize such efficiency.

As discussed previously, the pursuit of high-volume production and short-term economic rewards under high-powered productivity incentives can discourage practices that would improve labor practices at some cost to productivity. However, certification to management system standards can help suppliers develop and sustain production practices that ultimately improve productivity and reduce the marginal costs of compliance, which, in turn, can improve labor practices. For example, adopting quality management systems may improve production planning and reduce cycle time (Dunlop and Weil 1996, Appelbaum 2000), which, in turn, may reduce the pressure on workers to work overtime (Locke et al. 2009). Thus, by improving production process management, suppliers may reduce the cost of remediating certain violations of workplace standards. Furthermore, the management process improvements associated with lean production have been shown to increase productivity and quality (Holweg 2007) while also reducing noncompliance with supplier codes of conduct (Distelhorst et al. 2016). Such production practices can alleviate the underlying tension between short-term economic rewards and labor code compliance in high-productivity-oriented contexts.

We posit that unions, too, can attenuate the negative relationship between high-powered productivity incentives and the coupling of labor codes of conduct and labor practices. First, unions often educate workers on occupational hazards, the costs they would bear from workplace injuries, and their legal rights (Meng and Smith 1993, Morse et al. 2003), which can countervail the incentive to cut corners in pursuit of rapid production. Second, unions are associated with longer job tenure (Freeman 1980, Bender and Sloane 1999), which increases the chance that managers will invest in worker training and other programs that improve both labor practices and productivity, but only over the long term. Workers similarly may be more likely to support such practices if they expect to be around long enough to benefit from them, which can, in turn, increase the likelihood that managers will invest in them. In addition, in domestic contexts where many suppliers in our sample are

located, unions are used as a vehicle for reconciling social goals with business interests (Zajak 2017). Therefore, we hypothesize the following:

Hypothesis 3a. *Being certified to management system standards attenuates the looser coupling of labor codes of conduct and labor practices associated with high-powered productivity incentive structures.*

Hypothesis 3b. *Workers' unions attenuate the looser coupling of labor codes of conduct and labor practices associated with high-powered productivity incentive structures.*

Efficiency Structures Temper Coupling by Managerial Structures. We hypothesized above that managerial structures can mitigate the looser coupling of labor codes and practices that we observe when efficiency structures act as a buffer. Here, we posit the inverse relationship, that efficiency structures can temper the positive association between managerial structures and the coupling of labor codes and labor practices. Existing literature suggests that when multiple organizational structures reflecting different logics coexist within an organization, the structure that is core to the organizational tasks and operations is likely to dominate, diminishing or marginalizing other structures (Thornton et al. 2012, Besharov and Smith 2014). In the global value chain context, as we argued above, efficiency demands are paramount. In suppliers that maintain high-powered productivity incentives, labor productivity is prioritized at the expense of improved labor practices. For example, managers at piece-rate suppliers are less likely to take workers off the line to engage in comprehensive training that would teach continuous improvement techniques (e.g., to identify hazards and learn safer work procedures) or internal assessment and review meetings that would foster interunit dialogue. Similarly, workers at such suppliers might be more reluctant to provide input and engage in communication that might even temporarily impede productivity. Thus, we posit that efficiency structures like piece-rate payment incentives will attenuate the positive relationship between managerial structures like certification and unions and code compliance improvement.

Hypothesis 3c. *High-powered productivity incentive structures attenuate the tighter coupling of labor codes of conduct and labor practices associated with being certified to management system standards.*

Hypothesis 3d. *High-powered productivity incentive structures attenuate the tighter coupling of labor codes of conduct and labor practices associated with being unionized.*

Managerial Structures Complement Each Other. Prior scholarship has argued that management systems to protect workers are more likely to succeed when they are supported by workers who can provide information, monitoring, and advocacy (Rodriguez-Garavito 2005, Anner et al. 2013)—that is, that the relationship is complementary. Yet, another strand of research suggests that the relationship is substitutive by arguing that certified management systems are designed to displace union interventions (Esbenshade 2004, Bartley 2005) or to substitute for ineffective unions (Locke et al. 2013). In the context of global supply chain factories, we argue that unions and certified management systems are complementary in their association with tighter coupling between labor codes and labor practices because together they provide more comprehensive communication channels and richer input across the organization.

On the one hand, certified management systems tend to focus on developing communication channels across formal organizational units or departments. As argued previously, certified management systems can engage multiple units and management teams in ongoing internal assessments, continuous improvement efforts, and corrective action procedures. These activities provide formal channels for workers' unions to bring workplace hazards to management's attention in a systematic manner, magnifying their efforts to broadcast these concerns to multiple units across the organization, and enhancing workers' unions' communication role. In addition, these internal assessment and review meetings can also convey integrated messages from multiple units to workers' unions, which can then deliver more comprehensive information and useful training to workers.

On the other hand, unions tend to focus on fostering communication channels across organizational constituencies (rather than units) and enriching the content of communication by cultivating input from workers. For instance, unions can collect from frontline workers information related to issue identification, risk assessment, and procedure updates, which in turn can improve the implementation of management systems. In addition, the union's educational and communicative roles can raise workers' awareness of management system standards and engagement in certain certification programs (O'Rourke 2003, Rodriguez-Garavito 2005, Yu 2009), enhancing the usefulness of worker input about the implementation of these programs. Because the value of each of these managerial structures depends, jointly, on both the availability of communication channels and the quality of dialogue flowing through them, we hypothesize the following:

Hypothesis 4a. *Being certified to management system standards enhances the coupling of labor codes of conduct and labor practices associated with being unionized.*

Hypothesis 4b. *Workers' unions enhance the coupling of labor codes of conduct and labor practices associated with being certified to management system standards.*

Data and Measures

We test our hypotheses using a proprietary data set from a large social auditing firm that required anonymity as a condition of sharing its data. The Europe-based multinational firm has tens of thousands of employees based in hundreds of offices around the world. It is a well-recognized inspection and product testing agency, is accredited to conduct certification assessments of several leading codes of conduct standards in the industry, and also conducts social auditing assessments of its clients' proprietary supplier codes of conduct. The data set includes all audits against a single code of conduct that the firm conducted from 2012 through 2015. The time gap between suppliers' successive audits averaged 9 months and ranged from 2.4 months to 14.5 months.[2] The data set also provides characteristics (but not the names) of each audited supplier,[3] the audit team, and the buyer on whose behalf the audit was conducted.

Because our empirical specification includes a supplier's focal (current) audit and its prior audit, our estimation sample is limited to those suppliers with at least two audits in our data set. For our primary analysis, we omit 769 suppliers (about 17% of the full data set) that report information about the presence of a workers' union, piece-rate payment, or certification that is inconsistent between the prior and focal audits because of concerns about potential endogeneity associated with their adoption during our sample period. Doing so results in our hypothesized variables in our primary analysis being identified based on differences between (not within) suppliers, an approach suitable for our correlational analysis.[4] Our estimations are based on 4,887 focal audits of 3,276 suppliers in 55 countries on behalf of 102 buyers from 11 countries. Because our specification also relies on data from each supplier's prior audit, our analysis is based on a total of 8,323 focal and prior audits.[5] Table A1 of Online Appendix A reports the industry composition of our sample: the most common industries are hardlines (merchandise such as furniture, household utensils, and home décor), apparel, and electronics. As Table A2 of Online Appendix A shows, most of the audited suppliers are in China; the rest are elsewhere in Asia, Europe, and the Americas.

Dependent Variable

In our context, audit teams assess the extent to which suppliers' workplace conditions meet a single code of conduct that specifies maximum working hours and minimum wages, occupational health and safety practices, and environmental management practices. This standard is highly consistent with international consensus standards such as the International Labour Organization (ILO) core labor standards.[6] During the audit, auditors review documentation, interview employees who are randomly selected by auditors, and conduct onsite inspections to assess the actual state of affairs on the shop floor. Each audit results in a *labor practice score*, a summary score of all aforementioned code of conduct categories, that ranges from 0 to 100, with higher scores indicating that labor practices better adhere to the code and thus tighter coupling. In our sample, scores range from 19 to 100, the average being 79.

Our dependent variable measures a supplier's *labor practice improvement* between its prior and focal audits, calculated by subtracting the prior audit's labor practices score from the focal audit's score. Larger values indicate greater improvement and thus an increase in coupling between labor practices and labor codes of conduct. In our sample, *improvement* averages 6 and ranges from –62 to 67.[7]

Independent Variables

We identify factories that use high-powered productivity incentives by coding *piece-rate payment*, a dichotomous variable, as 1 when the supplier pays its frontline workers on a piece rate, and 0 otherwise.[8] We code *certification* to a management system standard as 1 when a supplier is certified to at least one standard—such as SA8000, WRAP, ISO 9001, or OHSAS 18001—at the time it is audited,[9] and 0 otherwise. *Workers' union*, another dichotomous variable, equals 1 when the supplier is unionized, as recorded by the auditor, and 0 otherwise. Data for these three variables were obtained from the audit database. In our model, we use lagged values so that they pertain to the supplier's prior audit to examine their effect on subsequent improvement. Fifteen percent of these prior audits were conducted at certified suppliers,[10] 26% at unionized suppliers, and 11% at suppliers that use piece-rate payment.

Control Variables

Audit Level. We control for several audit-level factors that might influence the extent to which suppliers improve labor practices. We include *labor practice score (prior audit)* because suppliers with lower prior scores have more room for improvement—and might face less expensive improvement opportunities—than those that already had superior labor practices. We also control for *audit sequence* with a series of dummies denoting the supplier's first audit in the sample, the second, and so on, because suppliers may face increasing remediation costs and difficulties in subsequent audits. Whether the supplier is paying for the audit can also influence auditors' reports because of the conflict of interest that might lead auditors to report fewer violations when the audit is paid for by the supplier rather than the buyer (Short et al. 2016). We therefore create two dummy variables, *paid by buyer (prior audit)* and *paid by buyer (focal audit)*, to distinguish those audits from those paid for by the supplier itself.

We control for several characteristics of audit teams that prior research has shown can affect audit scores

(Short et al. 2016). First, we create dummy variables to control for the gender composition of the audit teams that conducted the supplier's prior and focal audits: *all-female audit team* and *mixed-gender audit team*, with *all-male audit team* as the omitted category. Second, we control for *audit team average age* for the prior and focal audits, based on auditor age data provided by the auditing firm. Third, we control for *audit team maximum tenure*—the most years that any member of the audit team had worked at the auditing firm—for the prior and focal audits.[11]

Supplier Level. We control for supplier size because larger factories, being more visible, are exposed to higher regulatory pressures (Surroca et al. 2013), which could increase their willingness to improve. We measure supplier size as the number of employees, obtained from the auditing company, which we log to reduce skew. We also control for supplier age by adding 1 to the difference between the audit year and the factory's founding year. We top-code the values at the 99th percentile of the sample distribution (68) to reduce the potential impact of outliers, then use the log to reduce skew.

We control for several other factors that might influence a supplier's improvement rate. Migrant workers are more likely to be exploited and mistreated while local workers tend to demand better working conditions (Flanagan 2006). Managers in factories with a higher proportion of local workers (compared with migrant workers) might therefore face more pressure to improve labor practices. In contrast, some factories might invest in improving labor practices to better attract migrant workers. These competing concerns lead us to control for *local worker ratio* in the supplier factory, operationalized as the percentage of frontline employees who are local, based on audit data. Gender differences in the workforce might also influence improvement rates. Some studies suggest that female workers in labor-intensive industries are docile and complain less (e.g., Caraway 2007), which implies that workplaces with a greater proportion of female employees might improve less because there will be less pressure to remedy harmful conditions. However, other studies argue that female employees resist exploitive workplace conditions and actively exercise their rights (e.g., Rock 2003, Elias 2005), which implies that workplaces with a greater proportion of female employees might improve more. The possibility that the gender composition of the workforce might influence improvement rates in one direction or the other leads us to control for female worker ratio in the supplier factory, operationalized as the percentage of frontline employees who are women. Furthermore, some factories outsource part of their production to subcontractors to evade health and safety requirements (O'Rourke 2003). Because factories that subcontract might improve more if they outsource problems, we include a dummy variable *use subcontractors*, which we code based on audit data.

Estimation and Results

The aforementioned independent variables and control variables can influence labor practice scores in both the prior and focal audits. Therefore, to predict improvement, we need to account for these factors for both audits. We include audit team characteristics—gender composition, average age, and maximum tenure—for both.[12] However, because the supplier-level variables are very stable, including them for both audits would substantially increase multicollinearity without adding meaningful controls.[13] Therefore, we include them only for the prior audit.

We include industry and year fixed effects to control for potential differences in improvement rate between suppliers in different industries and between various years in our sample. Because research shows that governmental, economic, and civil society attributes of buyers' headquarters country can influence their attentiveness to supply chain conditions, which can in turn affect the pressure they exert on suppliers to comply to labor standards (Toffel et al. 2015), we construct dummy variables for each *buyer's headquarters country*.[14]

Results

Summary statistics are reported in Table 1; descriptive statistics and correlations are reported in Tables A1–A3 of Online Appendix A. We test our hypotheses using ordinary least squares (OLS) regression, clustering standard errors by the supplier's country (a more conservative approach than clustering by supplier), and report results in Table 2.[15] Model 1 tests our direct-effect hypotheses (Hypotheses 1, 2a, and 2b). The statistically significant negative coefficient on *piece-rate payment (prior audit)* ($\beta = -3.59$, $p < 0.01$) reveals that factories paying workers on a piece-rate basis improve less on average than other factories, which supports Hypothesis 1. Predictive margins indicate that suppliers that used piece-rate payment improved their audit score in successive audits by 3.0 points on average, less than half the 6.6-point average improvement among suppliers that did not use piece-rate payment.

The statistically significant positive coefficient on *certification (prior audit)* ($\beta = 0.98$, $p < 0.01$) indicates that suppliers certified to management system standards improve more than noncertified suppliers, which supports Hypothesis 2a. Predictive margins indicate that certified suppliers improved by an average of 7.0 points, 17% more than the 6.0-point average improvement of noncertified suppliers.

The statistically significant positive coefficient on *workers' union (prior audit)* ($\beta = 1.18$, $p < 0.01$) indicates that unionized suppliers improve more than nonunionized suppliers, which supports Hypothesis 2b. Predictive

Table 1. Summary Statistics

	Mean	Standard deviation	Minimum	Maximum
Labor practice score (focal audit)	78.83	16.19	19.22	100
Improvement	6.19	16.53	−62.42	66.55
Piece-rate payment (prior audit)	0.11	0.31	0	1
Certification (prior audit)	0.15	0.36	0	1
Workers' union (prior audit)	0.26	0.44	0	1
Labor practice score (prior audit)	72.65	17.33	16.05	100
Paid by buyer (prior audit)	0.33	0.47	0	1
Paid by buyer (focal audit)	0.33	0.47	0	1
All-female team (prior audit)	0.34	0.47	0	1
All-female team (focal audit)	0.36	0.48	0	1
Mixed-gender team (prior audit)	0.14	0.35	0	1
Mixed-gender team (focal audit)	0.12	0.32	0	1
Audit team average age (prior audit)	30.80	4.89	24.70	47
Audit team average age (focal audit)	31.03	5.04	24.50	47
Audit team maximum tenure (prior audit)	3.82	2.70	0.69	10.48
Audit team maximum tenure (focal audit)	4.00	2.75	0.72	10.48
Audit sequence	2.73	1.01	2	6
Supplier's size (prior audit)^{L}	5.21	1.30	1.79	9.62
Supplier's age (prior audit)^{L}	2.22	0.74	0	4.22
Female worker ratio (prior audit)	0.57	0.20	0	1
Local worker ratio (prior audit)	0.49	0.40	0	1
Use subcontractors (prior audit)	0.19	0.39	0	1

Note. $N = 4{,}887$.
^{L} indicates logged.

margins indicate that unionized suppliers improved by 7.1 points, 20% more than the 5.9-point average improvement of nonunionized suppliers.

We test Hypothesis 3a and Hypothesis 3c with Model 2, which adds the interaction between *piece-rate payment (prior audit)* and *certification (prior audit).* Pairwise comparison of predictive margins reveals that piece-rate payment factories that are not certified to management system standards improve by an average of 2.6 points (42% of the 6.2-point sample mean), whereas piece-rate payment factories that are certified improve by an average of 4.7 points (76% of the sample mean), a statistically significantly difference ($F = 18.48$, $p < 0.01$). These results support the prediction of Hypothesis 3a that certification to a management system standard significantly attenuates the negative association between piece-rate payment and the coupling of labor codes and labor practices. Furthermore, certified factories that do not use piece-rate payment improve by an average of 7.2 points (116% of the sample mean), statistically significantly more than the average 4.7-point improvement of certified factories that use piece-rate payment ($F = 10.39$, $p < 0.01$). These results support the prediction of Hypothesis 3c that piece-rate payment significantly attenuates the positive association between certification to management system standards and the coupling of labor codes and labor practices. Figure A1 of Online Appendix A graphs these average predicted effects along with their 95% confidence intervals.

We test Hypothesis 3b and Hypothesis 3d with Model 3, which adds to our base model the interaction between *piece-rate payment (prior audit)* and *workers' union (prior audit).* Pairwise comparison of predictive margins reveals that nonunionized piece-rate payment factories improved an average of 2.1 points (34% of the sample mean), whereas unionized piece-rate payment factories improved an average of 4.6 points (74% of the sample mean), a statistically significant difference ($F = 25.5$, $p < 0.01$). These results, depicted in Figure A2 of Online Appendix A, support the prediction of Hypothesis 3b that workers' unions significantly attenuate the negative association between piece-rate payment and the coupling of labor codes and labor practices. Furthermore, unionized factories that do not use piece-rate payment improve an average of 7.3 points (118% of the sample mean), statistically significantly more than the average 4.6-point improvement of unionized piece-rate payment factories ($F = 10.22$, $p < 0.01$). These results, also depicted in Figure A2 of Online Appendix A, support the prediction of Hypothesis 3d that piece-rate payment significantly attenuate the positive association between piece-rate payment and the coupling of labor codes and labor practices.

We test Hypothesis 4a and Hypothesis 4b with Model 4, which adds to our base model the interaction between *certification (prior audit)* and *workers' union (prior audit).* Pairwise comparison of predictive margins reveals that certified unionized factories averaged 9.2-point improvement, whereas noncertified unionized factories improved by an average of 6.4 points, a statistically significant difference ($F = 23.46$; $p < 0.01$; also see Figure A3 of Online Appendix A). This supports the prediction of

Table 2. Regression Results

Dependent variable: *Improvement*	(1)	(2)	(3)	(4)
Piece-rate payment (prior audit)	–3.588***	–3.842***	–4.168***	–3.623***
	(0.838)	(0.901)	(0.815)	(0.871)
Certification (prior audit)	0.977***	0.804**	0.958***	–0.262
	(0.196)	(0.231)	(0.192)	(0.379)
Workers' union (prior audit)	1.177***	1.164***	0.962***	0.527*
	(0.127)	(0.132)	(0.122)	(0.249)
Piece-rate payment (prior audit) × Certification (prior audit)		1.327*		
		(0.615)		
Piece-rate payment (prior audit) × Workers' union (prior audit)			1.489**	
			(0.487)	
Certification (prior audit) × Workers' union (prior audit)				3.068**
				(0.913)
Labor practice score (prior audit)	–0.603***	–0.603***	–0.603***	–0.603***
	(0.006)	(0.006)	(0.006)	(0.006)
Paid by buyer (prior audit)	0.169	0.173	0.153	0.178
	(0.299)	(0.299)	(0.301)	(0.292)
Paid by buyer (focal audit)	0.978*	0.974*	0.975*	0.986*
	(0.448)	(0.449)	(0.450)	(0.443)
All-female team (prior audit)	–0.138	–0.145	–0.124	–0.170
	(0.221)	(0.220)	(0.221)	(0.220)
All-female team (focal audit)	–0.576*	–0.574*	–0.573*	–0.593**
	(0.218)	(0.217)	(0.220)	(0.215)
Mixed-gender team (prior audit)	1.656*	1.664*	1.691*	1.708*
	(0.697)	(0.694)	(0.696)	(0.700)
Mixed-gender team (focal audit)	–4.302***	–4.300***	–4.302***	–4.266***
	(0.748)	(0.745)	(0.742)	(0.734)
Audit team average age (prior audit)	–0.074	–0.074	–0.072	–0.079
	(0.050)	(0.050)	(0.051)	(0.052)
Audit team average age (focal audit)	0.114**	0.114**	0.114**	0.112**
	(0.038)	(0.038)	(0.039)	(0.038)
Audit team maximum tenure (prior audit)	0.305***	0.306***	0.302***	0.305***
	(0.056)	(0.056)	(0.056)	(0.056)
Audit team maximum tenure (focal audit)	–0.307***	–0.306***	–0.308***	–0.310***
	(0.066)	(0.066)	(0.065)	(0.065)
Supplier's size (prior audit)^{L}	0.281*	0.283*	0.285*	0.289†
	(0.138)	(0.139)	(0.138)	(0.145)
Supplier's age (prior audit)^{L}	–0.013	–0.012	–0.001	–0.005
	(0.154)	(0.155)	(0.153)	(0.152)
Female worker ratio (prior audit)	3.842***	3.876***	3.825***	3.972***
	(0.382)	(0.379)	(0.378)	(0.390)
Local worker ratio (prior audit)	–0.360***	–0.361***	–0.332***	–0.415***
	(0.096)	(0.096)	(0.094)	(0.100)
Use subcontractors (prior audit)	0.012	0.002	0.026	0.022
	(0.669)	(0.666)	(0.670)	(0.673)
Observations	4,887	4,887	4,887	4,887
R^2	0.3983	0.3984	0.3984	0.3992

Notes. Ordinary least squares (OLS) regression coefficients with standard errors clustered by supplier country in parentheses. Industry fixed effects, year fixed effects, audit-sequence fixed effects, supplier-country fixed effects, and buyer-country fixed effects are included.
$^{\dagger}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$ (two-tailed tests).
^{L} indicates logged.

Hypothesis 4a that workers' unions are associated with greater coupling of labor codes and labor practices (and thus greater *labor practice improvement*) in certified suppliers than in not-certified suppliers. In addition, the 9.2-point average improvement among certified unionized factories is statistically significantly more than the average 5.6-point improvement of certified nonunionized factories ($F = 23.52$; $p < 0.01$; also see

Figure A3 of Online Appendix A). This supports the prediction of Hypothesis 4b that certification is associated with greater coupling of labor codes and labor practices (and thus greater *labor practice improvement*) in unionized suppliers than in nonunionized suppliers.

Turning to our control variables, we find strong evidence that improvement rates significantly differ by industry (see Table B1 of Online Appendix B), year, audit-sequence, and buyer country (each of four Wald tests rejects the equality of each set of fixed effects at $p < 0.01$). Consistent with the notion that high performers face fewer or more expensive opportunities to improve, we find that factories with higher baseline scores exhibit less improvement, as evidenced by a significant negative coefficient on *labor practice score (prior audit)*.

Regarding audit team characteristics, we first examine the effects of the focal audit team, which are interpreted as leniency that influences the current audit score element of *improvement.* Our results yield negative coefficients on *all-female team (focal audit)*, *mixed-gender team (focal audit)*, and *audit team maximum tenure (focal audit)*, suggesting that all-male teams and less-experienced teams are more lenient, which is consistent with Short et al. (2016).[16] Considering the characteristics of prior audit teams, we find more improvement among factories whose prior audit teams were more experienced (confirming Hugill et al. 2018) and that were mixed gender.[17]

Regarding the payment party and noting that *paid by buyer (focal audit)* and *paid by buyer (prior audit)* are highly correlated ($\rho = 0.74$, per Table A3), our reestimation shows that coefficients reported in Table 2 on *paid by buyer (prior audit)* and *paid by buyer (focal audit)* are driven by multicollinearity and should thus be interpreted with caution.[18]

Turning to supplier characteristics, significant positive coefficient on *supplier's size (prior audit)* suggests that larger factories improve more. The significant positive coefficient on *female worker ratio (prior audit)* indicates that factories with a greater proportion of female workers improve more, which suggests female workers might be more likely to raise concerns about workplace conditions, consistent with studies on female workers' resistance to exploitive labor conditions (e.g., Rock 2003, Elias 2005). The significant negative coefficient on *local worker ratio (prior audit)* indicates that factories with larger proportions of migrant workers improve more, which suggests that factories might be more motivated to improve labor practices to attract migrant workers than to attract local workers. We find no significant effect of the use of subcontractor labor on improvement.

Robustness Tests

Online Appendix C reports further analyses to assess the robustness of our results. First, we assess whether controlling for whether an audit is announced or unannounced affects our results, as prior research indicates that it can influence improvement rates (Hugill et al. 2018). We added two dummy control variables, *announced (prior audit)* and *announced (focal audit)*, to our primary models and estimated them on the subsample of audits (those conducted in 2014 and 2015) for which our data set includes announcement information (see Table C1). Second, we assess whether the time gap between suppliers' prior and focal audits influenced our results by testing our hypotheses on a new dependent variable, *improvement per month* (see Table C2). Third, because more powerful buyers might be more successful at coercing their suppliers to improve labor practices, we control for this by including admittedly crude proxies for buyer power (*total number of facilities audited for each buyer* and its square in Table C3 and log in Table C4). Fourth, all models (including ours) that predict a difference score while controlling for the lagged score assume there is no contemporaneous correlation between the lagged score and the error term (that is, between $y_{i,t-1}$ and $\varepsilon_{i,t}$). As a robustness test, we estimate an alternative set of models that predict $\ln(y_{i,t}/y_{i,t-1})$ and control for $\ln(y_{i,t-1})$ instead of $y_{i,t-1}$, which assumes no contemporaneous correlation between the lagged log score ($\ln(y_{i,t-1})$) and the error term ($\varepsilon_{i,t}$) resulting from predicting $\ln(y_{i,t}/y_{i,t-1})$ conditional on $\ln(y_{i,t-1})$. All of these robustness test results support our hypotheses. Lastly, in our primary analysis, we compare variations between suppliers using a cross-sectional approach, and here we test whether our theory holds by examining variations within suppliers with supplier fixed-effects models. The coefficients on the hypothesized variables in these supplier fixed-effects models are identified exclusively by instances in which suppliers adopted (or dropped) piece-rate payment, certification, and/or unions. As such, these coefficients are generated by an entirely different set of suppliers from our main sample. This set of supplier fixed-effects models yields results that are largely consistent with our main models, which increases the external validity of our theory.

Supplemental Analysis: Prescriptive vs. Generative Management Systems

In the above analyses, we treat management system standards certification generically, focusing on the interunit dialogue improvement features common to these regimes. However, different regimes have different degrees of emphasis on process improvement versus compliance with prescriptive, substantive rules. We conducted supplemental analyses to investigate whether certifications that differ in this regard also differ in their relationship to the coupling of codes of conduct and supplier labor practices.

Several of the certification programs in our sample prescribe substantive rules with which suppliers must comply to obtain certification. For example, the Business Social Compliance Initiative (BSCI) management system

standard includes a code of conduct requiring fair remuneration and observance of specified occupational health and safety rules and prohibiting child labor and forced labor. Worldwide Responsible Accredited Production (WRAP) mandates adherence to 12 "Production Principles" similarly protecting workers' rights. These management systems provide externally imposed prescriptive rules, and suppliers certified to these systems are audited primarily to ensure they fully comply with these substantive rules. We define these as "prescriptive" certifications and code the variable *prescriptive certification (prior audit)* as 1 when the audited supplier has been certified to at least one of them, and 0 otherwise.

In contrast, we define "generative" certifications as those that lack prescriptive rules and instead require the organization to identify and develop its own objectives in the production process based on risk assessment practices and to update these objectives through periodic review. For instance, ISO 9001 places responsibility on the certified organization to "establish the objectives and processes necessary to deliver results" (ISO 9001-2000: vi), and ISO 14001 stresses that objectives may differ across organizations (ISO 14001-1996). We code the variable *generative certification (prior audit)* as 1 when the audited supplier is certified to at least one such system, and 0 otherwise. (Table D1 of Online Appendix D lists the prescriptive and generative certifications in our sample.)

Replacing our single certification variable with these two certification variables yields a positive and significant coefficient on *generative certification (prior audit)* and a nonsignificant coefficient on *prescriptive certification (prior audit)*. The results, reported as Model 1 of Table D2 (Online Appendix D), indicate that generative certification is associated with improvements in supplier labor practices, but no evidence that prescriptive certification is. We also analyze the relationship between these two certification variables and *labor practice levels* (that is, the labor practice scores reported in focal audits) and report results as Model 2 of Table D2. Both certification variables are positively associated with superior labor practice levels. Yet, as Model 1 shows, only generative certifications are associated with improvement. These findings offer additional support for our argument that it is an emphasis on the development of organizational processes that facilitate cross-organizational dialogue that explains the positive association between managerial structures and the coupling of codes of conduct and labor practices. In the Discussion section, we discuss the implications of these findings in greater detail.

Discussion

Our study reveals important insights about the internal structural conditions under which codes of conduct are more likely to be coupled with improvements in labor practices and the extent to which core production activities are more likely to be buffered from codes by other organizational structures. First, we find that labor standards are less coupled to labor practices in suppliers with high-powered productivity incentive structures. Second, coupling is tighter in the presence of two managerial structures: certified management systems and unions. Third, we identify important dependencies between these organizational structures: management system certifications and unions attenuate the looser coupling of labor codes and labor practices associated with high-powered productivity incentive structures, while high-powered productivity incentive structures also temper the tighter coupling of codes and practices associated with managerial structures. We also find support for the argument that certified management systems and unions complement each other in the coupling of labor standards and practices. These findings contribute in important ways to theory and practice.

Contribution to the Literature on Formal Organizational Structures and Practices

First, our focus on the internal structural composition of organizations to ascertain how coupling varies across firms in challenging institutional environments significantly extends a body of scholarship that has concentrated largely on the coupling force of institutional factors external to organizations (e.g., Hafner-Burton and Tsutsui 2005, Bromley and Powell 2012, Bartley and Egels-Zandén 2016). We find that even in emerging economies—where labor regulatory institutions are weak and efficiency demands are strong—some internal structures, such as certification and unions, are associated with tighter coupling of labor codes of conduct and labor practices in suppliers and can attenuate buffering by high-powered productivity incentives. This suggests the need to reconsider the boundary conditions delineating environments in which coupling is more or less likely. Since Meyer and Rowan (1977), the assumption that decoupling is likeliest in less-elaborated institutional environments has shaped the literature and arguably has constrained the parameters of research. Some recent studies finding gaps between companies' formal human rights commitments and their actual practices do not even entertain the possibility that such commitments could be substantive rather than symbolic (Lim and Tsutsui 2012, Berliner and Prakash 2015). This is an important arena for future research.

Second, we investigate the interaction of multiple and potentially competing internal structures. To date, studies have tended to examine the conditions under which a single organizational structure is coupled to or decoupled from organizational practices. But this approach ignores the complex and multifarious nature of these structures inside organizations. Firms face multiple and competing institutional demands that become sedimented into multiple and competing layers of

organizational structure. It is crucial to appreciate the internal interaction of these structures to understand whether and when they will be coupled to organizational practices. Our attention to the contingent relationships among organizational structures also extends qualitative research on internal (de)coupling processes that, to date, has centered on the activities and interactions of individual actors, such as powerful managers (Fiss and Zajac 2004, Hallett 2010, Overdevest 2010), union representatives (Bartley and Egels-Zandén 2016), a new generation of differently trained personnel (Tilcsik 2010), or boundary-spanning professionals (Edelman 1992, Sutton and Dobbin 1996).

Accounting for how different configurations of internal organizational structures are related to the coupling of legitimacy structures (i.e., labor codes) and organizational practices (i.e., labor practices) allows us to advance theories of internal buffering. Going beyond the stylized idea that legitimacy structures are cordoned off from an organization's core activities, we show that legitimacy structures are not completely isolated from other structures but rather are conditioned by these structures. Specifically, efficiency structures can act as a buffer to shield core labor practices from threatening changes by labor codes, but managerial structures that foster intraorganizational dialogue make it difficult to completely buffer practices from codes. Furthermore, we show important interactions among efficiency structures and managerial structures relating to the buffering of legitimacy structures: efficiency structures temper the reduced buffering of codes associated with managerial structures, managerial structures attenuate the heightened buffering associated with efficiency structures, and multiple managerial structures can complement one another to mitigate the buffering of codes. These findings echo the rising strand of literature on institutional complexity and on organizational hybridity encompassing multiple logics (e.g., Binder 2007, Thornton et al. 2012, Besharov and Smith 2014). Consistent with this literature, we show that efficiency imperatives and legitimacy imperatives can become compatible when they are aligned in realizing organizational goals under certain internal structural conditions. Our study also shares affinities with research on channels of internal influence in organizations, including stakeholder receptivity (McDonnell et al. 2015), middle manager involvement (Huy 2002), and executive ideology (Briscoe et al. 2014). Studies like these tend not to be framed in terms of "internal buffering." We believe that, going forward, our elaboration of the concept of "internal buffering" will provide a useful framework for analyzing how external institutional pressures are translated internally to influence organizations.

Third, we directly theorize and test the association between efficiency imperatives and coupling of legitimacy structures and practices. While the specter of efficiency demands looms large in decoupling studies, they are not typically the object of empirical study. The literature broadly assumes that the implementation of legitimacy structures will be impeded by efficiency-related imperatives emanating from the organizational environment. However, to understand the coupling and decoupling of legitimacy structures, it is critical to recognize that environmental efficiency imperatives get operationalized as formal organizational structures and to investigate how these structures are related both to organizational practices and to other organizational structures. Our investigation shows that while some efficiency structures buffer the internal impact of legitimacy structures, this can be mitigated by certain managerial structures. These findings extend understandings about the relationship between legitimacy and efficiency imperatives that lie at the core of the decoupling literature.

Last, we extend the literature on certification to management systems standards. Our supplementary analysis reveals heterogeneity among certification systems, highlighting the importance of continuous process improvement and input from multiple units in designing management systems. We found no statistically significant labor practice improvement among suppliers certified to prescriptive management system standards, which impose a static set of objectives. Such certifications are often used as a "seal of approval" to market good practices to reputation-sensitive global buyers, though we find no evidence that adopters are particularly adept at substantially *improving* those practices. Instead, our finding that certification is associated with greater improvement turns out to be driven entirely by generative management systems, which emphasize continuous improvement processes and input from multiple units via self-assessment activities, without prescribing specific substantive outcomes. These findings contribute to the handful of studies that have investigated whether certification to management systems standards in one domain—such as environmental compliance or quality control—can improve management practices in ways that spill over into other domains (King et al. 2005, Levine and Toffel 2010, Lim and Prakash 2017). And they suggest the need for caution in assessing the value of certification and more nuanced attention to the design features of different management certification systems when theorizing and testing their effects.

Contribution to the Literature on Labor Practices in Global Supply Chains

Studies examining labor practices in global supply chains have focused on external institutional determinants of compliance with privately imposed labor codes of conduct, including civil society institutions (Seidman 2007, Vogel 2008, Anner 2012, Anner et al. 2013, Distelhorst et al. 2015, Toffel et al. 2015, Bartley and Egels-Zandén 2016, James et al. 2018), state-based institutions like the

stringency of domestic labor law (Locke et al. 2013, Distelhorst et al. 2015, Toffel et al. 2015), and government inspection practices (Amengual 2010, Amengual and Chirot 2016). Our study extends this literature by empirically investigating the internal organizational structures that might impede or expedite suppliers' compliance with labor codes.

We also provide important new empirical evidence in the debate over the relationship of management systems and unions. Some studies suggest that the two are complementary (e.g., Bartley 2005, Rodriguez-Garavito 2005), others that certified management systems are used as a substitute for unions (e.g., Esbenshade 2004, Anner et al. 2013). Our findings provide evidence that the relationship between these two structures is complementary in suppliers that have adopted both: each enhances the positive association of the other with the coupling of codes of conduct and labor practices. However, complementarity might depend on suppliers' willingness to engage in the kind of cross-organization dialogue we theorize to cultivate and utilize information provided by workers about workplace conditions. Studies rejecting the complementarity of these two structures tend to be in contexts where suppliers used certification strategically to crowd out unions (e.g., Esbenshade 2004, Anner et al. 2013). We suspect that these structures may very well lack complementarity if they are not implemented synergistically to increase cross-organization dialogue, but future research is needed to identify the precise mechanisms driving complementarity. This suggests the need for caution in assessing the value of certification and for nuance in understanding the design and function of different management certification systems when theorizing and testing their effects.

Our examination of high-powered productivity incentives contributes to the literature that examines the relationship between labor standards and global value chain incentive structures. Many have argued that supplier labor standards are largely shaped by the incentives created by buyer sourcing practices (e.g., Bartley 2005, Locke 2013). Others have examined how the internal incentives created by "lean production systems" shape working conditions. Lean production emphasizes waste minimization and work flow maximization to increase productivity. Like the high-powered productivity incentives we study, lean production systems have been criticized for their association with intensified workloads and deteriorated working conditions (e.g., Landsbergis et al. 1999, Parker 2003, Stewart et al. 2009). Yet, recent studies show either mixed relationships (e.g., Jackson and Mullarkey 2000, Hasle 2009) or positive relationships (e.g., Locke and Romis 2007, 2010; Distelhorst et al. 2016) between lean production and working conditions. We extend this literature by exploring the relationship between labor standards improvement and a different type of productivity incentive—piece-rate payment, and by showing how this relationship is conditioned by other organizational structures. Our data only allow us to investigate one type of productivity incentive, and we encourage future studies to examine the relationship between labor standards improvement and the many different types of production incentive systems suppliers have instituted.

Finally, our findings provide important insights for MNCs selecting suppliers and designing governance regimes to improve labor practices. Many MNCs have focused on long-term relationships with suppliers and helping them improve their labor practices. Our findings suggest that MNCs can strategically target suppliers having managerial structures like generative certifications and worker participation, while being wary of suppliers using piece-rate systems. Furthermore, because of the influence of economic incentives on labor practices, altering the internal payment structure from piece-rate to hourly may help. For suppliers that cannot change their payment schemes systemically in the near term, instituting alternative governance structures, including worker participation and certification programs, might reduce the negative influence of high-powered productivity incentives.

Limitations and Future Directions

There are several limitations in our study. First, we do not observe why the suppliers in our sample adopted various efficiency and managerial structures; for instance, whether doing so was voluntary or coerced (and if so, by whom) and whether structures were adopted symbolically with the intent to decouple them from practices. We focus on postadoption outcomes rather than the conditions and motivations surrounding adoption. We acknowledge that adopters and nonadopters might differ in many unobservable aspects, such as management attitudes and organizational capacity. Becoming certified or unionized at different times or under different conditions may also influence the improvement of labor practices differently. Our data set does not enable us to empirically disentangle these differences, which remain important opportunities for future research.

Second, our data set lacks data on supplier profitability and many management characteristics—including the use of productivity-enhancing structures other than piece-rate payment—and on buyer–supplier order history and contractual terms, all of which might influence suppliers' improvement rates. We encourage future research to consider the possible relationship between different business models and improvement in labor practices. In addition, we rely on existing literature to hypothesize rather than directly observing the intraorganizational processes in suppliers. While the structures we hypothesize are designed to promote intraorganizational dialogue, we cannot observe the extent to which

they do. Additional qualitative research is required to answer these important questions.

Lastly, ours is one of many papers that use audit scores as a measure of compliance with labor codes of conduct (e.g., Locke et al. 2007, Oka 2010, Ang et al. 2012, Distelhorst et al. 2015, Toffel et al. 2015), but researchers and other stakeholders should be aware of the limitations of audit reports for measuring improvements in labor conditions. The improvement of audit scores reflects changes in compliance as judged by auditors, and auditor judgment is based on their review of documented evidence (e.g., payroll records) as well as their ability to interview workers and observe actual conditions, which supplier management can seek to impede.

Conclusion

Many skeptics have argued that organizational legitimacy structures are not associated with actual changes in organizational practices. Our findings suggest that the coupling of legitimacy structures and organizational practices is conditioned by the organization's internal structural conditions, particularly the extent to which the core organizational efficiency imperatives are buffered from change or made more permeable to change by other organizational structures. Our study suggests the need to look beyond the symbolism of organizational legitimacy structures and attend to how they can be associated with actual implementation and improvement.

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Endnotes

[1] International Organization for Standardization, https://www.iso.org/management-system-standards.html.

[2] As described below, robustness tests that account for variation in this time lag between successive audits yield the same inferences as our primary results.

[3] We use suppliers and factories interchangeably, both referring to the establishment audited. All supplier/factory-level variables are measured at the establishment level. In addition, while it is possible that some of the thousands of audited establishments in our data set might be owned by a firm that operates multiple supplier factories, these establishments are not owned by the buyers, which tend to be brands. Our social auditing data does not include establishment names or ownership information.

[4] As explained below, we also estimate supplier fixed-effects models based on the full sample that includes suppliers whose piece-rate payment, certification, or union status changes, which generate results largely consistent with our primary results.

[5] Note that 8,323 is less than twice the number of focal audits because some suppliers were audited more than twice in our sample period, which results in 1,451 audits serving both as a focal audit in one observation and as a prior audit in another observation.

[6] The terms of our data-sharing agreement require us to protect the identity of the social audit firm that provided the data to us, which prevents us from disclosing the full list of audit categories and how they are aggregated and weighted to produce the final score of labor practice.

[7] Our model that predicts *improvement* (that is, $Score_{i,t} - Score_{i,t-1}$) while controlling for the prior audit score ($Score_{i,t-1}$) is virtually mathematically identical to a model that predicts the focal audit score ($Score_{i,t}$) while controlling for the prior audit score ($Score_{i,t-1}$). That is, our current approach can be expressed as $(Score_{i,t} - Score_{i,t-1}) = \beta_1 Score_{i,t-1} + \beta_2 X_{i,t} + \varepsilon_{i,t}$. Adding $Score_{t-1}$ to both sides yields $Score_{i,t} = (\beta_1+1)\, Score_{i,t-1} + \beta_2 X_{i,t} + \varepsilon_{i,t}$. Note that these alternative specifications yield identical coefficients on our hypothesized variables (β_2).

[8] If some factories in our sample do not use piece-rate pay but instead supplement their hourly wage scheme with other productivity incentives, such as production bonuses, that we do not observe in our data, our estimated coefficient on *piece-rate payment* should be considered the lower bound of the true impact of high-powered incentives. This is because our estimates identify the difference between factories that rely on piece-rate payment and all other factories and some of those other factories might rely on other high-powered incentives.

[9] For the full list of management system standards, see Table D1 of Online Appendix D.

[10] Nearly 15% of the establishments in our sample are certified to at least one management standard, which is broadly similar to certification rates among manufacturing establishments in China and in the United States, according to our calculations based on data from Bloomberg Terminal, the International Organization for Standardization's *2016 ISO Survey*, and the US Census Bureau's *Statistics of U.S. Businesses*. Because certified suppliers might be especially good at keeping records, creating systems for managing problems, and documenting changes—which could trigger improved audit scores—we explored whether certification was associated with improvements in the subset of audited labor practice items that are based on physically examining shop floor conditions (rather than process and system related issues that might be associated with better record keeping). Examples of such items include the functioning of machines' emergency stop switches, the installation of fire hoses, the proper use of personal protective equipment, and the correct labeling of chemicals and materials. Like our main results, we find that certified suppliers exhibit more improvement in labor practice audit items that are based on examining shop floor conditions ($\beta = 0.810$, $p < 0.01$). This allays the concern that our main certification result is driven solely by certified establishments being especially good at process and system issues like recordkeeping. As an aside, the coefficients on *piece rate payment* and *workers' union* are quite similar in magnitude and statistical significance across these two models, which indicates that those structures are associated with comparable degrees of improvement in both documented *and* examined items of labor practices.

[11] Audit team demographics not only might influence auditor scrutiny and thus audit score (Short et al. 2016), but also might cause different amounts of knowledge transfer to be conveyed to and/or received by the audited establishment (e.g., auditors could teach suppliers how to remediate issues), which could influence the learning and improvement that would be reflected in the next audit score and thus in our *improvement* measure. We theorize neither the net magnitude of these interconnected relationships nor their potential influence on improvement; we merely control for them, so as not to risk omitted variable bias that could contaminate the estimates of our hypothesized effects.

[12] Because three control variables (*paid by buyer*, *audit team average age*, and *audit team maximum tenure*) have moderately high correlations between values measured at the focal and the prior audit, we investigated whether our inclusion of them measured at time t and time t-1 (that is, these variables being measured at the focal audit and the

prior audit) influence the coefficients on our hypothesized variables. We compared our primary model's estimates to two alternative models: a model that omitted these three variables measured at time t (the focal audit), and a model that instead omitted these three variables measured at time t-1 (the prior audit). Both of these alternative models yielded coefficients on our hypothesized variables that remained statistically significant and of very similar magnitude to our primary results (differences ranged from 0.3% to 4.4%).

[13] For instance, the correlation of *supplier's size* between the prior and focal audits is 0.96 and the correlation of *female worker ratio* between the prior and focal audits is 0.86.

[14] As a robustness test, we include three supplier-country–level variables *rule of law*, *press freedom*, and *FDI inflows*, which yielded nearly identical results. Because our main models use supplier-country fixed effects, including these supplier-country-level variables risks multicollinearity issues. We thus do not include them in the main models.

[15] A likelihood-ratio test indicates that our main model (Column 1) provides significantly more explanatory power than a model that omits our three independent variables (*certification*, *workers' union*, and *piece-rate payment*) ($\chi^2 = 39.2$; $p < 0.01$), and a Wald test assessing whether the three independent variables in our main model are jointly zero is strongly rejected ($F = 48.6$; $p < 0.01$).

[16] Noting that audit team maximum tenure (prior audit) and audit team average age (prior audit) are highly correlated ($\rho = 0.55$), and audit team maximum tenure (focal audit) and audit team average age (focal audit) are highly correlated ($\rho = 0.59$), we reestimated our main model (Column 1 of Table 2) except omitting prior and focal audit team maximum tenure, and then, separately, omitting the audit team average age variables corresponding to the prior and focal audit. This reduced the magnitude of the significant negative coefficient on audit team maximum tenure (focal audit) and the magnitude of the significant positive coefficient on audit team maximum tenure (prior audit) and led to the coefficients on both audit team average age (focal audit) and audit team average age (prior audit) becoming nearly 0 and nonsignificant. This indicates that significant coefficient reported in Table 2 on audit team average age (focal audit) is driven by multicollinearity and should be interpreted with caution. The coefficients on our hypothesized variables were nearly identical across these alternative specifications.

[17] Specifically, we find positive significant coefficients on *audit team maximum tenure (prior audit)* and *mixed-gender team (prior audit)* and a Wald test statistic indicating that the negative coefficient on *all-female team (prior audit)* differs significantly from the coefficient on *mixed-gender team (prior audit)* ($F = 11.2$, $p<0.01$).

[18] Specifically, we reestimated our main model (Column 1 of Table 2) except that we omitted *paid by buyer (focal audit)*, and then, separately, omitted *paid by buyer (prior audit)*. This increased the magnitude of the significant positive coefficient on *paid by buyer (prior audit)*, and rendered the coefficient on *paid by buyer (prior audit)* significant. Coefficients on our hypothesized variables were nearly identical across these alternative specifications.

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ONLINE APPENDICES

To Article:

Coupling Labor Codes of Conduct and Supplier Labor Practices: The Role of Internal Structural Conditions

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Contents:

Appendix A. Descriptive Tables and Interaction Graphs

Table A1. Industry Composition of Audits and Audited Suppliers

	Audits		Suppliers	
Industry	Number	Percent	Number	Percent
Hardlines	968	19.8%	631	19.3%
Apparel	899	18.4%	614	18.7%
Electronics	414	8.5%	277	8.5%
Housewares	334	6.8%	214	6.5%
Textiles	329	6.7%	235	7.2%
Toys	328	6.7%	222	6.8%
Food	224	4.6%	140	4.3%
Accessories	227	4.6%	170	5.2%
Personal Use Items	195	4.0%	141	4.3%
Footwear	157	3.2%	106	3.2%
Automotive	117	2.4%	70	2.1%
Sports Equipment	110	2.3%	71	2.2%
Leather Goods	104	2.1%	80	2.4%
Paper Products	88	1.8%	63	1.9%
Bottling	69	1.4%	42	1.3%
Technical Services	28	0.6%	22	0.7%
Other	296	6.1%	178	5.4%
Total	4,887	100%	3,276	100%

Table A2. Location of Audits and Audited Suppliers

	Audits		Suppliers	
Location of audits	Number	Percent	Number	Percent
China	3,732	76.4%	2,456	77.0%
India	174	3.6%	129	3.9%
Cambodia	136	2.8%	77	2.4%
Vietnam	128	2.6%	93	2.8%
Indonesia	108	2.2%	61	1.9%
Taiwan	90	1.8%	66	2.0%
Italy	88	1.8%	71	2.2%
Thailand	85	1.7%	57	1.7%
South Korea	52	1.1%	34	1.0%
Turkey	36	0.7%	27	0.8%
Mexico	35	0.7%	30	0.9%
Sri Lanka	20	0.4%	10	0.3%
Bangladesh	16	0.3%	13	0.4%
Egypt	16	0.3%	11	0.3%
Guatemala	15	0.3%	12	0.4%
United States	15	0.3%	12	0.4%
Countries with <15 audits in sample	141	2.9%	117	3.6%
Total	4,887	100%	3,276	100%

Table A3. Correlations

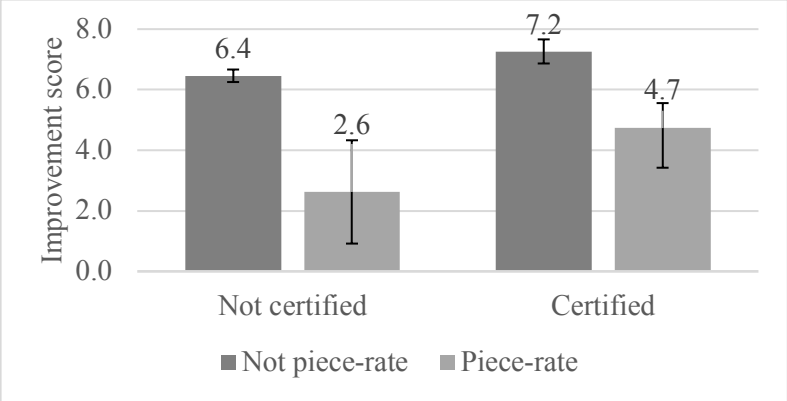
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Improvement	1															
2	Certification (prior audit)	-0.01	1														
3	Workers' union (prior audit)	0.02	0.17	1													
4	Piece-rate payment (prior audit)	0.02	0.05	0.12	1												
5	Labor practice score (prior audit)	-0.57	0.07	0.04	-0.14	1											
6	Paid by buyer (prior audit)	0.00	-0.03	0.01	-0.03	0.07	1										
7	Paid by buyer (focal audit)	-0.01	-0.04	0.00	-0.04	0.08	0.74	1									
8	All-female team (prior audit)	0.02	0.01	-0.03	0.01	-0.07	-0.03	-0.03	1								
9	All-female team (focal audit)	0.03	0.00	-0.01	0.02	-0.06	-0.02	-0.02	0.19	1							
10	Mixed-gender team (prior audit)	0.05	0.03	0.10	0.00	0.00	0.09	0.08	-0.29	-0.04	1						
11	Mixed-gender team (focal audit)	-0.12	0.03	0.11	0.02	0.10	0.04	0.07	-0.06	-0.27	0.24	1					
12	Audit team average age (prior audit)	0.01	0.01	-0.02	-0.05	0.11	-0.08	-0.09	-0.10	-0.03	-0.03	-0.03	1				
13	Audit team average age (focal audit)	-0.01	0.01	-0.01	-0.05	0.13	-0.08	-0.09	-0.01	-0.12	-0.01	.000	0.46	1			
14	Audit team maximum tenure (prior audit)	0.05	0.00	0.02	-0.02	0.00	-0.03	-0.03	-0.09	-0.03	0.16	0.08	0.55	0.22	1		
15	Audit team maximum tenure (focal audit)	-0.06	-0.02	0.03	-0.03	0.09	-0.05	-0.04	-0.01	-0.11	0.08	0.15	0.25	0.59	0.33	1	
16	Audit sequence	-0.09	0.05	0.07	-0.01	0.13	0.05	0.07	0.01	0.00	0.03	0.07	0.01	0.01	0.04	0.05	1
17	Supplier's size (prior audit) [L]	-0.01	0.24	0.33	0.11	0.03	0.00	-0.02	-0.08	-0.03	0.37	0.33	-0.10	-0.11	0.08	0.03	0.12
18	Supplier's age (prior audit) [L]	-0.03	0.14	0.16	0.02	0.08	-0.08	-0.08	-0.04	-0.01	0.05	0.05	0.13	0.10	0.07	0.07	0.14
19	Female worker ratio (prior audit)	-0.01	-0.05	0.03	0.03	0.06	0.13	0.13	0.04	0.02	0.00	0.00	-0.13	-0.13	-0.03	-0.01	0.01
20	Local worker ratio (prior audit)	0.03	0.03	0.13	0.01	0.11	0.11	0.09	-0.03	-0.05	0.00	0.00	0.14	0.13	0.04	0.03	-0.01
21	Use subcontractors (prior audit)	0.04	0.00	0.06	0.08	-0.04	0.07	0.06	0.01	-0.01	0.01	0.03	0.00	-0.02	-0.01	-0.02	0.00

		17	18	19	20	21
17	Supplier's size (prior audit) [L]	1				
18	Supplier's age (prior audit) [L]	0.17	1			
19	Female worker ratio (prior audit)	-0.02	-0.07	1		
20	Local worker ratio (prior audit)	-0.03	0.10	0.14	1	
21	Use subcontractors (prior audit)	0.05	-0.02	0.06	0.05	1

N = 4,887; [L] indicates logged.

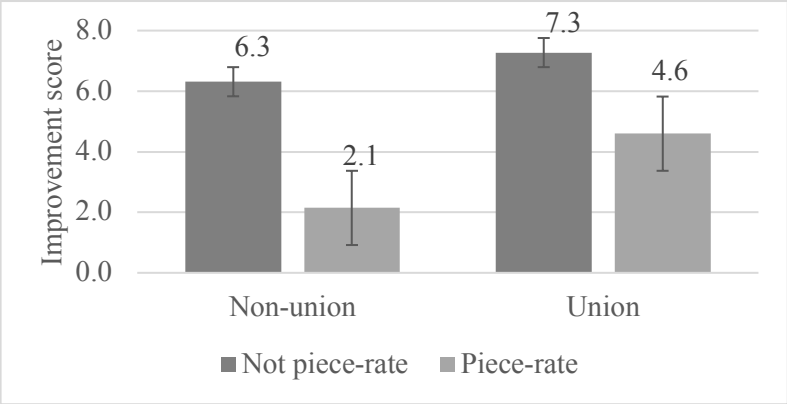
Interactions among Efficiency Structures and Managerial Structures

Figure A1. Suppliers with piece-rate payment schemes improve less on average, but the gap is significantly smaller among certified suppliers. Suppliers with certified management systems improve more on average, but the gap is significantly smaller among piece-rate payment suppliers.



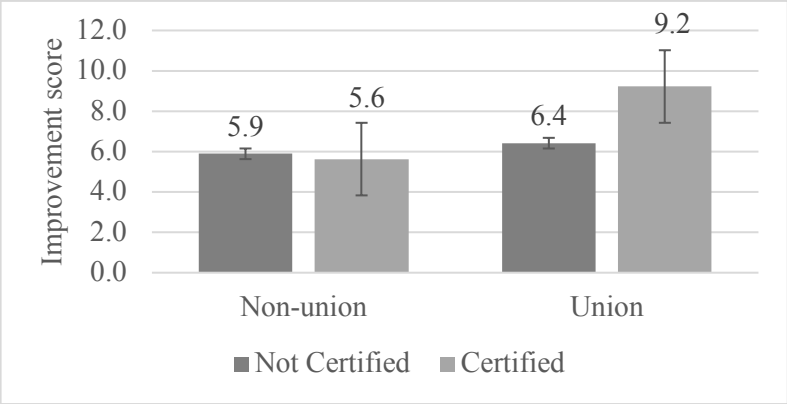
Note: This graph depicts average predicted effects and 95% confidence intervals based on Model 2 in Table 2.

Figure A2. Suppliers with piece-rate payment schemes improve less on average, but the gap is significantly smaller among unionized suppliers. Suppliers with workers' unions improve more on average, but the gap is significantly smaller among piece-rate payment suppliers.



Note: This graph depicts average predicted effects and 95% confidence intervals based on Model 3 in Table 2.

Figure A3. Among unionized suppliers, certified suppliers improvement significantly more than not-certified suppliers. Among certified suppliers, unionized suppliers improve significantly more than non-unionized suppliers.



Note: This graph depicts average predicted effects and 95% confidence intervals based on Model 4 in Table 2.

Appendix B. Interpreting Control Variables in Table 2

Table B1 Improvement Regression Coefficients on Industries and Supplier Countries from the Model Reported in Column 1 of Table 2.

Apparel	-1.337**	Hardlines	-2.830***	Technical Services	-4.932*
	(0.405)		(0.542)		(2.318)
Automotive	1.187	Housewares	-3.080***	Sports Equipment	-3.123***
	(0.770)		(0.503)		(0.525)
Bottling	-3.100**	Leather Goods	-4.173***	Textiles	-0.674
	(1.080)		(1.174)		(0.792)
Electronics	-2.666***	Paper Products	0.038	Toys	-2.308***
	(0.650)		(0.672)		(0.523)
Food	-1.392+	Personal Use Items	-1.654*	Other	-1.813*
	(0.802)		(0.657)		(0.731)
Footwear	-3.549***				
	(0.906)				
Argentina	-3.286***	Honduras	3.744*	Portugal	14.719***
	(0.642)		(1.499)		(0.914)
Bangladesh	4.732***	Hong Kong	12.073***	Romania	9.767***
	(0.547)		(0.841)		(0.795)
Belgium	4.049**	Hungary	1.134	Russia	7.088**
	(1.347)		(2.551)		(2.043)
Brazil	18.806***	India	5.955***	Singapore	-3.541***
	(0.871)		(0.435)		(0.734)
Bulgaria	14.627***	Indonesia	-0.561	Slovenia	12.023***
	(0.758)		(0.491)		(1.162)
Cambodia	3.469***	Italy	11.173***	South Africa	-4.586***
	(0.241)		(0.926)		(0.711)
Canada	10.011***	Jordan	-7.813***	South Korea	1.997***
	(1.746)		(0.596)		(0.410)
Chile	12.233***	Kenya	11.169***	Spain	11.539***
	(0.836)		(0.537)		(0.730)
Colombia	24.939***	Lebanon	1.328	Sri Lanka	8.456***
	(1.577)		(0.857)		(0.572)
Czech Republic	13.998***	Malaysia	10.818***	Sweden	18.862***
	(0.969)		(0.894)		(2.034)
Dominican Republic	4.576***	Mauritius	4.511***	Switzerland	12.893***
	(0.648)		(0.913)		(0.879)
Egypt	-1.019	Mexico	5.885***	Taiwan	4.209***
	(0.691)		(0.290)		(0.470)
El Salvador	3.048***	Netherlands	12.488***	Thailand	9.294***
	(0.558)		(1.522)		(0.344)
Finland	16.779***	New Zealand	15.591***	Tunisia	1.847
	(2.171)		(1.061)		(1.833)
France	10.485***	Pakistan	9.622***	Turkey	2.962***
	(0.616)		(0.810)		(0.828)
Germany	11.630***	Peru	0.831+	UK	6.696***
	(0.748)		(0.459)		(0.747)
Greece	-3.916***	Philippines	13.502***	United States	9.545***
	(0.496)		(0.933)		(0.483)
Guatemala	4.362***	Poland	10.330***	Vietnam	5.298***
	(0.267)		(0.490)		(0.351)

Notes: The baseline industry is Accessories; the baseline country is China. See the paper's Table 2 for remaining notes.

Figure B1. Average Improvement among Suppliers by Industry (Descriptive)

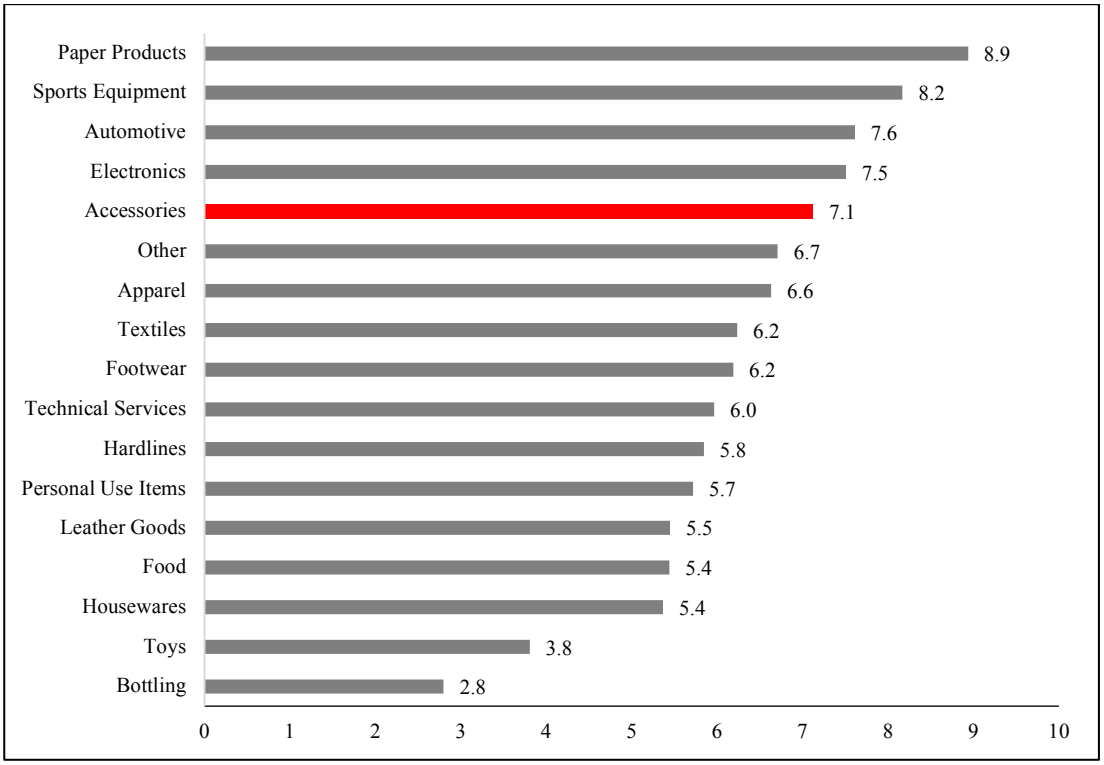
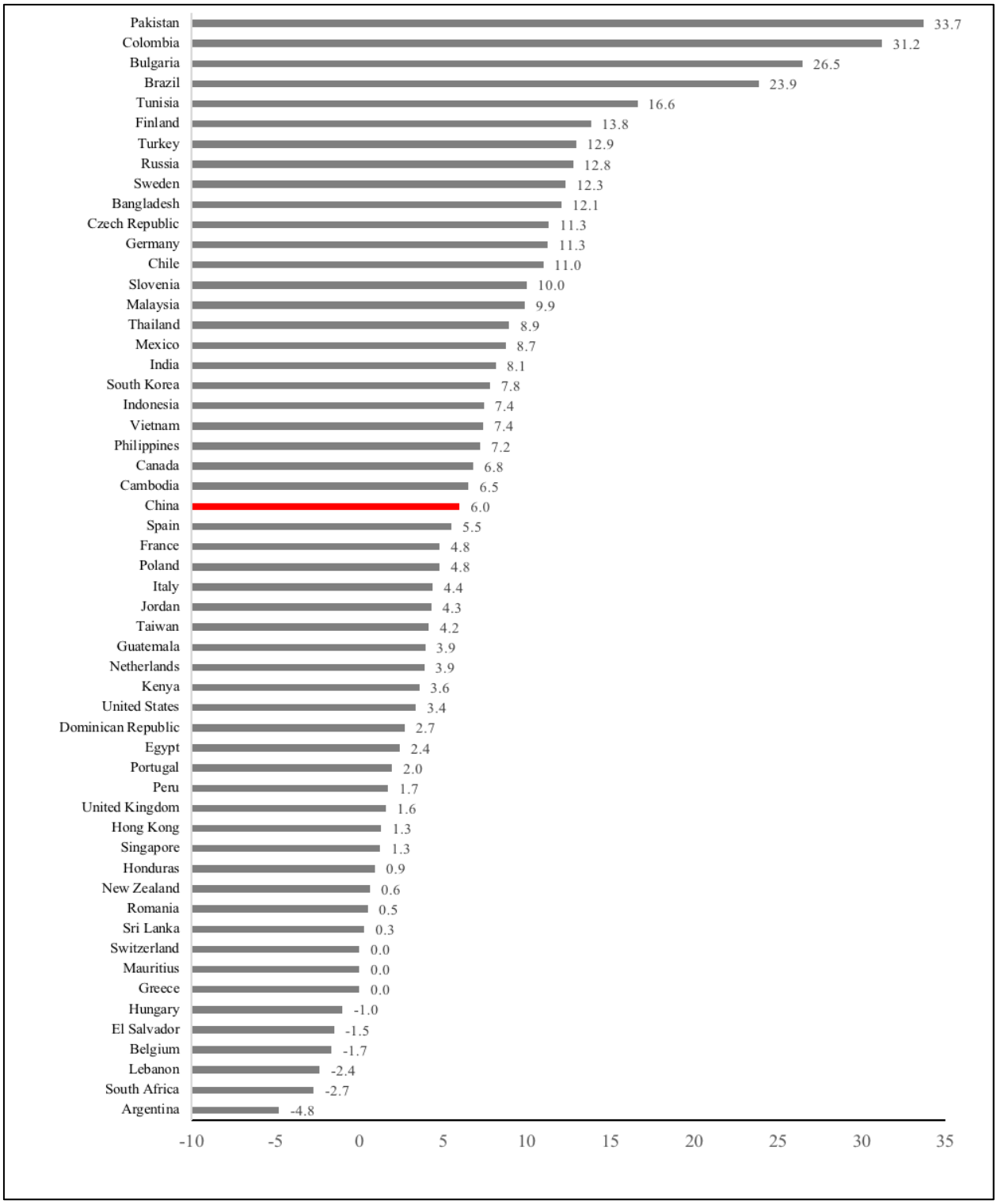


Figure B2. Average Improvement among Suppliers by Country (Descriptive)



Appendix C. Robustness Tests

Assessing the impact of including announcement information

The auditing company that provided our data only began recording announcement information in 2014, midway through our sample period. To explore whether omitting this information biased our results, we estimate our model on the subsample of audits conducted in 2014 and 2015, for which the announcement data was available. To provide a basis for comparison, we re-estimated our primary model during this same period and report the results as Model 1 in Table C1. We then estimated the model including the two dummy variables, *announced (prior audit)* and *announced (focal audit)*, in Model 2 in Table C1.

Overall, these two models yield very similar coefficients, magnitudes, and standard errors. Wald tests comparing our hypothesized coefficients across these models indicated no significant difference between the *certification* coefficients *(prior audit)* (Wald $\chi^2 = 0.23$, $p = 0.63$) or between the *workers' union (prior audit)* coefficients (Wald $\chi^2 = 0.03$, $p = 0.86$). The coefficient magnitude on *piece-rate payment (prior audit)* declined by a slight 2.6% in the model that included announcement status (where 2% is calculated as -2.9 - (-2.8)] / (-2.9)). This was statistically significant (Wald $\chi^2 = 7.29$, $p = 0.01$), suggesting that omitting announcement status in our primary models might cause us to slightly underestimate the deleterious effect of piece-rate payment on improvement in labor practices.

Assessing the impact of including the time gap between audits

Because improvement might depend on the amount of time between the prior and focal audits, which our primary models do not account for, we estimate our models identical to our primary models except we predict *improvement per month*, which ranges from -1.4 to 6.5 and averages 1.5 (S.D. = 2.5). In our sample, the time gap between two audits for a supplier ranges from 2.4 months to 14.5 months with an average of 9 months. The results of these models (see Table C2), which explicitly account for the amount of time between the prior and focal audits, continued to yield statistically significant coefficients of the same sign on most hypothesized effects, except for H3a. One possible explanation is that in

factories with efficiency incentives, the long-term benefits of a certified management system in tempering efficiency demands are more likely to be salient when the time gap between audits is greater.

Assessing the impact of buyer power

Our primary models include buyer-country fixed effects, but it is possible that improvement might differ across particular buyers, which might influence our hypothesized relationships. Specifically, buyers might differ in their potential to exert coercive pressure on suppliers to improve and that this might be correlated with variables in our model in ways that result in biased estimates. We pursued two approaches to assess this. We calculate the total number of supplier factories audited for each buyer as an imperfect proxy for buyer size, with the assumption that larger buyers have more supplier factories audited. (We opted to create a single count rather than an annual count to avoid noise). We include this variable and its square (to provide a more flexible functional form) as a control variable in our models. We alternatively include the log of this variable in our models. All of these specifications yielded results nearly identical to those of our original models, as reported below in Table C3 and C4.

Assessing models that predict labor practice score as opposed to the score difference

We pursued two approaches to assess whether our primary results are robust to two potential issues associated with models that predict difference or change scores. First, all models (including ours) that predict a difference score while controlling for the lagged score assume there is no contemporaneous correlation between the lagged score and the error term (that is, between $y_{i,t-1}$ and $\varepsilon_{i,t}$). As a robustness test, we estimated an alternative set of models that predict $\ln(y_{i,t}/y_{i,t-1})$, which is a different functional form of improvement. This logged ratio is an outlier-robust approximation of a percent change (that is, it is less prone to outliers than $\Delta y_i/y_{i,t-1}$). When we predict this outcome, we still control for the baseline score because suppliers with lower prior scores have more room for improvement—and might face less-expensive improvement opportunities—than suppliers that already had superior labor practices. In this model, we control for $\ln(y_{i,t-1})$ instead of $y_{i,t-1}$, which imposes a different assumption from that of our main model. Whereas our primary model assumes no contemporaneous correlation between the lagged score

($y_{i,t-1}$) and the error term ($\varepsilon_{i,t}$) resulting from predicting Δy_i conditional on $y_{i,t-1}$, this alternative model assumes no contemporaneous correlation between the lagged log score ($\ln(y_{i,t-1})$) and the error term ($\varepsilon_{i,t}$) resulting from predicting $\ln(y_{i,t}/y_{i,t-1})$ conditional on $\ln(y_{i,t-1})$. This alternative specification supports all of our hypotheses, just like our primary approach (reported in Table C5 below).

Second, a separate concern about models like ours that include a current and lagged variable (in our case, both $y_{i,t}$ and $y_{i,t-1}$) might be that the error structure is autocorrelated (that is, $\varepsilon_{i,t}$ might be correlated with $\varepsilon_{i,t-1}$). This is more of a concern for long panels (over 20–30 panels) and is less of a problem for short panels Automatic citation updates are disabled. To see the bibliography, click Refresh in the Zotero tab.. Cameron and Trivedi (2010: 336) also note, "In microeconometrics analysis, panel data have a time-series component. For short panels covering few time periods, there is no need to use HAC estimates." HAC estimation refers to heteroscedasticity- and autocorrelation-consistent estimation. For our dataset, the number of audit sequence is small (maximum audit sequence=6), and the number of factories is large (n>3,000). Thus, we believe this issue is not a severe concern for our data. In addition, to address the autocorrelation concern, researchers report standard errors clustered by firms, which are unbiased (Peterson, 2009). For our circumstance, because factories are nested in countries, we report standard errors clustered by supplier countries. Clustering by the larger group (country) is more conservative than clustering by the smaller group (factory). Standard errors clustered by the larger group will be larger than the standard errors clustered by the smaller group (Cameron and Miller 2011, 2015).

Assessing within-supplier variations

We examine whether our hypothesized relationships manifest *within* suppliers when they decide to change their use of piece rate payment or change their certification or unions status. We created a set of supplier fixed-effects models. These models use *labor practice score* as the dependent variable (instead of change in labor practice scores) and do not control for lagged scores (to avoid dynamic panel concerns that are infeasible to address in our short panel with approaches such as Arellano-Bond estimators that

rely on several-period lags as instruments). This supplier fixed effects model seeks to identify whether labor practice scores are affected by within-supplier *changes* in *piece rate payment*, *workers' union*, or *certification* status. Thus, whereas the sample used in our primary analysis omits establishments that changed in any of these dimensions to avoid potential endogeneity concerns, we expand the sample to estimate the supplier fixed-effects models to include establishments that experienced a change in any of these three dimensions during our sample period. Note that these models do not precisely test our hypotheses and are vulnerable to endogeneity bias associated with suppliers' endogenous decisions to make those changes. We do not report the results table from these analyses to avoid mis-interpretation that these coefficients indicate causal relationships.

This set of supplier fixed-effects models yield findings that are mostly consistent with our general theoretical accounts: *changing* to piece-rate payment is associated with statistically significant declines in labor practice scores, whereas *becoming* certified or unionized are associated with statistically significant increases in *labor practice scores*. These findings, like those from our primary models, are consistent with H1, H2a, and H2b.

We also find being certified to a management system standard attenuates the negative association between piece-rate payment and improvement, but this difference is just outside conventional thresholds for statistical significance. This is inconsistent with H3a. Furthermore, when suppliers change to piece-rate payment, those who do so without also becoming unionized have statistically lower labor practice scores than those that also become unionized, consistent with H3b.We also test the inverse relationship as depicted in H3c and H3d that efficiency structures can temper managerial structures. When suppliers become unionized or certified, those who do so without also changing to piece-rate payment have lower labor practice scores than those that also change to piece-rate payment. So these results are consistent with H3c and H3d.

We also find support for H4a and H4b. When factories become unionized, those who do so without also becoming certified have significantly lower labor practice scores than those that also become certified, consistent with H4a. When factories become certified, those who do so without also becoming

unionized have significantly lower labor practice scores than those that also become unionized, consistent with H4b. These findings are consistent with our arguments that unions and certifications are complementary, rather than substitutive.

In conclusion, this set of supplier fixed-effects models yield results that are largely consistent with our main models, which is remarkable given these models do not precisely test our hypotheses and the coefficients on the hypothesized variables are identified by a completely different set of suppliers (those that change their status regarding piece-rate payment, certifications, and unions). As such, these models increase the external validity of our theory.

Table C1. Regression Results

Dependent variable: *Improvement*	Omits announcement (1)	Includes announcement (2)
Piece-rate payment (prior audit)	-2.832***	-2.906***
	(0.634)	(0.653)
Certification (prior audit)	1.783***	1.765***
	(0.498)	(0.499)
Workers' union (prior audit)	0.046	0.049
	(0.242)	(0.250)
Labor practice score (prior audit)	-0.601***	-0.601***
	(0.017)	(0.017)
Announced (prior audit)		-1.522***
		(0.402)
Announced (focal audit)		-0.608
		(0.841)
Paid by buyer (prior audit)	1.912***	1.567***
	(0.345)	(0.328)
Paid by buyer (focal audit)	-0.959*	-1.052*
	(0.356)	(0.473)
All-female team (prior audit)	-0.313	-0.297
	(0.444)	(0.428)
All-female team (focal audit)	0.001	-0.007
	(0.411)	(0.412)
Mixed-gender team (prior audit)	2.027***	1.932***
	(0.403)	(0.405)
Mixed-gender team (focal audit)	-4.782***	-4.751***
	(0.571)	(0.579)
Audit team average age (prior audit)	-0.113**	-0.109**
	(0.037)	(0.037)
Audit team average age (focal audit)	0.141***	0.141***
	(0.037)	(0.036)
Audit team maximum tenure (prior audit)	0.234**	0.230**
	(0.069)	(0.070)
Audit team maximum tenure (focal audit)	-0.263*	-0.262*
	(0.113)	(0.113)
Supplier's size (prior audit) ^{L}	-0.160	-0.173
	(0.126)	(0.127)
Supplier's age (prior audit) ^{L}	-0.291	-0.295
	(0.224)	(0.221)
Female worker ratio (prior audit)	5.337***	5.334***
	(0.701)	(0.732)
Local worker ratio (prior audit)	-0.787**	-0.818**
	(0.291)	(0.290)
Use subcontractors (prior audit)	-0.653	-0.597
	(0.465)	(0.441)
Observations	2,033	2,033
R-squared	0.4505	0.4513

Note: Ordinary least squares (OLS) regression coefficients with standard errors clustered by supplier country in parentheses. Industry fixed effects, year fixed effects, audit-sequence fixed effects, supplier-country fixed effects, and buyer-country fixed effects are included. Model 1 is estimated on the sample from 2014 to 2015 without the announcement information; Model 2 is estimated on the same sample, but includes the announcement information. *** p<0.001, ** p<0.01, * p<0.05, + p<0.10 (two-tailed tests). ^{L} indicates logged.

Table C2. Regression Results

Dependent variable: *Improvement per month*	(1)	(2)	(3)	(4)
Piece-rate payment (prior audit)	-0.563***	-0.549***	-0.655***	-0.565***
	(0.102)	(0.111)	(0.106)	(0.104)
Certification (prior audit)	0.169***	0.179***	0.166***	0.100+
	(0.040)	(0.041)	(0.040)	(0.052)
Workers' union (prior audit)	0.253***	0.254***	0.219***	0.217***
	(0.037)	(0.038)	(0.044)	(0.045)
Piece-rate payment (prior audit) × Certification (prior audit)		-0.072		
		(0.075)		
Piece-rate payment (prior audit) × Workers' union (prior audit)			0.236**	
			(0.071)	
Certification (prior audit) × Workers' union (prior audit)				0.172*
				(0.069)
Labor practice score (prior audit)	-0.090***	-0.090***	-0.090***	-0.090***
	(0.001)	(0.001)	(0.001)	(0.001)
Paid by buyer (prior audit)	0.107*	0.107*	0.105+	0.108*
	(0.053)	(0.053)	(0.054)	(0.053)
Paid by buyer (focal audit)	0.113	0.114	0.113	0.114
	(0.121)	(0.121)	(0.121)	(0.121)
All-female team (prior audit)	0.016	0.016	0.018	0.014
	(0.024)	(0.024)	(0.024)	(0.024)
All-female team (focal audit)	-0.086	-0.086	-0.085	-0.087
	(0.060)	(0.059)	(0.060)	(0.059)
Mixed-gender team (prior audit)	0.501***	0.500***	0.506***	0.504***
	(0.136)	(0.137)	(0.136)	(0.136)
Mixed-gender team (focal audit)	-0.985***	-0.985***	-0.985***	-0.983***
	(0.150)	(0.150)	(0.149)	(0.150)
Audit team average age (prior audit)	-0.002	-0.002	-0.002	-0.003
	(0.006)	(0.006)	(0.006)	(0.006)
Audit team average age (focal audit)	0.015**	0.015**	0.015**	0.015**
	(0.005)	(0.005)	(0.005)	(0.005)
Audit team maximum tenure (prior audit)	0.059***	0.059***	0.059***	0.059***
	(0.015)	(0.014)	(0.014)	(0.014)
Audit team maximum tenure (focal audit)	-0.048***	-0.048***	-0.048***	-0.048***
	(0.012)	(0.012)	(0.012)	(0.012)
Supplier's size (prior audit) [L]	0.045*	0.045*	0.046*	0.046*
	(0.019)	(0.019)	(0.019)	(0.019)
Supplier's age (prior audit) [L]	-0.035	-0.036	-0.034	-0.035
	(0.026)	(0.026)	(0.026)	(0.026)
Female worker ratio (prior audit)	0.411***	0.409***	0.408***	0.418***
	(0.115)	(0.114)	(0.114)	(0.116)
Local worker ratio (prior audit)	-0.051*	-0.051*	-0.047*	-0.054*
	(0.021)	(0.021)	(0.022)	(0.021)
Use subcontractors (prior audit)	-0.013	-0.013	-0.011	-0.013
	(0.091)	(0.092)	(0.092)	(0.092)
Observations	4,887	4,887	4,887	4,887
R-squared	0.3883	0.3883	0.3884	0.3884

Note: Ordinary least squares (OLS) regression coefficients with standard errors clustered by supplier country in parentheses. Industry fixed effects, year fixed effects, audit-sequence fixed effects, supplier-country fixed effects, and buyer-country fixed effects are included. *** p<0.001, ** p<0.01, * p<0.05, + p<0.10, (two-tailed tests). [L] indicates logged.

Table C3 Regression Results Controlling for Buyer Size

	(1)	(2)	(3)	(4)
Piece-rate payment (prior audit)	-3.600***	-3.634***	-3.804***	-4.186***
	(0.865)	(0.897)	(0.929)	(0.824)
Certification (prior audit)	0.987***	-0.199	0.848***	0.967***
	(0.183)	(0.416)	(0.225)	(0.182)
Workers' union (prior audit)	1.173***	0.552*	1.163***	0.957***
	(0.126)	(0.244)	(0.131)	(0.115)
Piece-rate payment (prior audit) × Certification (prior audit)		2.934**		
		(0.904)		
Piece-rate payment (prior audit) × Workers' union (prior audit)			1.066+	
			(0.609)	
Certification (prior audit) × Workers' union (prior audit)				1.505**
				(0.489)
Labor practice score (prior audit)	-0.600***	-0.601***	-0.601***	-0.601***
	(0.007)	(0.007)	(0.007)	(0.007)
Paid by buyer (prior audit)	0.072	0.084	0.076	0.056
	(0.239)	(0.233)	(0.239)	(0.241)
Paid by buyer (focal audit)	0.025	0.060	0.027	0.022
	(1.041)	(1.042)	(1.044)	(1.043)
All-female team (prior audit)	-0.153	-0.184	-0.158	-0.139
	(0.215)	(0.214)	(0.214)	(0.214)
All-female team (focal audit)	-0.559*	-0.576*	-0.558*	-0.557*
	(0.220)	(0.218)	(0.219)	(0.222)
Mixed-gender team (prior audit)	1.743*	1.792*	1.749*	1.778*
	(0.703)	(0.706)	(0.701)	(0.701)
Mixed-gender team (focal audit)	-4.129***	-4.098***	-4.128***	-4.128***
	(0.737)	(0.725)	(0.734)	(0.732)
Audit team average age (prior audit)	-0.079	-0.084	-0.080	-0.077
	(0.048)	(0.050)	(0.048)	(0.049)
Audit team average age (focal audit)	0.108**	0.107**	0.108**	0.108**
	(0.037)	(0.037)	(0.037)	(0.038)
Audit team maximum tenure (prior audit)	0.309***	0.309***	0.310***	0.306***
	(0.056)	(0.056)	(0.056)	(0.056)
Audit team maximum tenure (focal audit)	-0.300***	-0.303***	-0.299***	-0.301***
	(0.066)	(0.065)	(0.066)	(0.065)
Supplier's size (prior audit) ^{L}	0.243+	0.251+	0.245+	0.247+
	(0.123)	(0.129)	(0.124)	(0.123)
Supplier's age (prior audit) ^{L}	-0.017	-0.010	-0.016	-0.006
	(0.153)	(0.151)	(0.154)	(0.152)
Female worker ratio (prior audit)	4.015***	4.138***	4.041***	3.999***
	(0.377)	(0.383)	(0.373)	(0.373)
Local worker ratio (prior audit)	-0.365***	-0.419***	-0.366***	-0.338***
	(0.098)	(0.101)	(0.099)	(0.097)
Use subcontractors (prior audit)	0.017	0.026	0.009	0.031
	(0.690)	(0.695)	(0.689)	(0.692)
Total number of facilities audited for each buyer	0.007***	0.007***	0.007***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)
Total number of facilities audited for each buyer squared	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	4,887	4,887	4,887	4,887

Note: Ordinary least squares (OLS) regression coefficients with standard errors clustered by supplier country in parentheses. Industry fixed effects, year fixed effects, audit-sequence fixed effects, supplier-country fixed effects, and buyer-country fixed effects are included. *** p<0.001, ** p<0.01, * p<0.05, + p<0.10, (two-tailed tests). ^{L} indicates logged

Table C4 Regression Results Controlling for Buyer Size

	(1)	(2)	(3)	(4)
Piece-rate payment (prior audit)	-3.565***	-3.600***	-3.819***	-4.148***
	(0.845)	(0.879)	(0.904)	(0.821)
Certification (prior audit)	0.998***	-0.218	0.825***	0.979***
	(0.183)	(0.408)	(0.224)	(0.180)
Workers' union (prior audit)	1.212***	0.574*	1.200***	0.997***
	(0.127)	(0.261)	(0.132)	(0.123)
Piece-rate payment (prior audit) × Certification (prior audit)		3.008**		
		(0.938)		
Piece-rate payment (prior audit) × Workers' union (prior audit)			1.326*	
			(0.608)	
Certification (prior audit) × Workers' union (prior audit)				1.498**
				(0.476)
Labor practice score (prior audit)	-0.603***	-0.603***	-0.603***	-0.603***
	(0.006)	(0.006)	(0.007)	(0.006)
Paid by buyer (prior audit)	0.083	0.095	0.087	0.067
	(0.256)	(0.248)	(0.256)	(0.258)
Paid by buyer (focal audit)	0.309	0.339	0.305	0.305
	(0.910)	(0.916)	(0.913)	(0.911)
All-female team (prior audit)	-0.131	-0.164	-0.139	-0.118
	(0.218)	(0.217)	(0.217)	(0.218)
All-female team (focal audit)	-0.574*	-0.591**	-0.572*	-0.571*
	(0.219)	(0.217)	(0.219)	(0.221)
Mixed-gender team (prior audit)	1.677*	1.728*	1.686*	1.712*
	(0.682)	(0.686)	(0.680)	(0.682)
Mixed-gender team (focal audit)	-4.262***	-4.228***	-4.260***	-4.261***
	(0.757)	(0.744)	(0.754)	(0.752)
Audit team average age (prior audit)	-0.075	-0.080	-0.075	-0.073
	(0.049)	(0.051)	(0.049)	(0.050)
Audit team average age (focal audit)	0.112**	0.110**	0.112**	0.112**
	(0.037)	(0.036)	(0.036)	(0.037)
Audit team maximum tenure (prior audit)	0.304***	0.304***	0.306***	0.302***
	(0.055)	(0.055)	(0.055)	(0.055)
Audit team maximum tenure (focal audit)	-0.303***	-0.306***	-0.302***	-0.304***
	(0.067)	(0.066)	(0.067)	(0.066)
Supplier's size (prior audit) ^{L}	0.286*	0.294*	0.288*	0.290*
	(0.133)	(0.139)	(0.133)	(0.133)
Supplier's age (prior audit) ^{L}	-0.003	0.004	-0.002	0.008
	(0.152)	(0.150)	(0.153)	(0.151)
Female worker ratio (prior audit)	3.795***	3.925***	3.829***	3.778***
	(0.385)	(0.392)	(0.382)	(0.381)
Local worker ratio (prior audit)	-0.320**	-0.375***	-0.321**	-0.292**
	(0.096)	(0.100)	(0.097)	(0.095)
Use subcontractors (prior audit)	0.051	0.060	0.041	0.066
	(0.684)	(0.690)	(0.682)	(0.686)
Total number of facilities audited for each buyer ^{L}	0.496	0.480	0.496	0.497
	(0.322)	(0.330)	(0.323)	(0.321)
Observations	4,887	4,887	4,887	4,887

Note: Ordinary least squares (OLS) regression coefficients with standard errors clustered by supplier country in parentheses. Industry fixed effects, year fixed effects, audit-sequence fixed effects, supplier-country fixed effects, and buyer fixed effects are included. *** p<0.001, ** p<0.01, * p<0.05, + p<0.10, ^{L} indicates logged.

Table C5. Regression Results Predicting Improvement ($\ln(y_{i,t}/y_{i,t-1})$)

DV= $\ln(y_{i,t}/y_{i,t-1})$.	(1)	(2)	(3)	(4)
Piece-rate payment (prior audit)	-0.057***	-0.058***	-0.063***	-0.069***
	(0.013)	(0.014)	(0.014)	(0.013)
Certification (prior audit)	0.014***	-0.004	0.010**	0.014***
	(0.003)	(0.005)	(0.003)	(0.003)
Workers' union (prior audit)	0.018***	0.008*	0.018***	0.014***
	(0.001)	(0.003)	(0.002)	(0.001)
Piece-rate payment (prior audit) × Certification (prior audit)		0.045**		
		(0.013)		
Piece-rate payment (prior audit) × Workers' union (prior audit)			0.030**	
			(0.009)	
Certification (prior audit) × Workers' union (prior audit)				0.030***
				(0.007)
Labor practice score (prior audit) ($\ln(y_{i,t-1})$)	-0.607***	-0.607***	-0.607***	-0.607***
	(0.006)	(0.006)	(0.006)	(0.006)
Paid by buyer (prior audit)	0.001	0.001	0.001	0.001
	(0.004)	(0.004)	(0.004)	(0.004)
Paid by buyer (focal audit)	0.014*	0.014*	0.014*	0.014*
	(0.006)	(0.006)	(0.006)	(0.006)
All-female team (prior audit)	-0.002	-0.002	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)
All-female team (focal audit)	-0.010***	-0.010***	-0.010***	-0.010***
	(0.002)	(0.002)	(0.002)	(0.003)
Mixed-gender team (prior audit)	0.023*	0.023*	0.023*	0.023*
	(0.011)	(0.011)	(0.011)	(0.011)
Mixed-gender team (focal audit)	-0.061***	-0.060***	-0.061***	-0.061***
	(0.011)	(0.010)	(0.011)	(0.011)
Audit team average age (prior audit)	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Audit team average age (focal audit)	0.002***	0.002***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Audit team maximum tenure (prior audit)	0.005***	0.005***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
Audit team maximum tenure (focal audit)	-0.005***	-0.005***	-0.005***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
Supplier's size (prior audit) [L]	0.004	0.004	0.004	0.004
	(0.003)	(0.003)	(0.003)	(0.003)
Supplier's age (prior audit) [L]	0.000	0.000	0.000	0.000
	(0.002)	(0.002)	(0.002)	(0.002)
Female worker ratio (prior audit)	0.057***	0.059***	0.058***	0.057***
	(0.006)	(0.006)	(0.006)	(0.006)
Local worker ratio (prior audit)	-0.006***	-0.007***	-0.006***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
Use subcontractors (prior audit)	0.001	0.001	0.001	0.001
	(0.008)	(0.008)	(0.008)	(0.008)
Observations	4,887	4,887	4,887	4,887

Note: Ordinary least squares (OLS) regression coefficients with standard errors clustered by supplier country. Industry fixed effects, year fixed effects, audit-sequence fixed effects, supplier-country fixed effects, and buyer-country fixed effects are included. *** p<0.001, ** p<0.01, * p<0.05, + p<0.10 (two-tailed tests).

Appendix D. Supplementary Analysis

Table D1. Certification Frequency

Panel A

		Generative certifications				Total	
		No		Yes			
		Audits	Suppliers	Audits	Suppliers	Audits	Suppliers
Prescriptive certifications	No	4,140	2,736	547	387	4,687	3,123
	Yes	176	132	24	21	200	153
Total		4,316	2,868	571	408	4,887	3,276

Panel B

Prescriptive certifications			Generative certifications		
	Audits	Suppliers		Audits	Suppliers
ICTI	100	74	ISO 9001	421	306
SA8000	48	33	ISO 14001	283	202
WRAP	44	33	ISO Others	49	37
BSCI	8	8	OHSAS 18001	67	58
TLS	3	2	BRC	40	29
			HACCP	28	18
			GB	29	20
			IFS	17	13
			FSSC	2	1

Note: These tables report the number of audits and suppliers in our sample that have prescriptive and generative certifications. ICTI refers to International Council of Toy Industries. SA8000 refers to Social Accountability 8000. WRAP refers to Worldwide Responsible Accredited Production. BSCI refers to the Business Social Compliance Initiative. TLS refers to Thai Labor Standards. ISO 9001 is a Quality Management System Standard. ISO 14001 is an Environmental Management System Standard. Other ISO certifications include ISO TS 16949 (an application of the ISO 9001 Quality Management System Standard to the automotive industry), ISO 22000 (Food Safety Management System), ISO 27000 (Information Security Management System), and ISO 13485 (Quality Management System for Manufacturing Medical Device). OHSAS 18001 refers to US Occupational Health and Safety Assessment Series 18001. BRC refers to British Retail Consortium. HACCP refers to Hazard Analysis and Critical Control Points. GB includes GB/T 28000 (the Chinese equivalent of OHSAS 18001), GB/T 24000 (the Chinese equivalent of ISO 14000), and GT/T 19000 (the Chinese equivalent of ISO 9000). IFS refers to International Featured Standards. FSSC refers to Food Safety System Certification.

Table D2. Regression Results of Models Distinguishing Prescriptive and Generative Certification

	(1)	(2)
Dependent variable:	*Labor practice improvement*	*Labor practice level*
Prescriptive certification (prior audit)	0.453	
	(0.353)	
Prescriptive certification (focal audit)		1.657***
		(0.368)
Generative certification (prior audit)	1.059***	
	(0.273)	
Generative certification (focal audit)		1.828***
		(0.384)
Workers' union (prior audit)	1.165***	
	(0.126)	
Workers' union (focal audit)		1.107***
		(0.234)
Piece-rate payment (prior audit)	-3.594***	
	(0.838)	
Piece-rate payment (focal audit)		-6.382***
		(1.249)
Labor practice score (prior audit)	-0.603***	
	(0.006)	
Paid by buyer (prior audit)	0.171	
	(0.301)	
Paid by buyer (focal audit)	0.979*	2.149***
	(0.449)	(0.252)
All-female team (prior audit)	-0.141	
	(0.220)	
All-female team (focal audit)	-0.576*	-0.883***
	(0.217)	(0.213)
Mixed-gender team (prior audit)	1.668*	
	(0.706)	
Mixed-gender team (focal audit)	-4.290***	-3.385***
	(0.743)	(0.758)
Audit team average age (prior audit)	-0.074	
	(0.050)	
Audit team average age (focal audit)	0.115**	0.096*
	(0.038)	(0.041)
Audit team maximum tenure (prior audit)	0.307***	
	(0.056)	
Audit team maximum tenure (focal audit)	-0.307***	-0.272**
	(0.066)	(0.090)
Supplier's size (prior audit) [L]	0.286*	
	(0.133)	
Supplier's size (focal audit) [L]		1.013***
		(0.083)
Supplier's age (prior audit) [L]	-0.013	
	(0.153)	
Supplier's age (focal audit) [L]		0.248
		(0.253)
Female worker ratio (prior audit)	3.876***	
	(0.382)	
Female worker ratio (focal audit)		3.460***
		(0.829)
Local worker ratio (prior audit)	-0.384***	
	(0.096)	
Local worker ratio (focal audit)		-0.688***
		(0.182)
Use subcontractors (prior audit)	0.011	
	(0.670)	
Use subcontractors (focal audit)		-1.081
		(0.664)

Note: OLS regression coefficients with standard errors clustered by supplier country in parentheses.
*** p<0.001, ** p<0.01, * p<0.05, + p<0.10 (two-tailed tests). All models also include fixed effects for industry, year, audit sequence, supplier country, and buyer country. For all models, N=4,887. L indicates logged.