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Sustainability Standards: Interactions Between Private Actors, Civil Society, and Governments

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Abstract

New partnerships between governments, private companies, and nongovernmental organizations (NGOs) are reshaping global environmental governance. In particular, there has been a rise of voluntary sustainability standards in an attempt to manage social and environmental impacts of global supply chains. We analyze the large spectrum of interactions between private, public, and civil society actors around voluntary sustainability standards, primarily for tropical agriculture and forestry. This review uncovers a policy ecosystem dominated by a proliferation of standards that complement, substitute, or compete against each other, with coordination mechanisms beginning to arise. Contrary to widely held views, interactions between governments, NGOs, and private companies surrounding the adoption of sustainable practices are not generally antagonistic, and public and private environmental governance regimes rarely operate independently. The influence of these interactions on the effectiveness of sustainability standards needs more attention. Better understanding how private regulations interact with the policy ecosystem will help design more effective interventions.

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1. INTRODUCTION

Over the past two decades, companies have increasingly adopted sustainability standards as instruments to improve social and environmental practices in their supply chains and to communicate these sustainable sourcing practices to their customers. In this context, voluntary sustainability standards (VSS) specify "requirements that producers, traders, manufacturers, retailers or service providers may be asked to meet, relating to a wide range of sustainability metrics, including respect for basic human rights, worker health and safety, the environmental impacts of production, community relations, land use planning and others" (1, p. 4). These standards can be set by NGOs, governments, and companies or through multistakeholder initiatives (MSIs). Tayleur et al. (2) found records of cropland under certification schemes that promote sustainability in 133 countries. Cropland under some form of sustainability certification covered 1.1% of global cropland, increasing at an annual rate of 11% from 2000 to 2012. Heavily traded commodities such as coffee, cocoa, tea, and palm oil have at least 10% of their production area globally under certification (2).

The rise of VSS is associated with the growing complexity and impact of global supply chains. The production of agricultural commodities may be tied to substantial social and environmental harm. For example, the production of beef, palm oil, soy, and wood in just seven tropical countries was responsible for 40% of global tropical deforestation from 2000 to 2011 (3). At the same time, commercial agricultural expansion often further marginalizes poor rural communities (4).

With economic globalization, the risk of displacing economic activity to so-called pollution havens and the resulting leakage of environmental impacts in response to stringent national policies have increased (5). Traditional forms of state-centric environmental governance that are implemented at a national scale by public authorities have therefore lost some of their ability to promote sustainability at a global scale. Multilateral environmental agreements are failing to replace national-scale environmental governance as they suffer from multiyear negotiation processes that often lead to weak regulations, the possibility for a country to opt out after signature, and weak or absent sanctions in case of noncompliance by participating countries (6–8). Private (i.e., nonstate) environmental governance attempts to fill the gaps in national and multilateral public policies on the environment.

Although the design of VSS often involves NGOs, private companies are central to their adoption and implementation. More than half of a random sample of 449 companies listed on the

Table 1 Definition of types of voluntary sustainability standards reviewed

Lead stakeholder	Standard	Who sets	Who monitors	Example
Government	Voluntary government-led certification	Government, often with input from NGOs, companies, and producers	Third party	USDA Organic
NGO	NGO certification	NGO	Third party	Fair Trade, Rainforest Alliance
	Multistakeholder certification	NGOs, companies, producers	Second or third party	FSC, RSPO
Company	Industry standards	Group of companies	First, second, or third party	GlobalGAP, Responsible Care®
	Company-led standards	Company	First, second, or third party	Unilever Sustainable Agriculture Code

Abbreviations: FSC, Forest Stewardship Council; NGO, nongovernmental organization; RSPO, Roundtable on Sustainable Palm Oil; USDA, United States Department of Agriculture.

largest Organization for Economic Cooperation and Development (OECD) stock exchanges in the food, wood products, and textile sectors had adopted sustainable sourcing practices (9). The adoption of private sustainability standards has been described as a form of governance without government (10). A more nuanced examination shows that private governance does not stand alone; instead, it interacts with existing public governance systems (11). For example, implementation of VSS often requires clear property rights and publicly available information systems on land ownership and land use to ensure traceability along supply chains (12).

Private, public, and civil society actors who are engaged in sustainability standards interact in many ways, giving rise to multiple forms of hybrid governance of sustainability (13). Following the increase in the number of schemes applying nonstate authority to control social and environmental impacts of global supply chains, the number of interactions between such schemes and with public policies has greatly increased as well. These interactions include, as Eberlein et al. (14, p. 2) contend, "the myriad ways in which governance actors and institutions engage with and react to one another." They argue that understanding how private governance systems interact with one another and with state regulations is necessary to grasp the performance of individual private governance approaches and actors' capacity to design effective interventions.

The objective of this review is to understand the full range of interactions between private, public, and civil society actors leading to the design, adoption, and implementation of VSS. We focus on environmental and social standards, mainly in tropical agriculture and forestry. Where evidence from these sectors is lacking, we refer to studies from other sectors. We begin by defining sustainability standards and the interactions between actors involved in their implementation. In Section 3, we review studies that document interactions between these actors.

2. DEFINING VOLUNTARY SUSTAINABILITY STANDARDS

VSS are a form of entrepreneurial authority, whereby a private actor must persuade other (private and public) actors to recognize its authority to develop its own rules, standards, or practices, and therefore the legitimacy of these rules (15). These standards include a broad and diverse portfolio of instruments (**Table 1**), ranging from NGO-led certification to company codes of conduct and geographic indications that identify products originating in a certain region (16, 17).

2.1. Types of Voluntary Sustainability Standards

Nonstate market-driven governance regimes include individual firm initiatives, certifications, public/private partnerships, management systems, and industry associations (18). Different types of actors—i.e., private, public, civil society—are involved in the design and implementation of standards (19). Actors who define and control standards may be outside or inside the supply chain being regulated (20).

Voluntary standards differ along three dimensions (21): (*a*) the governance arrangements, including the actors involved, the regulatory mechanisms, and the strategies pursued; (*b*) the specific social and ecological content of the standards; and (*c*) the market coverage and growth potential of the initiative. A key characteristic of instruments is their stringency, which depends on whether (*a*) suppliers are required to conform to a standard or just show improvement in practices toward a goal; (*b*) specific practices are identified and enforced by the instrument; and (*c*) the verification of compliance is the responsibility of an independent group (third party), of a party associated with the firm (second party), or of the firm itself (first party) (17).

Sustainability commitments by private sector actors may either be aspirational, with broad objectives shared by multiple stakeholders and that do not specify implementation measures, or they may identify actionable changes by prescribing specific production or sourcing practices (12). Companies often use VSS as a way to implement their sustainability commitments.

2.2. Types of Interactions Between Multiple Actors

Eberlein et al. (14) propose an analytical framework to study interactions in transnational business governance. Interactions can be analyzed at the level of individuals and organizations, governance schemes, and regulatory complexes (e.g., how labor rights intersect with international trade regulations) (14). Horizontal analyses focus on interactions occurring between actors at the same level, whereas vertical analyses focus on interactions between actors across levels. Interactions are intentional when they are managed and designed to increase impact. They may also be unintentional when standards are designed or implemented independently for a same commodity or region, or in cases of institutional isomorphism (14).

Three types of interactions between governance systems have been identified, which have been variously labeled as (*a*) complementarity, collaboration, coordination, synergism, or symbiosis; (*b*) substitution, superseding, or cooptation; and (*c*) competition, antagonism, or chaos (14, 16, 18, 22). Interactions are also dynamic: They may change form through the stages of regulatory governance and over time and place within a specific private governance arrangement (23).

3. MULTIPLE INTERACTIONS

We now review studies that have documented various interactions between actors that influence the effectiveness of private governance instruments. This section is organized around the so-called governance triangle that includes the state, companies, and nongovernmental organizations (19). We first review interscheme—or horizontal—interactions between schemes developed by different NGOs and/or MSIs (referred to below as NGO-led certifications for simplicity) and then between private sector initiatives. We then review two-way interactions between NGOs, private sector actors, and governments in producing and consuming countries (**Figure 1**).

3.1. Interactions Between Nongovernmental Organization–Led Schemes

Certification schemes are constantly subjected to the two countervailing mechanisms of differentiation and convergence, giving rise to markets of standards (24). Below, we review evidence for

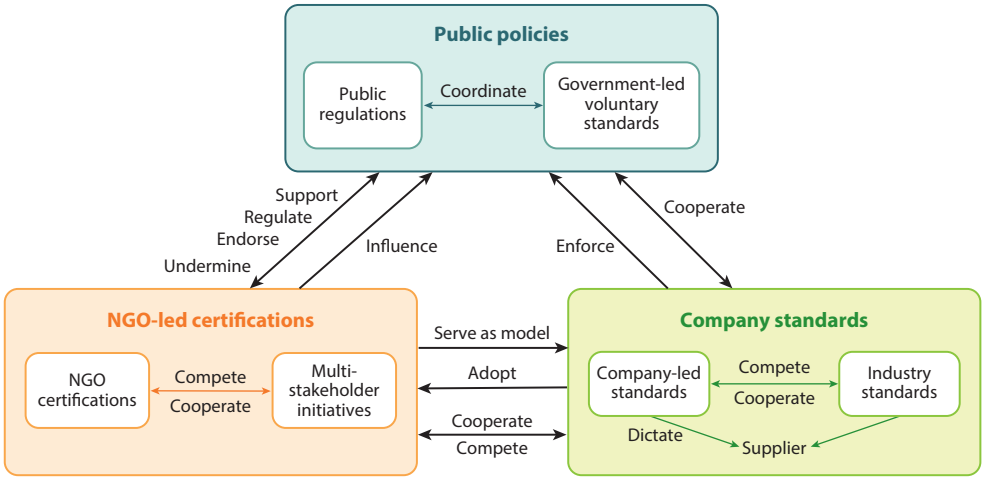

Figure 1

Main interactions between public policies, NGO-led certification, and company standards.

both differentiation and complementarities between NGO-led certification schemes as well as the recent rise in meta-governance of standards.

3.1.1. Differentiation and duplication. For many agricultural and forestry commodities whose production systems have been identified as being environmentally or socially sensitive, multiple, uncoordinated certification schemes coexist, each attempting to gain market shares (21, 25). Certification schemes compete for adoption by producers, for recognition by buyers, for price premiums, and for legitimacy (26). This reflects the coexistence of various stakeholder groups, each with their own vision of sustainability challenges, solutions, and trade-offs (27). When one stakeholder group (e.g., producers or civil society advocates of a particular cause) feels excluded from an existing private sustainability initiative or affected in its ability to compete, it is likely to create its own certification (27). This proliferation of sustainability certifications is also explained by differences in national institutional and economic factors in producing and consuming countries that contribute to standards transmission and selection—i.e., buyer preferences for particular certifications, the role of producer associations and traders, and farm sizes and organizations (28).

Duplicative certification schemes also occur as individual schemes expand their scope to cover more and more issue areas (29). According to Auld (29), problem interactive effects arise when two sustainability challenges—e.g., agriculture production and deforestation—are inter-related, making it difficult to disentangle the processes at play. Policy interactive effects occur when "a policy response to a problem affects the policy response to other problems" (29, p. 130). These interactive effects force private governance initiatives to design certification schemes comprehensively, by broadly addressing both social and environmental issues. This increases the risk of overlap and competition between certification schemes. For example, originally Fair Trade was focused on social issues and Rainforest Alliance on environmental issues. Currently, they each focus on both issues, with significant topic overlap (24).

The emergence of rival sustainability initiatives leads to a fragmentation and sometimes duplication of efforts. Rival certification schemes being implemented in the same marketplace give rise to horizontal—or interscheme—interactions. This can sometimes be viewed as a healthy source of competition, leading to a race to the top and improvements in standards. In the forest sector, for

example, competitive benchmarking is associated with a strengthening of standards of programs certifying sustainable production (30). The proliferation of certification schemes may also waste financial resources and cause a race to the bottom of standard stringency. In the coffee sector, competition between certification schemes leads to the emergence of weak standards that capture market shares (26). Similarly, the biofuels sector has 17 different voluntary certification schemes recognized by the European Commission to comply with its Renewables Directive. Many of these tend to meet only the minimum requirements to access renewable energy markets, leading to standards weak on land use competition, food security, and rights-related issues (31). Moreover, producers often have to bear additive auditing costs as they generally simultaneously adopt multiple certifications and sell their production under the certification that offers the largest price premium on a given day (14, 32). Multiple certifications also generate confusion as consumers and producers alike may be unable to understand the differences between certifications that address similar issues. A chaotic proliferation of certification schemes may undermine the credibility and legitimacy of the VSS system as a whole (33).

Forest Stewardship Council (FSC): global nonprofit organization that sets standards dictating what is a responsibly managed forest, both environmentally and socially

Sustainable Forestry Initiative (SFI): North American forest certification standard

Program for the Endorsement of Forest Certification (PEFC): international nonprofit organization that promotes sustainable forest management

3.1.2. Complementarities. Certification schemes do not always compete but may also reinforce each other, within or across sectors. For example, the uptake of agricultural or forestry certifications is influenced by certifications in downstream sectors. As an illustration, the Forest Stewardship Council (FSC), a multistakeholder roundtable that developed a standard for sustainable forest production, is the only certification that gets credit in the Leadership in Energy and Environmental Design (LEED) building certification, allowing it to outcompete other, more industry-friendly forestry certifications such as the American Sustainable Forestry Initiative (SFI) (27). Similarly, the Bird Friendly coffee certification requires Organic certification as a baseline, creating some convergence of standards within the coffee sector (21).

Parallel and competing certification schemes may also cooperate, formally or informally. A pioneer standard can serve as a benchmark for inspiring newer standards and can define the meaning of sustainability in that particular sector. FSC has arguably played this role in forestry (34). NGO-led certifications are also often connected through institutional linkages and overlapping memberships of organizations, as shown for the cocoa sector (35). Certification programs may also engage in bilateral or multilateral coordination to address interactive effects, by establishing joint decision-making and operational procedures (29). The creation of joint certification platforms reduces auditing costs for producers who adopt multiple certifications (24).

3.1.3. Empirical evidence. Scholars have analyzed the dynamics between certification schemes, in particular for timber and coffee. Few studies have compared the effectiveness of competing certifications using rigorous study designs that correct for selection bias and consider a counterfactual of noncertified producers. In the timber sector, the main competing certification to FSC, the Program for the Endorsement of Forest Certification (PEFC), is a more industry-friendly process with more flexible and discretionary standards, at least initially (36, 37). Intercomparisons between the two forest certification systems have found mixed evidence that FSC has been more effective in improving environmental outcomes than PEFC (38, 39). On the basis of forest inventory data in Sweden, Nordén et al. (39) found no difference between the two certification schemes. None of them led to improvement in forests set aside for conservation, preservation of environmentally important areas, or number of trees and high stumps left after felling.

In contrast, Heilmayr & Lambin (38) compared collaborative and confrontational strategies between environmental and industry stakeholders aimed at ending the conversion of natural forests to industrial pine and eucalyptus plantations in Chile. The more collaborative multistakeholder certification (FSC) achieved better environmental performance than a more confrontational approach,

based on naming-and-shaming campaigns, and a more industry-friendly standard (endorsed by PEFC). This supports the argument for collaborative approaches to environmental governance (40). Participation in multiple governance regimes did not improve environmental performance, likely due to interferences across regimes (38).

Utz: program and label for the certification of coffee, cocoa, tea, and hazelnuts

Other rigorous comparisons have focused on the difference between more economic or environmentally focused certification schemes such as Utz and Rainforest Alliance that aim at improving production practices, and Fair Trade schemes that focus on cooperative organization and guarantee a minimum price for producers. A study of different types of certified coffee producers in Nicaragua showed that Fair Trade was associated with higher prices, thus supporting market participation. However, farms certified under Rainforest Alliance had higher yields and quality upgrading (41). A study of coffee producers in Kenya confirmed that different certification initiatives may play complementary roles: Fair Trade increased coffee returns by creating more engagement by farmers in dry coffee processing, whereas Utz increased returns by improving coffee productivity (42). In Uganda, Fair Trade certification was associated with significant gains in living standard of coffee producers, potentially because of greater quality of beans related to improved processing methods. Livelihood improvements were not seen for Utz and Organic certifications (43). In coffee, multiple certifications seem to be associated with a greater farm specialization in that crop and a positive price effect, thanks to a diversification of sales outlets (41, 42). However, this farm specialization may also take away from other income-generating activities when farmers have to give up other farm or nonfarm activities to free labor to meet multiple certification standards. This may negatively affect total household income, as shown in southwest Colombia (44).

3.1.4. Meta-governance of standards. Systems for a meta-governance of sustainability standards have arisen, with the aim of creating more coherence across certification schemes (25, 45). The meta-governance of private standards has generally been led by private entities rather than by government authorities, except for the standards on organic agriculture (see Section 3.3.2) (46). Private meta-governance projects have tended to follow two pathways (25). In the first pathway, common goals and priorities are imposed on existing standard initiatives to improve coherence among standards with respect to their content, as is the case of organic agriculture. This leads to a common standard that is progressively adopted by competing organizations. In the second pathway, harmonization efforts focus on the procedures for standards setting and certification, to increase the capacity of individual standards initiatives to implement certification programs, as attempted with sustainable tourism (25).

Multiple rival meta-governance initiatives of standards have emerged over the past decade, therefore creating a risk of reproducing the coordination problem they are trying to respond to (45). The International Organization for Standardization (ISO) has developed a family of standards for environmental management (ISO 14000). The main meta-governance organization of agricultural sustainability standards is the International Social and Environmental Accreditation and Labeling (ISEAL) Alliance. ISEAL was established in 2002 to strengthen credible sustainability standards by improving the impact, credibility, uptake, and effectiveness of standards. Fransen (45) discusses interactions between ISEAL and four other meta-governance initiatives that have developed with a focus on similar issue areas and sectors. These meta-governance initiatives have been developed by stakeholder groups that occupy different positions in commodity value chains—i.e., retailers, branded firms, private standards organizations—to pursue different objectives and have divergent priorities on how to make production more sustainable.

3.1.5. Future research. A recent consolidation among certification initiatives took place with the 2017 announcement of a merger of two of the largest sustainability certification schemes, Utz

and Rainforest Alliance. No research so far has attempted to evaluate the relative effectiveness of VSS in sectors characterized by different portfolios of rival private initiatives and different levels of competition and cooperation between initiatives. A theoretical model of such competition between NGOs in the provision of eco-certification suggests limited competition between NGOs may be optimal to ensure that the stringency of standards is neither too high nor too low (47).

Coffee and Farmer Equity (C.A.F.E.): standard and practices used by Starbucks to ensure that it sources sustainably grown and processed coffee

GlobalGAP: worldwide standard for good agricultural practices

3.2. Interactions Between Private Sector Actors

Two primary types of interactions emerge among private sector actors. First, there are vertical or interfirm interactions within the supply chain that influence how sustainability standards are developed and implemented. Second, there are horizontal or interscheme interactions between individual company- and industry-led standards.

3.2.1. Vertical interactions. A company's position within their supply chain significantly influences their adoption of sustainability standards, with consumer-facing retailers and manufacturers being most likely to adopt such standards (9, 48). Traders can also play an important role in integrating sustainability standards across the supply chain, but few studies have examined the influence of these middlemen (28).

The ability of retailers and manufacturers to dictate sustainability standards to their suppliers is in part due to the significant consolidation among a small group of downstream firms (49–51). However, dictating sustainability standards to suppliers may lead to factories and farms simply avoiding detection through paying off auditors or hiding violations during the audit process (52, 53). Sustainability standards also have the potential to squeeze out the most marginalized farmers when resources are not available to support smallholders in the adoption of new requirements (54).

Increasingly, downstream actors are taking a more collaborative approach to sustainability topics with their suppliers. For example, the major apparel retailer Nike provides substantial capacity building, which helps suppliers address labor challenges (55, pp. 78–125; 56). When buyers support producer groups through knowledge sharing and long-term relationships, farms are more likely to implement good labor practices (57). Similarly, Thorlakson et al. (58) show that when producers feel a sense of partnership with food retailers they are more likely to make substantial improvements in the environmental management of their farms. How supply chain actors interact on sustainability topics appears to substantially influence the ultimate effectiveness of sustainability standards.

3.2.2. Horizontal interactions. Similar to NGO interactions, private actors also interact when competing company- and industry-developed standards overlap in the marketplace. Individual companies often set their own sustainability requirements for their supply chain (9). These independent standards can impose multiple overlapping social and environmental requirements on suppliers. For example, coffee farmers may be subject to both Starbucks' C.A.F.E. program and Nespresso's AAA standard (59). We lack empirical studies examining how multiple company-led programs interact, likely due to the proprietary nature of such initiatives.

The proliferation of company-led initiatives often leads to the convergence of company programs to a single industry-led standard. GlobalGAP (formerly EurepGAP) exemplifies this convergence in the food sector, where food retailers developed a food safety and environmental standard for suppliers that is now used by more than 110,000 producers worldwide (60). Food retailers later came together to develop the Global Social Compliance Program in response to the growing number of individual company worker welfare standards (61). The fruit and wine industry in South Africa created similar industry-wide standards in response to the proliferation

of food retailers' labor standards (61, 62). The consolidation of company-led programs to shared industry requirements in the food sector has mirrored a similar coordination in the textile industry around factory labor audits (63).

Despite some convergence, many companies continue to use their own standards, often to differentiate their brand from competitors (64). One study showed that South African produce farmers were subject to up to six different environmental farm audits in a given year, despite being certified with the industry standard, GlobalGAP (58). On the basis of a comparison between GlobalGAP and a company-led program in the fresh produce sector, Thorlakson et al. (58) found the industry-led program most effective at encouraging the uptake of legal requirements, whereas the company-led standard was better at driving more conservation-oriented management practices among farmers.

Consumer Goods Forum (CGF): industry organization that brings consumer goods manufacturers and retailers together globally

Private actors also interact through their joint commitments as part of industry organizations. Industry groups such as the Consumer Goods Forum (CGF) have committed to zero net deforestation by 2020. Little is known so far about how industry organization commitments influence the member companies' adoption of sustainability practices (12). NGOs have examined whether deforestation commitments by individual CGF companies follow the CGF net deforestation commitment and found that, as of 2016, the majority of CGF member companies had not yet made any specific deforestation commitment, despite the CGF's bold commitment (65, 66). Further research is needed to explore how corporate commitments through industry bodies translate into actual adoption of practices on the ground.

3.3. Interactions Between Nongovernmental Organizations and Public Sector Actors

The key characteristic of private regulatory initiatives is that rule-making authority is not derived from governments (36, 67, 68). However, the rise of the private governance of sustainability and the authority gained by nonstate actors does not imply that states do not contribute to the governance processes. Although private governance arose because of a perceived failure of public governance (69), the threat of increased governmental regulation in the absence of effective private regulation is also a factor in the acceptance of VSS. Certification also mandates compliance with state laws, allowing them to claim that they support public policies (70).

An analysis of interactions between public policies and NGO-led certification schemes must distinguish between governments in countries who are mainly producers of certified commodities and those that are mainly consumers (26). Consuming-country governments tend to be more supportive of sustainability standards than producing-country governments, who are more likely to perceive them as a rival governance system controlled by actors external to the country (71). However, although consuming-country governments often stimulate the demand for commodities that meet sustainability standards, producing-country governments create the conditions for standards to be widely adopted and effective.

Initially, interactions between government and NGO-led sustainability standards have been studied mostly in one direction: how government policies support, regulate, endorse, or undermine certification schemes that originate from NGOs. More recent studies have also examined how government policies are influenced by NGO-led certification.

3.3.1. Governments supporting nongovernmental organization–led certification. Public regulations and private regulatory initiatives work best in tandem. With the rise of private standards, public governments are not expected to abdicate responsibility for social and environmental regulation, but rather to defend existing state regulations and support private actors to jointly

contribute to a wider adoption of more sustainable practices (21). In most cases, the state does not contribute to VSS rule setting—with a few exceptions such as the roundtable for biofuels and organic labels (72). However, behind the success of a certification system in a given place, one often detects the shadow of the state. A meta-synthesis of case studies on FSC and Marine Stewardship Council (MSC) certification in developing countries found that 70% of certified producers benefited from some sort of government support (73). As described below, governments can support NGO-led certification through creating enabling environments, supporting producers marginalized by private governance schemes, and contributing to so-called carrot-and-stick approaches.

Marine Stewardship Council (MSC): independent nonprofit organization that sets standards for sustainable fishing

Producing-country governments create enabling conditions for private instruments to be effective and widely adopted (16). An effective implementation of VSS, whether led by NGOs or private companies, depends on key functions that are provided by public governments. Key roles of producing-country governments are to establish the rule of law, a legal system that sanctions cheaters, well-established contract and property law (including clear land rights), functioning markets that create a level playing field for private companies, physical infrastructure to facilitate trade, a minimum level of land use planning, collection of information on economic activities and their social and environmental impacts, and redistribution policies to alleviate the marginalization of weak actors (12). Producing-country governments may also develop principles grounded in public law to establish transparency and accountability procedures and information disclosure that increase the credibility of private governance initiatives (46). Enabling conditions ensured by the state can also entail information dissemination, supporting extension services to help farmers meet certification standards, offering training on the benefits of certification, paying for audit fees (74), providing tax benefits for actors who adopt sustainable practices, facilitating resource access rights, and avoiding regulatory burden (73).

Some producing-country governments have also developed social programs to compensate for costs borne by farmers and rural communities that are negatively affected by private regulations, such as prohibitions of environmentally unsustainable practices. For example, Brazil designed a program of payments for environmental services to compensate farmers who adopted land use practices that contributed to forest conservation (75). Government and NGO-led programs may also mitigate the marginalization of smallholders, by offering better access to technologies, information, and financial resources (12).

Public and NGO-led policy instruments in producing countries may also reinforce each other in carrot-and-stick approaches. NGO-led certification provides incentives for producers who are already integrated in the market and are among the pioneers in the adoption of sustainable practices. By contrast, public governments focus on command-and-control policies with a threat of sanctions for laggards, and they support weak actors who do not have access to the capital, training, and technology to meet sustainability criteria (12).

More generally, the regulatory context of a country influences the success of voluntary standards. In consuming countries, a legal system and sociocultural tradition emphasizing transparency, consumer rights to be informed, and consumers' responsibility to make decisions based on available information create a favorable context for voluntary standards to thrive (76). Government support for private governance does not necessarily have to be coordinated ex ante to be effective. A study on cattle certification in Brazil showed how multiple governance interventions interacted to enhance sustainability, even though there was a lack of coordination between these initiatives (77). Key government interventions that were supporting the Sustainable Agriculture Network's cattle certification program in Brazil included the enforcement of forest laws, a requirement for land registration, identification of best management practices for cattle farmers, and satellite monitoring of illegal deforestation which helped track compliance to the NGO-led standard (77).

Producing-country governments are more likely to support private governance initiatives if certification programs help public authorities meet their public policy objectives (78). For example, a diversification of income sources and the development of a rural nonfarm economy are widely viewed by policymakers as offering pathways out of poverty. In this case, alignment between public policies and certification largely depends on whether certification-supported farming is compatible with diversified activities. A study in the Philippines concluded that certified farmers were able to diversify their livelihoods both into and away from farming. However, this only occurred if financial benefits from certification (i.e., a market condition) and land access rules (i.e., a public policy) minimized conflicts between investments in certified agriculture and income diversification (79).

3.3.2. Governments regulating nongovernmental organization–led certification. In a few cases, governments or intergovernmental organizations have stepped in to encourage or force certification schemes to converge. Following the proliferation of different organic standards and certification systems, a partnership between United Nations agencies—for Food and Agriculture and for Trade and Development—and an international multistakeholder platform for organic production (the International Federation of Organic Agriculture Movements) founded the International Task Force on the Harmonization and Equivalence in Organic Agriculture in 2003 (46). Its mission was to better integrate the multiple standards, technical regulations, and certification requirements in the organic sector. It developed baseline requirements for organic certification and equivalence rules across standards. After transitioning into the Global Organic Market Access project, the task of harmonization and equivalence was incorporated into the United Nations Forum on Sustainability Standards, whose goal is to make private sustainability standards a driver of sustainable development in developing countries. It is thus an intergovernmental meta-governance body that regulates private standards (46).

Certification schemes are also constrained and influenced by government policies (80). For example, mandatory government policies are regularly used as a benchmark for voluntary certification schemes. Compliance with the laws of producing countries is often the minimum requirement. Governments may also use their power to restrict the rule-making authority of private governance initiatives, e.g., by enacting regulations that restrict their discretion or by rejecting or discriminating against weak certification schemes (36). Governments excluding weaker certification schemes may provide a stimulus for improving the standards needed to gain access to public markets. This occurred with PEFC and SFI in 2005, after the UK government concluded that they did not meet its public procurement requirements for sustainable forest management (36). Public comparisons and benchmarking of forest certification schemes have led to a ratcheting up of the standards, leading to an upward convergence of certification programs (81).

3.3.3. Governments endorsing nongovernmental organization–led certification. In some cases, governments rely on a private governance initiative to implement their public regulations. The private initiative benefits from being incorporated in a public policy through the legitimacy it receives, the government's enforcement capacity, and the greater uptake by market actors (36). Governments in consuming countries may see VSS as a first step toward better regulating producers outside their direct control. Voluntary standards can be a precursor to mandatory regulations, preparing the ground for more stringent public policies (76).

Governments in consuming countries can require state-owned companies to adopt standards and enact public procurement policies that stipulate the purchase of certified products, in particular in sectors for which the state is a major buyer, such as forest products (36). This sends a signal to other buyers for a more sustainable market. For example, several European countries

have voluntarily adopted procurement policies on purchasing timber from legal and sustainable sources, in response to the European Union's Forest Law Enforcement, Governance and Trade action plan. These countries have accepted FSC and PEFC certification as evidence of legal and sustainable timber from all regions and producer countries (36), thereby providing legitimacy to these certification schemes and stimulating market uptake of certified wood. The US Lacey Act also includes a public recognition of private certification schemes for timber, albeit in a weaker form than in Europe, as participation in a certification scheme may be claimed as evidence of "due care" (81). Once public procurement policies have been enacted in a country, timber suppliers tend to switch over to certified wood products for both their public and private customers, to simplify their supply chain, thereby amplifying the impact of public procurement decisions (36). Using a spatial price allocation equilibrium model, a study quantified the leverage effect of Europe's green procurement policies for wood. Under these policies, the production and consumption of certified wood increases globally, but not everywhere. In the simulation results, private consumers in Europe also switch from conventional to certified wood: The increase in conventional wood price and decrease in price premium for certified wood make them equally attractive in Europe (82).

Public law may also facilitate compliance with private standards (46). Bolivia's forest code is inspired from the FSC standard, with several legal criteria for sustainable forest management being copied from FSC guidelines (83). Environmental NGOs that contributed to define the FSC guidelines were consulted in the design of the Bolivian law. Because of this alignment, it is easier and cheaper for privately held concessions in public forests to obtain the FSC certification in Bolivia, as the government strongly enforces its forest laws (83). The Bolivian government also encourages certification by giving tax breaks for certified wood and by exempting certified timber companies from government audits, resulting in lower administrative costs for certification (83).

Some governments in producing countries have also established long-term collaboration agreements with certifying NGOs. For example, the government of Minas Gerais in Brazil signed an alliance with Utz based on a convergence between the Utz Code of Conduct and the "Certifica Minas Café" certification standard. The Minas Gerais coffee farmers are therefore gaining access to international markets by partaking in the Utz network (46).

Trade policies may also lead to a de facto endorsement of certification. Trade agreements between the European Union and Central America require traceability standards, therefore forcing companies to adopt such standards (84). The European Union's Renewable Energy Directive includes requirements on the sustainable production of biofuels, which is driving up demand for Bonsucro certification of sugarcane in Brazil (85). More indirectly, government restrictions on the import of genetically modified (GM) soy in European countries and labeling requirements have led some Brazilian Amazon producers to specialize in the production of non-GM crops. High market shares in the European market also exposed these Brazilian producers to consumer demand for sustainable and deforestation-free soy, thus leading to high rates of soy certification in regions in Brazil producing non-GM soy (86). By endorsing VSS, consuming-country governments are able to steer production practices in a desirable direction without contravening World Trade Organization rules. The World Trade Organization strictly regulates the ability of countries to restrict imports of goods whose production methods do not meet social and environmental criteria (76, 87).

3.3.4. Governments undermining nongovernmental organization–led certification. Some governments from producing countries have been pushing against NGO-led certification as a northern-imposed approach (62, 71). On one hand, these governments may value the opportunity to access new export markets, promote rural development, and improve their image internationally thanks to certification of their national production. On the other hand, some governments in producing countries perceive VSS as a threat. They may resent the loss of sovereignty associated

with the imposition of private certification schemes that are largely controlled by northern actors (46). They may also fear that private standards will lead to the exclusion from key export markets of the part of their production that does not meet certification criteria (46).

As a tactical response, some governments from producing countries have supported weak standards that compete against more stringent ones. Other governments in producing countries have created their own national, government-led standards as rival governance networks that challenge global private standards "from the North" (71, 88). In 2011, the government of Indonesia launched the standard for Indonesian Sustainable Palm Oil (ISPO), whose organization mimics the principles and criteria of the global Roundtable on Sustainable Palm Oil (RSPO) multistakeholder certification. However, compared to the RSPO, the ISPO lacks key requirements on transparency; social conflicts, i.e., informed consent of local communities; and environmental impacts, i.e., no conversion of primary forests and of other areas with high conservation value (71, 88). The ISPO is mandatory for all oil palm plantation actors in Indonesia. However, it lacks international recognition, especially in Western economies. Malaysia also launched its own standard for palm oil in 2015, the Malaysian Sustainable Palm Oil (MSPO), due to become mandatory by 2019. These government interventions to retake control of production standards occurred in a context where major export markets in Asia and Russia have shown little interest so far in sustainability standards (46). By contrast, the European Parliament issued in 2017 a resolution to only import sustainable palm oil after 2020. It also called for the introduction of minimum sustainability criteria for palm oil.

In forestry, China promotes its own forest certification scheme for its domestic market (89). As an alternative to FSC certification, Mexico developed in 2008 a state-sponsored forest certification program, the Mexican Forest Certification System, which is simpler and better adapted to small forest properties (90). Indonesia also developed its own standards for coffee and cocoa (71).

NGO certifications are more likely to be undermined by governments in producing countries if they fail to align with existing public policies and government regulations, thus resulting in conflicting requirements (91). For example, the RSPO standard requires the protection of land that meets the criteria of high conservation value forests (HCVF), whereas the Indonesian policy on land zoning requires that all land in palm oil concessions allocated to private companies is put to use (92).

With the rise of South–South trade, emerging market governments that import commodities may also undermine the uptake of certification in producing countries by failing to promote sustainability criteria at home. Brazilian soy producers started to oppose soy certification by the Roundtable on Responsible Soy once China replaced Europe as the most important export destination, which relieved the transnational regulatory pressure (85). Similarly, growing imports of palm oil by India has undermined RSPO certification uptake in Indonesia, which supplies approximately 80% of India's demand (93). Markets with low environmental awareness continue to demand uncertified products, including from companies that fill the gaps left by more responsible firms that stop sourcing from vulnerable ecosystems and law-breaking suppliers (94). In China, however, government agencies are providing some state support to the RSPO, paving the way to certification of palm oil in the Chinese market (95).

Roundtable on Sustainable Palm Oil (RSPO): nonprofit organization that develops and implements global standards for sustainable palm oil

High conservation value forests (HCVF): forest management designation for forests that meet criteria related to biodiversity and ecosystem services

3.3.5. Nongovernmental organization–led certification influencing public policies. Government regulations may also be influenced by VSS. Given their flexible governance structure, NGOs have the ability to innovate faster than governments do. As a result, systems of voluntary standards are constantly evolving and develop new concepts and tools, which can then influence public policies. With regard to forestry, FSC introduced in the late 1990s the forest management designation of HCVF. This concept was then adopted by other certification schemes, by private companies making zero-deforestation commitments, and by public administrations responsible

for forest management (96). In Brazil, the Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis, the administrative arm of the Ministry of the Environment, relies on the HCVF concept for planning and establishing protected areas.

The adoption of VSS, with its associated verification requirements, can also raise the bar for public sector practitioners. In Indonesia, voluntary timber certifications have led to a better training of auditors and better auditing practices, which in turn have improved legality verification standards and auditing requirements (96). The general perception among actors in the forestry sector of the nature of sustainable forest management, of the value of transparency and community participation, and of the social responsibility of extractive companies has also improved, given these topics have been brought to the fore by certification (96).

Governments in producing countries sometimes use NGO-led certification systems as models to create systems of traceability and certification to improve market access for their producers. Several provincial governments in Ecuador have created alternative models of local agricultural certification based on a multistakeholder governance and independent auditing (97). These systems include a certification of small-scale producers in sustainable agriculture, a certification of geographical origin, and the unification of local producers' initiatives for organic production (97). These public initiatives represent alternatives to NGO-led certification. They are more accessible to small producers, thanks to the absence of fees, and therefore give small producers access to niche markets. Certification is thus transformed into a public rather than a private good (97).

Jurisdictional sourcing is an emerging interaction that some have heralded as a unique opportunity to leverage the complementarity of public and private actors (98). Under a jurisdictional approach, adherence to social and environmental criteria is required for an entire geographical region. By leveraging both public incentives (e.g., credit access) and private incentives (e.g., market-access, price premiums), governments, NGOs, and companies cocreate "sustainability havens" to showcase the benefits of sustainable production practices. For example, RSPO and the governments of Ecuador, of the State of Sabah (Malaysia), and of the province of Central Kalimantan (Indonesia) are implementing a jurisdictional approach to RSPO certification.

The wide adoption of stringent private regulations may also spur governments in producing countries to improve the enforcement of laws (71). These governments often have similar requirements as VSS, but they are poorly enforced. Given legal compliance is a basic criterion in most sustainability standards, an indirect benefit of certification systems is to enforce existing government laws (58, 99).

3.3.6. Future research. Governments are increasingly engaged in private governance and attempt to regain partial control of standards designed by NGOs to promote sustainability. Whether this engagement will lead to a more coherent landscape of VSS, more fruitful public-private partnerships to promote sustainability, or a taming of innovations in private governance still needs to be researched.

3.4. Interactions Between Nongovernmental Organizations and Private Sector Actors

Historically, profit and nonprofit organizations have had confrontational interactions. More recently, this relationship has shifted more toward cooperation to develop a coregulation of business. We review these interactions below.

3.4.1. Opposition. In the 1990s, activist NGOs shifted some of their focus away from government policies to aim directly at the practices of private companies and industries (7, 48). Initially, the

dominant interaction between NGOs and private companies has taken the form of brand-focused activism, based on naming-and-shaming against companies to critique particular practices and incentivize firms to reform (94, 100, 101). Baron & Diermeier (102) built a theoretical model of NGO campaigns, which are theorized as an encounter between an activist organization and a company. The company is rewarded if it meets the demand from NGOs or sanctioned otherwise. The NGOs are able to harm branded firms through market-based campaigns that target the reputational value of companies (103). If NGOs are playing the markets in a smart way, firms risk losing customers, employees, and access to capital. However, by targeting mostly North American and European companies to incentivize them to adopt sustainable practices, activists risk reproducing the North-South inequalities that characterize the international political economy (103).

The private sector has responded in multiple ways to NGO campaigns. Some companies have chosen to self-regulate by adopting NGO-led certification or their own standards to preempt attacks to their reputation (102). A statistical analysis on a large sample of companies found that large, consumer-facing companies, with a high brand value, who serve European markets and have their headquarters in a country with high NGO density are most likely to adopt sustainable sourcing practices (9). This highlights the influence of reputational risk and pressures by NGOs and consumers on sustainability commitments by the private sector.

Corporations may also lobby against strict sustainability standards that are promoted by NGOs. Lobbying includes reducing support for NGO programs, raising the cost of conducting campaigns, and limiting actions by NGOs through legal means (102). Where industry has the greatest influence, certification standards tend to have a weaker sustainability bar (21). Other strategies used by corporate actors to weaken standards include pressures to simplify the content of standards. For example, the multifaceted agro-ecological practices that form an alternative to conventional agriculture are often reduced to an organic standard defined by a limited number of issues, e.g., banning agrochemicals and GMOs (104).

Some companies may also develop a reputation for toughness through coercion, by challenging government regulations and fighting lawsuits to forestall future campaigns. Socially responsible companies are most likely to be attacked by activist NGOs as they have created a reputation for being soft and responsive by conceding to past demands by activist NGOs (102).

Another response of the private sector against stringent NGO-led sustainability certifications has been the design of rival company- or industry-level standards (105). In forestry, the SFI and PEFC certification systems are an industry response to the FSC certification (37). In coffee, the 4C certification is a response to Rainforest Alliance certification (106). A proliferation of industry standards in addition to the many NGO-led certifications creates confusion among consumers for whom understanding differences in the content of standards is difficult. In cattle production in Brazil, private standards developed by slaughterhouses compete with Rainforest Action Network certification, taking away market shares from the NGO certification (77).

Company standards tend to focus more on yields and quality than NGO-led certifications. Most companies also buy commodities under market-conform conditions from producers who meet their standards rather than at a minimum guaranteed price, as Fair Trade does (41). For example, Starbucks' commitment to buy 100% ethically sourced coffee relies on its standard C.A.F.E. Practices, developed in partnership with a major NGO. In interviews with producer groups in Costa Rica, Snider et al. (107) found that producers are paid higher for their C.A.F.E.-certified coffee than for conventional coffee in years of low global supply, and they are paid lower for their C.A.F.E.-certified coffee in years of oversupply. Such a private company certification may thus slightly increase coffee price fluctuations as compared to NGO-led certification where premiums are often more stable over time (107).

Corporate social responsibility (CSR): when companies take responsibility for their impact on society

3.4.2. Cooperation. NGOs and private companies are increasingly shifting from confrontational to collaborative interactions. Advocacy groups see a great opportunity in leveraging the new power and authority of multinational corporations as global environmental regulators (48). So-called green alliances between NGOs and business have taken different forms (108): (*a*) commodity round tables, (*b*) partnerships where NGO actors provide advice on the design and implementation of sustainable practices, (*c*) research-oriented projects, and (*d*) adoption by companies of NGO-led sustainability certification of their products or raw materials. In these alliances, corporations hold considerably more economic power than NGOs. However, NGOs are more successful than businesses at influencing both public opinions and certain public policies, and they have a broader view of social and environmental challenges, which can decrease the unequal power relationships (109).

Civil society and industry actors cocreate standards and certifications through their participation in MSIs (91). In the agri-food sector, these multistakeholder sustainability alliances are often organized around a specific commodity and include supply chain actors, competing firms, investors, knowledge institutions, NGOs, and other civil society organizations. Governmental departments are also included in some cases. The objective of this process of coregulation is to jointly define and reach sustainability objectives (110). Many widely adopted standards result from MSIs—e.g., FSC, MSC, RSPO. Participation in multistakeholder sustainability alliances with several diverse actors that have a reputation for being socially and environmentally responsible seems to decrease accusations of "greenwashing" (110).

NGO-led certifications are also being adopted by corporate actors to implement their aspirational pledges. For example, IKEA's sustainability commitments rely on certifications such as FSC and the Better Cotton Initiative, whereas Unilever, Mars, and other big brands often rely on RSPO, Utz, and similar certifications to fulfill many of their sustainable material commitments. 19% of companies in a large random sample reported using at least one multistakeholder standard, and 9% of companies used NGO certification (9). Companies also rely on NGOs to help implement their corporate social responsibility (CSR) programs, as shown in the case of Walmart (111). In this case, NGOs become full partners of companies, which signals to consumers their endorsement of a company's CSR program.

However, different companies engage in certification differently. For example, Raynolds (112) finds that mission-driven coffee companies are strongly committed to Fair Trade's alternative values and sell only certified products. Quality-driven firms use Fair Trade certification to satisfy consumer demand and ensure a reliable supply of quality coffee. In contrast, market-driven companies typically are dominant coffee brands that use certification as a reputation tool to position themselves in the market. They are generally uncommitted to Fair Trade values, but use certification as a mechanism for traceability (112).

Large companies may co-opt NGOs to avoid negative pressure while at the same time rewriting the rules of VSS to benefit from the market opportunities they offer, as happened with organic and fair trade agriculture (104). When Starbucks became the largest US buyer of Fair Trade coffee, concerns were raised about the mainstreaming and increased vulnerability of Fair Trade, given its dependency on a few powerful corporate actors (113). Some activists are highly critical about sustainability certifications being "sold out" to corporate interests (104). They argue that partnerships between NGOs and companies can only lead to incremental changes within capitalism rather than to the rise of a new economic model that is not based on perpetual economic growth (48). Another form of dependency occurs when corporate funding is directed toward large NGO projects.

Companies often rely on NGOs to support their corporate initiatives and create legitimacy for their CSR activities (21, 49). For example, NGOs play a key role in legitimizing MSIs through their participation in the standards-setting process (114). NGOs also developed an accountability framework (**https://accountability-framework.org**) based on harmonized norms and guidelines

to track progress on sustainability supply chain commitments by companies and foster transparency and legitimacy. When NGOs move away from supporting a particular standard, it often loses credibility in the marketplace (85, 114) because its political legitimacy is undermined (62). Despite the power imbalance, the relationship between NGOs and private companies around sustainability is largely one of mutual dependence.

3.5. Interactions Between Private and Public Sector Actors

Governments also interact with companies' approaches to sustainability standards, such as company codes of conduct or industry-wide standards (referred to collectively below as company standards). Similar to interactions identified above, company standards can displace or substitute for public governance or act in a complementary way. Given the limited evidence on company standards in agriculture and forestry, we also draw on examples from other sectors.

3.5.1. Displacement. The displacement hypothesis suggests that the use of company standards is a way to replace, preempt or avoid public regulation (115). A study of the chemical industry found that companies adhering to an industry-set environmental standard polluted more than nonparticipants (116). Although companies may have initially used company standards to displace more stringent government regulations, civil society groups have effectively repositioned these codes as a way to increase companies' liability for their supply chain actions as firms were no longer able to claim a lack of knowledge of bad practices (115).

3.5.2. Complementarities. Studies have found little empirical evidence for the displacement hypothesis, highlighting instead the complementarity of company standards and public regulations. Three types of complementarities have been identified: (*a*) Legal regulations are enforced by private codes, (*b*) complementary enforcement mechanisms are provided, and (*c*) scarce monitoring resources are more efficiently split. We examine each of these points below.

Firstly, company and industry standards frequently use local legal requirements as a baseline standard (117, 118). For example, the Ethical Trade Initiative uses a country's labor laws to define many of their labor requirements for farm workers (119). Similarly, the Brazilian government's Forest Code is used as a baseline requirement for the private sector's soy moratorium and cattle agreement in the Amazon region (77, 98). Empirical evidence shows that the strength of these government requirements are an important predictor of the number of violations to company standards, with stronger government regulations improving private governance compliance (120, 121). In addition, by using legal requirements as their reference point, company standards gain more authority to influence producers' practices (117).

Secondly, private sector and public regulations also reinforce one another via different enforcement capabilities. A study of Coca Cola's private labor standard in Brazilian sugar production showed that, although the public sector had the legal authority to enforce minimum requirements, the private sector auditors were better able to leverage their sector-specific expertise to help managers reform their approaches to meet these labor requirements (122). In the fight against deforestation in the Brazilian Amazon, the federal government enforced forest laws via fines and by constraining access to credit, whereas the soy moratorium adopted by transnational agribusiness companies used market access as a key enforcement mechanism (98). The Brazilian soy industry's Soja Plus program helps farmers understand and apply government regulations, which strengthen the implementation of national laws (62). Public and private regulations also tend to focus on different topics—e.g., health and safety for the private sector and rights to unionize for governments, allowing for specialization between public and private regulators (123).

Finally, governments often lack resources to monitor social and environmental practices, particularly in developing countries. Company standards often provide the necessary awareness and enforcement of social and environmental laws that sometimes go unchecked by government officials (62, 98, 124, 125). Audits conducted as part of company standards can also help governments focus their limited resources. For example, the introduction of private labor audits in the Dominican Republic allowed public auditors to target higher risk firms that were not covered by company standards (123). A similar allocation of scarce monitoring resources was found among public and private food safety regulation (126). However, using private monitoring to identify regulatory noncompliance poses a risk, as private actors often have a conflict of interest in passing requirements. Third-party monitoring helps to avoid the inherent conflict of interest of reporting on one's own company's environmental performance, but it is not without its limitations (53, 127).

Other complementarities between public and company regulations include the importance of government databases to provide crucial information for the enforcement of private regulations (98). In the Brazilian Amazon, a government program to monitor on an annual basis deforestation based on remote sensing provides the basis to verify compliance with the soy moratorium that is implemented by private companies (128).

Consuming-country governments also interact with private regulations. Governments in Europe increasingly regulate CSR, relying on endorsement, facilitation, and mandate to encourage adoption of CSR practices (129). Several consuming-country governments require companies to disclose information on their supply chain. For example, the 2010 Dodd–Frank Wall Street Reform and Consumer Protection Act requires companies to disclose how they are ensuring certain minerals do not support oppressive government regimes. California's recent Transparency in Supply Chain Act and the United Kingdom's Modern Slavery Act both require companies to disclose measures adopted to address slavery and human trafficking (130). In 2017, France adopted the corporate duty of vigilance law, creating a legal requirement for companies to identify and prevent human rights and environmental abuses related to their activities and those of their subsidiaries, subcontractors, and suppliers (131). Evidence from other industries suggest voluntary disclosure encourages firms to improve their environmental performance (132, 133). It remains to be seen how these new consumer-country disclosure laws will influence company standards.

4. CONCLUSION

We reviewed the full range of interactions between private, public, and civil society actors leading to the design, adoption, and implementation of VSS. Our findings challenge the view that voluntary sustainability standards are a form of governance without government. The reality uncovered by this review is rather that of a rich policy ecosystem formed by the interplay between government, NGO, and private company policies. They also question the view that the interactions between governments, civil society, and private company actors are mainly antagonistic regarding the adoption of sustainable practices. We find that policy interactions generally result in outcomes that are closer to the goals pursued by each individual policy, with some exceptions. These interactions include duplication, borrowing, and integration of standards, as well as multiple forms of competition, substitution, and complementarity between standards. This review also highlights an insufficient number of rigorous empirical studies on how these interactions influence the effectiveness of sustainability standards. Most impact studies so far evaluated the effectiveness of a single intervention rather than that of policy mixes in specific policy contexts.

This review reveals four themes. Firstly, there is a tendency toward a proliferation of parallel standards, which are developed either independently by different stakeholder groups or in response to pre-existing standards that exclude and discriminate against particular stakeholders. Secondly,

there is a competition between standards in that each tries to gain market shares through a race to the top or to the bottom. Standards either expand their scope, therefore increasing their overlap with competing schemes, or carve their own niche to increase their effectiveness and efficiency at addressing a particular problem, therefore becoming complementary to one another. This competition may also lead, for example, to public interventions attempting to undermine or replace private standards that do not align with public policies. Thirdly, coordination mechanisms are eventually designed to reinforce the complementarity of standards. This may lead either to the incorporation of a standard into another system or to the design of a meta-governance of standards. Fourthly, although VSS have emerged in response to the growing inadequacy of traditional forms of national-scale public governance to promote sustainability in global supply chains, governments are increasingly engaging with, and regaining partial control of, private environmental governance initiatives designed by NGOs and companies. Given its recent emergence, one should not assume that the world of sustainability standards has reached a state of equilibrium: The dynamics of standard interactions is likely to lead to new configurations and innovations, such as jurisdictional approaches to certification.

This review did not address interactions within organizations as this topic is understudied. Within governments, interactions occur between departments or ministries with different competencies (e.g., forest, mining, agriculture, indigenous affairs) and between different levels of governments (i.e., federal, state, provinces) that are sources of innovation in environmental governance. Within NGOs, tensions persist between proponents of a deeper collaboration with private companies and advocates of aggressive campaigns to denounce unsustainable practices. Within companies, interactions between departments in charge of sustainability or public affairs on one hand, and sourcing and procurement on the other hand, are often the focal point of trade-offs between the social, economic, and environmental dimensions of sustainable development.

As private governance continues to expand as a type of regulation of social and environmental issues, it is necessary to better understand how private regulations interact with the broader policy ecosystem. Accounting for these interactions is essential for the design of effective interventions. Voluntary sustainability standards have not yet achieved their self-proclaimed social and environmental objectives. Yet, it may well be that their true contribution is as catalyzers, by having accelerated and facilitated adoption by companies and governments of credible policies addressing sustainability.

SUMMARY POINTS

1. Governments, private companies, and nongovernmental organizations (NGOs) interact in multiple ways on environmental governance.
2. There is a proliferation of parallel and uncoordinated voluntary sustainability standards generated by NGOs and private companies.
3. Initially, standards compete against each other for market shares and legitimacy. As they coevolve, standards may also start to cooperate and adopt complementary roles.
4. Systems of meta-governance of standards create coordination mechanisms between standards.
5. Despite their unequal power, NGOs and private companies depend on each other to legitimize and implement their sustainability programs.

6. Governments are increasingly engaging with, and regaining partial control of, private environmental governance initiatives designed by NGOs and companies.
7. Voluntary sustainability standards accelerate and facilitate adoption by companies and governments of policies addressing sustainability, thus acting as catalyzers.

FUTURE ISSUES

1. Empirical studies on the effectiveness of voluntary sustainability standards should account for interactions between multiple interventions, both private and public.
2. Industry- and company-led standards deserve more attention, despite data access challenges.
3. The impact of the growing engagement of governments in voluntary sustainability standards has not yet been evaluated systematically.
4. New forms of collaboration between governments, companies, and the civil sector—e.g., through jurisdictional approaches to certification—are emerging.
5. Theories of change related to sustainability standards need to integrate synergistic effects between multiple interventions, and catalyzing and amplification mechanisms.

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LITERATURE CITED

1. United Nations Forum on Sustainability Standards (UNFSS). 2013. *Voluntary Sustainability Standards: Today's Landscape of Issues & Initiatives to Achieve Public Policy Objectives*. Geneva: UNFSS
2. Tayleur C, Balmford A, Buchanan GM, Butchart SHM, Ducharme H, et al. 2017. Global coverage of agricultural sustainability standards, and their role in conserving biodiversity. *Conserv. Lett.* 10(5):610–18
3. Henders S, Persson UM, Kastner T. 2015. Trading forests: land-use change and carbon emissions embodied in production and exports of forest-risk commodities. *Environ. Res. Lett.* 10(12):125012
4. Lambin EF, Gibbs HK, Ferreira L, Grau R, Mayaux P, et al. 2013. Estimating the world's potentially available cropland using a bottom-up approach. *Glob. Environ. Change* 23:892–901
5. le Polain de Waroux Y, Garrett RD, Heilmayr R, Lambin EF. 2016. Land-use policies and corporate investments in agriculture in the Gran Chaco and Chiquitano. *PNAS* 113(15):4021–26
6. Biermann F, Pattberg P. 2008. Global environmental governance: taking stock, moving forward. *Annu. Rev. Environ. Resour.* 33:277–94
7. Vogel D. 2010. The private regulation of global corporate conduct: achievements and limitations. *Bus. Soc.* 49(1):68–87

8. Hall RB, Biersteker TJ. 2002. The emergence of private authority in the international system. In *The Emergence of Private Authority in Global Governance*, ed. RB Hall, TJ Biersteker, pp. 3–23. Cambridge, UK: Cambridge Univ. Press
9. Thorlakson T, de Zegher J, Lambin EF. 2018. Companies' contribution to sustainability through global supply chains. *PNAS* 115(9):2072–77
10. Young OR. 2002. *The Institutional Dimensions of Environmental Change: Fit, Interplay, and Scale*. Cambridge, MA: MIT Press
11. Gereffi G, Lee J. 2016. Economic and social upgrading in global value chains and industrial clusters: why governance matters. *J. Bus. Ethics* 133(1):25–38
12. Lambin EF, Gibbs HK, Heilmayr R, Carlson KM, Fleck LC, et al. 2018. The role of supply-chain initiatives in reducing deforestation. *Nat. Clim. Change* 8:109–16
13. Lemos MC, Agrawal A. 2006. Environmental governance. *Annu. Rev. Environ. Resour.* 31(1):297–325
14. Eberlein B, Abbott KW, Black J, Meidinger E, Wood S. 2014. Transnational business governance interactions: conceptualization and framework for analysis. *Regul. Gov.* 8(1):1–21
15. Green J. 2014. *Rethinking Private Authority: Agents and Entrepreneurs in Global Environmental Governance*. Princeton, NJ: Princeton Univ. Press
16. Lambin EF, Meyfroidt P, Rueda X, Blackman A, Börner J, et al. 2014. Effectiveness and synergies of policy instruments for land use governance in tropical regions. *Glob. Environ. Change* 28:129–40
17. Rueda X, Garrett RD, Lambin EF. 2017. Corporate investments in supply chain sustainability: selecting instruments in the agri-food industry. *J. Clean. Prod.* 142:2480–92
18. Auld G, Bernstein S, Cashore B. 2008. The new corporate social responsibility. *Annu. Rev. Environ. Resour.* 33(1):413–35
19. Delmas M, Young O. 2009. Introduction: new perspectives on governance for sustainable development. In *Governance for the Environment*, ed. MA Delmas, OR Young, pp. 3–11. Cambridge, UK: Cambridge Univ. Press
20. Waldman KB, Kerr JM. 2014. Limitations of certification and supply chain standards for environmental protection in commodity crop production. *Annu. Rev. Resour. Econ.* 6(1):429–49
21. Raynolds LT, Murray D, Heller A. 2007. Regulating sustainability in the coffee sector: a comparative analysis of third-party environmental and social certification initiatives. *Agric. Hum. Values* 24(2):147–63
22. Steering Committee of the State-of-Knowledge Assessment of Standards and Certification. 2012. *Toward Sustainability: The Roles and Limitations of Certification*. Washington, DC: RESOLVE
23. Pramudya EP, Hospes O, Termeer JAM. 2018. Friend or foe? The various responses of the Indonesian state to sustainable non-state palm oil initiatives. *Asian J. Sustain. Soc. Responsib.* 3:1
24. Reinecke J, Manning S, von Hagen O. 2012. The emergence of a standards market: multiplicity of sustainability standards in the global coffee industry. *Organ. Stud.* 33(5–6):791–814
25. Derkx B, Glasbergen P. 2014. Elaborating global private meta-governance: an inventory in the realm of voluntary sustainability standards. *Glob. Environ. Change* 27(1):41–50
26. Bitzer V, Francken M, Glasbergen P. 2008. Intersectoral partnerships for a sustainable coffee chain: Really addressing sustainability or just picking (coffee) cherries? *Glob. Environ. Change* 18(2):271–84
27. Smith TM, Fischlein M. 2010. Rival private governance networks: competing to define the rules of sustainability performance. *Glob. Environ. Change* 20(3):511–22
28. Manning S, Boons F, von Hagen O, Reinecke J. 2012. National contexts matter: the co-evolution of sustainability standards in global value chains. *Ecol. Econ.* 83:197–209
29. Auld G. 2014. Confronting trade-offs and interactive effects in the choice of policy focus: specialized versus comprehensive private governance. *Regul. Gov.* 8(1):126–48
30. Overdevest C. 2010. Comparing forest certification schemes: the case of ratcheting standards in the forest sector. *Socio-Econ. Rev.* 8:47–76
31. de Man R, German L. 2017. Certifying the sustainability of biofuels: promise and reality. *Energy Policy* 109:871–83
32. Fransen L, Schalk J, Auld G. 2016. Work ties beget community? Assessing interactions among transnational private governance organizations in sustainable agriculture. *Glob. Netw.* 16(1):45–67
33. Glasbergen P. 2013. Legitimation of certifying partnerships in the global market place. *Environ. Policy Gov.* 23(6):354–67

34. Visseren-Hamakers IJ, Glasbergen P. 2007. Partnerships in forest governance. *Glob. Environ. Chang.* 17(3–4):408–19
35. Bitzer V, Glasbergen P, Leroy P. 2012. Partnerships of a feather flock together? An analysis of the emergence of networks of partnerships in the global cocoa sector. *Glob. Netw.* 12(3):355–74
36. Gulbrandsen LH. 2014. Dynamic governance interactions: evolutionary effects of state responses to non-state certification programs. *Regul. Gov.* 8(1):74–92
37. Auld G. 2014. *Constructing Private Governance: The Rise and Evolution of Forest, Coffee, and Fisheries Certification*. New Haven, CT: Yale Univ.
38. Heilmayr R, Lambin EF. 2016. Impacts of nonstate, market-driven governance on Chilean forests. *PNAS* 113(11):2910–15
39. Nordén A, Coria J, Villalobos L. 2016. *Evaluation of the impact of forest certification on environmental outcomes in Sweden*. Work. Pap. Econ. 657, Dep. Econ., Univ. Gothenb., Gothenb., Swed. **https://gupea.ub.gu.se/bitstream/2077/44417/1/gupea_2077_44417_1.pdf**
40. Scott T. 2015. Does collaboration make any difference? Linking collaborative governance to environmental outcomes. *J. Policy Anal. Manag.* 34(3):537–66
41. Ruben R, Zuniga G. 2011. How standards compete: comparative impact of coffee certification schemes in Northern Nicaragua. *Supply Chain Manag.* 16(2):98–109
42. van Rijsbergen B, Elbers W, Ruben R, Njuguna SN. 2016. The ambivalent impact of coffee certification on farmers' welfare: a matched panel approach for cooperatives in Central Kenya. *World Dev.* 77:277–92
43. Chiputwa B, Spielman DJ, Qaim M. 2015. Food standards, certification, and poverty among coffee farmers in Uganda. *World Dev.* 66:400–12
44. Vellema W, Buritica Casanova A, Gonzalez C, D'Haese M. 2015. The effect of specialty coffee certification on household livelihood strategies and specialisation. *Food Policy* 57:13–25
45. Fransen L. 2015. The politics of meta-governance in transnational private sustainability governance. *Policy Sci.* 48(3):293–317
46. Glasbergen P, Schouten G. 2015. Transformative capacities of global private sustainability standards. *J. Corp. Citizsh.* 58:85–101
47. Heyes A, Martin S. 2017. Social labeling by competing NGOs: a model with multiple issues and entry. *Manag. Sci.* 63(6):1800–13
48. Dauvergne P, Lister J. 2012. Big brand sustainability: governance prospects and environmental limits. *Glob. Environ. Change* 22(1):36–45
49. Fuchs D, Kalfagianni A. 2010. The causes and consequences of private food governance. *Bus. Polit.* 12(3):1–34
50. Lee J, Gereffi G, Barrientos S. 2011. *Global value chains, upgrading and poverty reduction*. Captur. Gains Brief. Note 3. **http://dx.doi.org/10.2139/ssrn.1990232**
51. Ingenbleek P, Meulenberg MTG. 2006. The battle between "good" and "better": a strategic marketing perspective on codes of conduct for sustainable agriculture. *Agribusiness* 22(4):451–73
52. Hoang D, Jones B. 2012. Why do corporate codes of conduct fail? Women workers and clothing supply chains in Vietnam. *Glob. Soc. Policy* 12(1):67–85
53. Duflo E, Greenstone M, Pande R, Ryan N. 2013. Truth-telling by third-party auditors and the response of polluting firms: experimental evidence from India. *Q. J. Econ.* 128:1499–545
54. Lee J, Gereffi G, Beauvais J. 2012. Global value chains and agrifood standards: challenges and possibilities for smallholders in developing countries. *PNAS* 109(31):12326–31
55. Locke RM. 2013. *The Promise and Limits of Private Power: Promoting Labor Standards in a Global Economy*. New York: Cambridge Univ. Press
56. Distelhorst G, Hainmueller J, Locke RM. 2017. Does lean improve labor standards? Capability building and social performance in the Nike supply chain. *Manag. Sci.* 63(3):707–28
57. Tampe M. 2018. Leveraging the vertical: the contested dynamics of sustainability standards and labour in global production networks. *Br. J. Ind. Relat.* 56:43–74
58. Thorlakson T, Hainmueller J, Lambin EF. 2018. Improving environmental practices in agricultural supply chains: the role of company standards. *Glob. Environ. Change* 48:32–42
59. Giuliani E, Ciravegna L, Vezzulli A, Kilian B. 2017. Decoupling standards from practice: the impact of in-house certifications on coffee farms' environmental and social conduct. *World Dev.* 96:294–314

60. Beghin JC, Maertens M, Swinnen J. 2015. Nontariff measures and standards in trade and global value chains. *Annu. Rev. Resour. Econ.* 7(1):425–50
61. Pickles J, Barrientos SW, Knorringa P. 2016. New end markets, supermarket expansion and shifting social standards. *Environ. Plan. A* 48(7):1284–301
62. Schouten G, Bitzer V. 2015. The emergence of Southern standards in agricultural value chains: A new trend in sustainability governance? *Ecol. Econ.* 120:175–84
63. Hughes A, Wrigley N, Buttle M. 2008. Global production networks, ethical campaigning, and the embeddedness of responsible governance. *J. Econ. Geogr.* 8(3):345–67
64. Richards C, Lawrence G, Burch D. 2011. Supermarkets and agro-industrial foods: the strategic manufacturing of consumer trust. *Food Cult. Soc.* 14(1):29–47
65. Watson S, Mulet-Solon M, Schouten W-J, Hesp S, Runci A, Willems M. 2016. *Slow Road to Sustainability*. Gland, Switz.: WWF Int.
66. Bregman T, McCoy K, Servent R, MacFarquhar C. 2016. *Turning collective commitment into action: assessing progress by Consumer Goods Forum members towards achieving deforestation-free supply chains*. Rep., Glob. Canopy Programme, Oxford/CDP, London. **https://www.tfa2020.org/wp-content/uploads/2016/06/GCP-and-CDP-2016-Turning-collective-commitment-into-action.pdf**
67. Cashore B. 2002. Legitimacy and the privatization of environmental governance: how non-state market-driven (NSMD) governance systems gain rule-making authority. *Governance* 15(4):503–29
68. Bartley T. 2007. Institutional emergence in an era of globalization: the rise of transnational private regulation of labor and environmental conditions. *Am. J. Sociol.* 113(2):297–351
69. Gulbrandsen LH. 2004. Overlapping public and private governance: Can forest certification fill the gaps in the global forest regime? *Glob. Environ. Polit.* 4(2):75–99
70. Meidinger E. 2006. The administrative law of global private-public regulation: the case of forestry. *Eur. J. Int. Law* 17(1):47–87
71. Wijaya A, Glasbergen P. 2016. Toward a new scenario in agricultural sustainability certification? The response of the Indonesian national government to private certification. *J. Environ. Dev.* 25(2):219–46
72. Abbott KW, Snidal D. 2009. Strengthening international regulation through transnational new governance: overcoming the orchestration deficit. *Vanderbilt J. Transnatl. Law* 42:501–78
73. Carlson A, Palmer C. 2016. A qualitative meta-synthesis of the benefits of eco-labeling in developing countries. *Ecol. Econ.* 127:129–45
74. Grabs J, Kilian B, Calderón D, Dietz T. 2016. Understanding coffee certification dynamics: a spatial analysis of voluntary sustainability standard proliferation. *Int. Food Agribus. Manag. Rev.* 19(3):31–56
75. Börner J, Baylis K, Corbera E, Ezzine-de-Blas D, Ferraro PJ, et al. 2016. Emerging evidence on the effectiveness of tropical forest conservation. *PLOS ONE* 11(11):1–11
76. de Boer J. 2003. Sustainability labelling schemes: the logic of their claims and their functions for stakeholders. *Bus. Strateg. Environ.* 12(4):254–64
77. Nery Alves-Pinto H, Newton P, Pinto LFG. 2015. Reducing deforestation and enhancing sustainability in commodity supply chains: interactions between governance interventions and cattle certification in Brazil. *Trop. Conserv. Sci.* 8(4):1053–79
78. Berliner D, Greenleaf AR, Lake M, Levi M, Noveck J. 2015. Governing global supply chains: what we know (and don't) about improving labor rights and working conditions. *Annu. Rev. Law Soc. Sci.* 11:193–211
79. Makita R. 2016. Livelihood diversification with certification-supported farming: the case of land reform beneficiaries in the Philippines. *Asia Pac. Viewp.* 57(1):44–59
80. McDermott CL, Noah E, Cashore B. 2008. Differences that "matter"? A framework for comparing environmental certification standards and government policies. *J. Environ. Policy Plan.* 10(1):47–70
81. Overdevest C, Zeitlin J. 2014. Assembling an experimentalist regime: transnational governance interactions in the forest sector. *Regul. Gov.* 8(1):22–48
82. Brusselaers J, Van Huylenbroeck G, Buysse J. 2017. Green public procurement of certified wood: spatial leverage effect and welfare implications. *Ecol. Econ.* 135:91–102
83. Ebeling J, Yasue M. 2009. The effectiveness of market-based conservation in the tropics: forest certification in Ecuador and Bolivia. *J. Environ. Manag.* 90:1145–53

84. Krauss J, Krishnan A. 2016. *Global decisions and local realities: priorities and producers' upgrading opportunities in agricultural global production networks*. Discuss. Pap. 7, UN Forum Sustain. Stand.
85. Schleifer P. 2017. Private regulation and global economic change: the drivers of sustainable agriculture in Brazil. *Governance* 30(4):687–703
86. Garrett RD, Rueda X, Lambin EF. 2013. Globalization's unexpected impact on soybean production in South America: linkages between preferences for non-genetically modified crops, eco-certification and land use. *Environ. Res. Lett.* 8:044055
87. Bernstein S. 2011. Legitimacy in intergovernmental and non-state global governance. *Rev. Int. Polit. Econ.* 18(1):17–51
88. Hospes O. 2014. Marking the success or end of global multi-stakeholder governance? The rise of national sustainability standards in Indonesia and Brazil for palm oil and soy. *Agric. Hum. Values* 31(3):425–37
89. Bartley T. 2014. Transnational governance and the re-centered state: Sustainability or legality? *Regul. Gov.* 8(1):93–109
90. Garcia Montiel E, Cubbage F, Rojo-Alboreca A, Lujan-Álvarez C, Montiel-Antuna E, Corral-Rivas JJ. 2017. An analysis of non-state and state approaches for forest certification in Mexico. *Forests* 8(290):1–18
91. Vellema S, Van Wijk J. 2015. Partnerships intervening in global food chains: the emergence of co-creation in standard-setting and certification. *J. Clean. Prod.* 107:105–13
92. Ruysschaert D, Salles D. 2014. Towards global voluntary standards: questioning the effectiveness in attaining conservation goals. The case of the Roundtable on Sustainable Palm Oil (RSPO). *Ecol. Econ.* 107:438–46
93. Schleifer P. 2016. Private governance undermined: India and the Roundtable on Sustainable Palm Oil. *Glob. Environ. Polit.* 16(1):38–58
94. Dauvergne P. 2017. Is the power of brand-focused activism rising? The case of tropical deforestation. *J. Environ. Dev.* 26(2):135–55
95. Schleifer P, Sun Y. 2018. Emerging markets and private governance: the political economy of sustainable palm oil in China and India. *Rev. Int. Political Econ.* 25(2):190–214
96. Savilaakso S, Cerutti PO, Montoya Zumaeta JG, Ruslandi, Mendoula EE, Tsanga R. 2017. Timber certification as a catalyst for change in forest governance in Cameroon, Indonesia, and Peru. *Int. J. Biodivers. Sci. Ecosyst. Serv. Manag.* 13(1):116–33
97. Clark P, Martínez L. 2016. Local alternatives to private agricultural certification in Ecuador: Broadening access to "new markets"? *J. Rural Stud.* 45:292–302
98. Nepstad D, McGrath D, Stickler C, Alencar A, Azevedo A, et al. 2014. Slowing Amazon deforestation through public policy and interventions in beef and soy supply chains. *Science* 344(6188):1118–23
99. Lemeilleur S, N'Dao Y, Ruf F. 2015. The productivist rationality behind a sustainable certification process: evidence from the Rainforest Alliance in the Ivorian cocoa sector. *Int. J. Sustain. Dev.* 18(4):310–28
100. Soule S. 2009. *Contention and Corporate Social Responsibility*. New York: Cambridge Univ. Press
101. Bartley T. 2003. Certifying forests and factories: states, social movements, and the rise of private regulation in the apparel and forest products fields. *Polit. Soc.* 31(3):433–64
102. Baron DP, Diermeier D. 2007. Strategic activism and nonmarket strategy. *J. Econ. Manag. Strateg.* 16(3):599–634
103. Bloomfield MJ. 2014. Shame campaigns and environmental justice: corporate shaming as activist strategy. *Env. Polit.* 23(2):263–81
104. Jaffee D, Howard PH. 2009. Corporate cooptation of organic and fair trade standards. *Agric. Hum. Values* 27(4):387–99
105. Conroy ME. 2007. *Branded! How the Certification Revolution is Transforming Global Corporations*. Gabriola Isl., BC, Can.: New Society Publ.
106. Bitzer V. 2012. Partnering for change in chains: the capacity of partnerships to promote sustainable change in global agrifood chains. *Int. Food Agribus. Manag. Rev.* 15(B):13–38
107. Snider A, Gutiérrez I, Sibelet N, Faure G. 2017. Small farmer cooperatives and voluntary coffee certifications: Rewarding progressive farmers of engendering widespread change in Costa Rica? *Food Policy* 69:231–42

108. Glasbergen P, Groenenberg R. 2001. Environmental partnerships in sustainable energy. *Eur. Environ.* 13:1–13
109. Arts B. 2002. "Green alliances" of business and NGOs. New styles of self-regulation or "dead-end roads"? *Corp. Soc. Responsib. Environ. Manag.* 9:26–36
110. Dentoni D, Peterson HC. 2011. Multi-stakeholder sustainability alliances in agri-food chains: a framework for multi-disciplinary research. *Int. Food Agribus. Manag. Rev.* 14(5):83–108
111. Elder SD, Dauvergne P. 2015. Farming for Walmart: the politics of corporate control and responsibility in the global South. *J. Peasant Stud.* 42:1029–46
112. Raynolds LT. 2009. Mainstreaming fair trade coffee: from partnership to traceability. *World Dev.* 37(6):1083–93
113. Taylor PL. 2005. In the market but not of it: fair trade coffee and forest stewardship council certification as market-based social change. *World Dev.* 33(1):129–47
114. Gulbrandsen LH, Auld G. 2016. Contested accountability logics in evolving nonstate certification for fisheries sustainability. *Glob. Environ. Polit.* 16(2):42–60
115. Bartley T. 2005. Corporate accountability and the privatization of labor standards: struggles over codes of conduct in the apparel industry. *Res. Polit. Sociol.* 14:211–44
116. Khanna M, Brouhle K. 2009. The effectiveness of voluntary environmental initiatives. In *Governance for the Environment*, ed. M Delmas, O Young, pp. 144–82. Cambridge, UK: Cambridge Univ. Press
117. Kim JY. 2013. The politics of code enforcement and implementation in Vietnam's apparel and footwear factories. *World Dev.* 45:286–95
118. Pickles J, Barrientos S, Knorringa P. 2016. New end markets, supermarket expansion and shifting social standards. *Environ. Plan. A* 48(7):1284–301
119. Alford M. 2016. Trans-scalar embeddedness and governance deficits in global production networks: Crisis in South African fruit. *Geoforum* 75:52–63
120. Locke RM, Brause A, Qin F. 2007. Does monitoring improve labor standards? Lessons from Nike. *Ind. Labor Relat. Rev.* 61(1):1–31
121. Toffel MW, Short JL, Ouellet M. 2015. Codes in context: how states, markets, and civil society shape adherence to global labor standards. *Regul. Gov.* 9(3):205–23
122. Coslovsky SV, Locke RM. 2013. Parallel paths to enforcement: private compliance, public regulation, and labor standards in the Brazilian sugar sector. *Polit. Soc.* 41(4):497–526
123. Amengual M. 2010. Complementary labor regulation: the uncoordinated combination of state and private regulators in the Dominican Republic. *World Dev.* 38(3):405–14
124. Gibbs H, Rausch L, Munger J, Schelly I, Morton D, et al. 2015. Brazil's soy moratorium. *Science* 347(6220):377–78
125. Mueller M, dos Santos VG, Seuring S. 2009. The contribution of environmental and social standards towards ensuring legitimacy in supply chain governance. *J. Bus. Ethics* 89(4):509–23
126. Verbruggen P. 2013. Gorillas in the closet? Public and private actors in the enforcement of transnational private regulation. *Regul. Gov.* 7(4):512–32
127. LeBaron G, Lister J. 2015. Benchmarking global supply chains: the power of the "ethical audit" regime. *Rev. Int. Stud.* 41:905–24
128. Rudorff BFT, Adami M, Aguiar DA, Moreira MA, Mello MP, et al. 2011. The soy moratorium in the Amazon biome monitored by remote sensing images. *Remote Sens.* 3(1):185–202
129. Knudsen JS, Moon J, Slager R. 2015. Government policies for corporate social responsibility in Europe: a comparative analysis of institutionalisation. *Policy Polit.* 43(1):81–99
130. Parella K. 2014. Outsourcing corporate accountability. *Wash. Law Rev.* 89(3):747–818
131. Cossart S, Chaplier J, Beau De Lomenie T. 2017. The French law on duty of care: a historic step towards making globalization work for all. *Bus. Hum. Rights J.* 2(2):317–23
132. Toffel MW, Short JL. 2011. Coming clean and cleaning up: Does voluntary self-reporting indicate effective self-policing? *J. Law Econ.* 54(3):609–49
133. Delmas M, Montiel I. 2009. Greening the supply chain: When is customer pressure effective? *J. Econ. Manag. Strateg.* 18(1):171–201

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