

# The institutional design of ecolabels: Sponsorship signals rule strength

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## Abstract

Ecolabels are designed to help consumers identify environmentally superior products and services, however, they are not all created equal. Some ecolabels have strong rules that promote environmental improvements, while others have weaker rules that permit free-riding. Since information about ecolabel design and rule strength is typically not readily available at the point of purchase, consumers struggle to differentiate stronger ecolabels from weaker ones. We investigate whether ecolabel sponsorship is a signal that can help consumers distinguish among ecolabels according to the quality of their institutional design. Using data for 189 prominent ecolabels, we find that while most ecolabels have basic rules for environmental performance, monitoring, and conformance, the strength of these rules varies across labels according to sponsoring organization. Independent sponsors have the strongest ecolabel rules, followed by governments. Industry sponsored ecolabels have the weakest rule structures. Taken as a whole, these findings suggest that sponsorship may signal to consumers important information about whether an ecolabel is designed with rules that effectively condition firms to promote environmental performance outcomes.

**Keywords:** ecolabel, design, ecolabel sponsor, environmental performance standards, monitoring and conformance

## 1. Introduction

Consumers, regulators, environmental groups and other stakeholders increasingly want companies to offer more environmentally friendly products. However, these same stakeholders are rarely able to observe products' sustainability attributes directly (Nuttavuthisit & Thøgersen 2017), and they often distrust companies' self-reported sustainability claims (Baron 2010, 2009; King 2007; Harbaugh *et al.* 2011). Stakeholders therefore are reluctant to reward firms for developing environmentally friendly products unless they have confidence that the sustainability claims are genuine. Firms' thus develop products that offer fewer environmental benefits than they would otherwise.<sup>1</sup>

Ecolabels are product seals that, when functioning well, reduce information problems between companies and their stakeholders by providing a credible signal about a product's superior

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<sup>1</sup> Consumers also increasingly seek environmentally friendly services. However, for simplicity in our discussion, we focus on the product market even if the arguments are similar for services.

environmental attributes (Darnall *et al.* 2016). These product seals have the potential to encourage companies to develop products that improve environmental conditions, to satisfy stakeholders, and to create market mechanisms for companies to accrue additional market benefits (Fischer & Lyon 2014; Grabosky 2013; Ven 2015; Darnall & Aragón-Correa 2014).

However, ecolabels do not always live up to their promise. Weak rules fail to provide sufficient incentives for firms to improve their environmental performance (e.g., Potoski & Prakash 2013a, 2013b; Darnall & Carmin 2005; Rivera & deLeon 2004). For instance, weak rules do not require specific environmental targets and data to measure a product's environmental performance. They might also lack monitoring criteria, or require few procedures that ensure conformance with the label's environmental performance standards. Ecolabels might still be effective at reducing information problems if stakeholders could distinguish the strong labels from the weak. However, stakeholders often have little direct knowledge about institutional design of ecolabels<sup>†</sup> (Li & van't Veld 2015) and searching for information is costly (Darnall & Carmin 2005).

One path to solving this problem is for consumers and other stakeholders to use information cues (Grabosky 2013) to evaluate ecolabel strength (Jiang *et al.* 2008). Cues can reduce stakeholders' information acquisition costs related to assessing the unobserved strength of an ecolabel's rules. These cues might be obtained from the ecolabel itself, or via other readily available sources, and include the type of organization sponsoring the label (Darnall *et al.* 2016). We suggest that label sponsorship, which sometimes appears on the label itself, may serve as useful cue for evaluating ecolabels.

In this paper, we investigate whether sponsorship provides stakeholders with a useful signal about the rule strength of ecolabels. We consider three types of ecolabel sponsors – industry associations, independent entities, and governments – and suggest that each type of sponsor has different incentives to design more or less stringent ecolabel rules. Industry sponsors have incentives to design ecolabels with weaker institutional requirements in order to offer firms that display their ecolabel the benefits of stakeholder rewards without incurring the costs associated with environmental improvements (Fischer & Lyon 2014). By contrast, independent sponsors design labels with stronger rule structures because these sponsors are concerned with ensuring strong environmental performance and are highly dependent on the strength of their ecolabel brand (Reinecke *et al.* 2011). Government sponsors have competing incentives for the ecolabels they manage. On the one hand they may be more likely to develop more stringent rule standards to achieve the best environmental outcomes as possible, but on the other they may develop weaker standards to attract greater numbers of firms to display their ecolabels (thus enhancing their political clout) (Fischer & Lyon 2014; Li & van't Veld 2015; Darnall & Carmin 2005).

We analyze the institutional design of 189 international ecolabels, the largest comparative study of ecolabel rules to date. We examine the extent to which these ecolabels incorporate three rule categories: environmental performance standards, monitoring criteria, and conformance requirements, and then compare these requirements across different sponsors that administer the ecolabels. Our findings offer evidence that industry sponsored ecolabels have the weakest institutional design, whereas independent sponsored ecolabels have the strongest designs. Government sponsored programs have institutional designs that were somewhere in-between, although they are closer in form to industry sponsored programs. These findings suggest that program sponsorship is an important information cue signaling whether an ecolabel is likely to be effective in conditioning firms to promote environmental performance outcomes.

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<sup>†</sup> Institutional design is defined as the formal rules that create incentives for behavior (Crawford & Ostrom, 1995). Applied to the ecolabel setting, ecolabels with stronger institutional designs incorporate formal rules that create stronger incentives for firms to develop environmentally superior products.

## 2. Ecolabel Design and Rule Structure

Effective ecolabels solve information problems between firms and their stakeholders (and especially consumers) in that firms receive recognition for producing environmentally friendly products, and their stakeholders, who are now able to distinguish environmental leaders from laggards, bestow goodwill and market benefits by purchasing ecolabeled products. Based on this promise, ecolabels have proliferated from a dozen worldwide in the 1990s (Delmas *et al.* 2013) to more than 450 in 2014 (Darnall & Aragón-Correa 2014).

However, the mere presence of an ecolabel does not always signal a product's superior environmental attributes. For instance, the majority of the US fish farming industry's 20 ecolabels have been criticized for failing to distinguish between sustainably produced fish and conventional fish (Volpe *et al.* 2011). Ambiguities such as these have led to skepticism among consumers and other stakeholders about the legitimacy of some ecolabels (Delmas *et al.* 2013; Darnall *et al.* 2012). Moreover, while stakeholders typically understand ecolabels in general terms, they often lack specific understanding of what a particular label might require and how its standards are enforced. For example, Europe's most widely recognized ecolabel is the European Union (EU) Flower. This label indicates that a product or service has a reduced environmental impact throughout their life cycle, from the extraction of raw material through to production, use and disposal (European Commission 2016). Though most consumers know that the EU is the ecolabel sponsor, 40% of United Kingdom citizens report that they do not know the exact meaning of EU Flower ecolabel (Austgulen 2013), and far fewer understand the label's formal rules. Consumers' lack of knowledge is even more apparent for less known labels such as "Global Green Tag Certified" or "Cradle to Cradle Certified."

Since searching for information about the strength of ecolabels' rules is costly (Darnall & Carmin 2005) consumers might be better served by relying on other information cues instead. One potential information cue is the type of organization sponsoring the ecolabel (Darnall *et al.* 2016; Ven 2015). If sponsorship credibly signals the quality of ecolabel rules, ecolabels may be better positioned to help solve information problems between environmentally progressive companies and their stakeholders.

Previous research (e.g., Darnall & Carmin 2005; Henriques *et al.* 2013; Prakash & Potoski 2006, 2012) suggests that strong rule structures are more likely to encourage companies to reduce their environmental impact. While robust rules do not necessarily guarantee that a product will be more environmentally superior to competing products, the absence of rule structures almost certainly guarantees an ecolabel's failure to require participating firms to improve environmental performance. Three types of rules are particularly important: environmental performance standards (Prakash & Potoski 2006), monitoring criteria, and conformance requirements (Darnall & Carmin 2005).

An ecolabel's environmental performance standards define the environmental performance outcomes products must achieve in order to display the label. One type of performance standard is the requirement that firms use specific performance metrics or performance data for their labeled products. By incorporating environmental performance standards into their business practices, firms are more likely to meet those standards (Atlee & Kirchain 2006) because metrics enable firms to measure progress toward a performance goal (Atlee & Kirchain 2006). Another important aspect of an ecolabel's environmental performance standards involve requiring firms to conduct assessments of their environmental performance. Such assessments are important because firms tend to manage what they measure. Similarly, ecolabels that require firms to achieve ecolabel performance targets over time commit to long-term environmental performance expectations that help them sustain their environmental performance into the future.

A second important category of ecolabel rules is monitoring criteria. Effective monitoring criteria determine whether a product bearing an ecolabel meets the label's environmental standards (Catska & Corbett 2014). Third party *auditing* is a particularly important monitoring feature for improving ecolabel efficacy (Catska & Corbett 2014; Darnall & Sides 2008; Deaton 2004). Ongoing audits by independent third parties involve the systematic, documented processes for obtaining evidence and determining the extent to which ecolabel criteria are fulfilled. Such assessments can encourage continuous improvements over time (Tanner 2000) and bolster the label's credibility (Atkinson & Rosenthal 2014; Catska & Corbett 2014; Deaton 2004) among critical stakeholders. Similarly, third party *certification* goes a step further by indicating that an independent third party has confirmed that a product adheres to an ecolabel's rule structures.

Finally, conformance requirements articulate the expectations that a firm must undertake when its product fails to meet the ecolabel's environmental performance standards or monitoring criteria (Delmas & Burbano 2011). Conformance requirements include requiring firms to issue corrective action reports that oblige companies to make specific procedural changes in order to meet the ecolabel's environmental performance standards and monitoring criteria. By virtue of assessing the nonconformance and developing a corrective action remedy, firms are more likely to follow through with conforming to the standard (Darnall & Carmin 2005). In a voluntary setting where legal penalties do not exist for nonconformance, information disclosure is another type of requirement that can ensure firms' conformance with program rules (Delmas & Burbano 2011; Lyon & Montgomery 2013). By publicly disclosing information about the efficacy of the ecolabel, external sources can monitor firms' adherence to the program's environmental performance standards, thus increasing transparency and reducing opportunities for label misuse.

While the theoretical and empirical research clearly indicates that ecolabels need appropriate rule structures in order to live up to their policy potential (Bougherara & Grolleau 2005; Catska & Corbett 2014; Dendler 2014), what remains uncertain is the extent to which ecolabels are designed with strong overall rule structures and whether the strength of overall rule structures differ across sponsors. Assessing ecolabels' overall rule structures is important because even if an ecolabel has strong monitoring criteria and conformance rules, weak environmental performance standards is likely to lead to the development of ecolabeled products that fail to improve environmental conditions. Similarly, ecolabels with strong environmental standards, but weak monitoring criteria or conformance requirements create opportunities for labeled products to avoid meeting environmental performance standards. However, since ecolabel research has tended to focus narrowly on a single ecolabel (e.g., Brown *et al.* 2002; Heinzle & Wüstenhagen 2012), it has been difficult to compare ecolabel rule structures, and arrive at an overall assessment about the extent to which these rule structures differ across sponsors.

Comparing strengths of ecolabels rule structures across sponsors is particularly important for consumers because they generally have insufficient information to distinguish the strong ecolabels from the weak. Consumers often have limited knowledge about the rule structure of even the most common ecolabels in the market (Austgulen 2013; Bougherara & Grolleau 2005; Dendler 2014). Sponsorship therefore appears to be one feature that stakeholders, and especially consumers, can use even if rule strength is not. We posit that sponsorship may serve as an important information cue that helps consumers differentiate among ecolabels according to their rule strength.

### **3. Ecolabel Design and Sponsorship**

Ecolabel rule structures are put in place by their sponsors. There are three main types of sponsors that administer ecolabels: industry associations, independent organizations, and government entities (Fischer & Lyon 2014; Li & van't Veld 2015). Below we outline why ecolabel rules are likely to vary across sponsors and why consumers might rely on sponsorship as an

information cue that signals the robustness of an ecolabel's rules, and hence its effectiveness in promoting positive environmental behavior.

### **3.1. Industry Association Sponsors**

Industry associations are formed to promote the interest of member firms within a particular industrial sector (Bernstein & Cashore 2007; Li & van't Veld 2015). Industry associations may create their own ecolabels to help market their members' products (Bratt *et al.* 2011; Li & van't Veld 2015). These sponsors have considerable incentive to create ecolabel rules that attract interest from the broadest range of products and member companies (Li & van't Veld 2015). However, improving a business's environmental conditions often comes at a cost (Bernstein & Cashore 2007; Walley & Whitehead 1994) and association members are likely to pressure for weaker rule standards (Fischer & Lyon 2014; Li & van't Veld 2015). Since consumers cannot assess the strength of these ecolabels (Nuttavuthisit & Thøgersen 2017) association members may still benefit from using them. Moreover, because members pay to be part of their association, industry sponsors have a strong incentive to address member concerns and enhance the environmental reputation of their member businesses (Darnall *et al.* 2010). Instead of promoting genuine environmental improvement, an industry-sponsored ecolabel might therefore provide an opportunity for firms to symbolically respond to consumers' preferences for environmentally products by creating the appearance, but not the substance, of environmentally superior products.

### **3.2. Independent Sponsors**

Independent sponsors have incentives to design ecolabels with relatively strong rule structures. Independent sponsors are not affiliated with industry and include environmental NGOs and standard-setting entities (Carmin *et al.* 2003). With respect to environmental NGOs, improving the natural environment is central to their organizational mission, and the vehicle through which they attract support from their own stakeholders. In fulfilling their mission, many environmental NGOs serve as societal watchdogs that monitor corporate environmental activities. Other incentives for creating ecolabels with stronger rule structures relate to the fact that environmental NGOs are formed by members and donors who support their organizational mission. Should members or donors believe that the environmental NGO only symbolically supports its objective of improving the natural environment, then members and donors are likely to withdraw critical support (Reinecke *et al.* 2011). Additionally, by promoting strong program rules, environmental NGOs can boost their legitimacy with future funders. Environmental NGOs therefore may have strong incentives to develop ecolabels with rules that are designed to improve firms' environmental performance (Bernstein & Cashore 2007; Fischer & Lyon 2014; Li & van't Veld 2015; Reinecke *et al.* 2011).

Independent standard setting entities facilitate trade by way of enhancing the value of their brand (Auld 2014). However, brands of any sort must convey credible information in order to be successful (Blackshaw 2008). Credibility hinges on an ecolabel's ability to provide valid information about the environmental impacts of specific products (Carmin *et al.* 2003). In the absence of this credibility, consumers are less likely to use the ecolabel when making their purchasing decisions. Thus, like environmental NGOs, independent standard setting organizations have an incentive to develop ecolabels with strong rule structures.

### **3.3. Government Sponsors**

Government sponsors have incentives to create ecolabels with rule structures that fall between those sponsored by industry associations and independent entities (Bernstein and Cashore 2007; Fischer & Lyon 2014). Government sponsors face competing pressures between improving environmental outcomes and satisfying industry interests (Fischer & Lyon 2014; Li & van't Veld

2015). On the one hand, government programs that attract a large number of voluntary participants are regarded by internal stakeholders as being successful (Darnall & Carmin 2005). Ecolabels with weaker rule structures are more likely to achieve this objective. On the other hand, weaker rule structures are less likely to lead to meaningful environmental improvements, which in the long run can generate mistrust (Nuttavuthisit & Thøgersen 2017) among societal stakeholders. Weak program rule are also incongruent with government's mission to improve social conditions. When confronted with this conundrum, governments tend to negotiate and compromise among political interests seeking stronger and weaker rule standards. The outcomes are ecolabels with somewhat weaker ecolabel rules than those developed by independent organizations, but stronger rules than industry standards (Fischer & Lyon 2014).

**Hypothesis 1:** Compared to industry sponsored ecolabels, independent and government sponsored ecolabels have stronger rule structures.

**Hypothesis 2:** Compared to government sponsored ecolabels, independent sponsored ecolabels have stronger rule structures.

To investigate these hypotheses, we assess the environmental performance standards, monitoring criteria, and conformance requirements of 189 ecolabels operating worldwide. We examine differences among program sponsors to determine empirically whether variations in the strength of ecolabel rule structures exist among sponsorship categories, and thus whether sponsorship could serve as valid signals that help stakeholders differentiate among ecolabels according to their rule strength.

## 4. Data and Methods

### 4.1. Data

To assess variations in the institutional designs of ecolabel, we relied on three data sources, the first of which was obtained from Ecolabel Index. Developed by the B Corp, Big Room, Ecolabel Index is the largest directory of ecolabels – containing information on the rules of ecolabels that are implemented worldwide. Ecolabel Index assembled its data using an online survey that it administered to managers working for the ecolabel's sponsoring organization. These ecolabel managers were identified by way of online searches using key words. Additionally, Ecolabel Index used a snowball technique by asking ecolabel managers whether they knew of other ecolabels that should be included in its list. Ecolabel managers (not identified by Ecolabel Index or by the snowball technique) could also self-report information via the same online survey at the Ecolabel Index website.

By January 2013, Ecolabel Index had compiled program design data for 436 ecolabels. We limited the data by three criteria. First, each ecolabel had to operate in a country that was part of the 34 Organisation for Economic Co-Operation and Development member (OECD) nations. These countries represent many of the world's most advanced nations (OECD 2014), possessing stronger institutional settings and higher gross domestic product. Additionally, as part of their OECD membership, these countries are required to embrace the OECD's goal of reducing global environmental impacts (OECD 2014). A total of 391 ecolabels had primary offices headquartered within OECD countries. Our second and third criteria for inclusion were that the ecolabels had to be functioning as of July 2014, and they had to have their contact information available online. A total of 352 ecolabels met our criteria, of which, Ecolabel Index had obtained complete survey data (i.e., with no missing data) for 87 (24.72%) of the ecolabels in the sample. For the remaining 265 ecolabels, only partial information was available.

To obtain complete program design data for the remaining ecolabels, in July 2014 we sent ecolabel managers of these 265 programs an online survey. Ecolabel managers were contacted via email, and assured that their individual responses would be kept confidential. Nonrespondents were sent up to four follow-up email messages. A total of 102 program managers (38.5%) responded to our online survey. Coupled with the complete data from Ecolabel Index, we obtained ecolabel design information for 189 (53.7%) of the 352 ecolabels in our restricted sample, which is by far the largest sample of ecolabels or voluntary programs that have been compared (Ven 2015; Darnall & Carmin 2016).

Ecolabel managers answered 10 close-ended questions that mirrored the survey data collected by Ecolabel Index. The survey elicited information about each ecolabel's rule structures. Questions were asked about the presence or absence or aspects of these ecolabel rules (coded 1 or 0, respectively). Rules that addressed the environmental performance outcomes that a product must achieve in order to display the label were categorized as *environmental performance standards* (Prakash & Potoski 2006). Rules that determined whether a product bearing an ecolabel meets the label's environmental standards (Catska & Corbett 2016) were categorized as *monitoring criteria*. Finally, rules that articulated expectations that a firm must undertake when its product fails to meet the ecolabel's environmental performance standards or monitoring criteria (Delmas & Burbano 2011) were categorized as *conformance requirements*.

While it might be easy to assume that all three ecolabel rules be valued equally, our position is simply that the presence of one rule without the others undermines the label's ability to perform equivalently to labels that have all three rules.

**Environmental performance standards.** Our data collection included three questions about each ecolabel's environmental performance standards. The first question drew on prior literature suggesting that having specific performance metrics or performance data leads to improved performance by enabling firms to measure progress toward a performance goal (Atlee & Kirchain 2006). We measure whether each ecolabel required firms bearing their logo to report environmental information to the ecolabel managers. Ecolabel managers were asked whether their "ecolabel requires organizations that use the label on their products/services to provide specific metrics or performance data." Ecolabel managers reported "Yes" (1) or "No" (0).

Since ecolabel sponsors may not necessarily assess the environmental or performance data that firms collect, ecolabel managers were asked, "Does your organization assess the environmental/social impacts associated with your ecolabel?" Ecolabel managers responded by indicating "Yes" (1) or "No" (0). Because ecolabels that require performance targets over time are more likely to encourage firms to commit to long term environmental performance expectations, a third type of environmental performance standard was whether or not ecolabel users were "required to improve the environmental/social performance of their ecolabeled product over time." Ecolabel managers reported "Yes" (1) or "No" (0).

**Monitoring criteria.** We utilized two measures of monitoring criteria, the first of which focused on audits. Ecolabel managers were asked whether their "ecolabel conducts ongoing audits to determine the extent to which ecolabel criteria are fulfilled." Respondents answered either "Yes" (1) or "No" (0). Additionally, ecolabel managers were asked whether or not the ongoing audit was an independent third party organization. Respondents answered either "Yes" (1) or "No" (0).

For our second monitoring criteria measure, we determined whether or not the ecolabel required that products bearing their logo undergo external certification. Additionally, ecolabel managers were asked, "what entity verified conformity to the ecolabel." Verification is the process by which organizations' products/services are assessed for whether they conform to a set of ecolabel program criteria. Respondents indicated whether verification was determined by an third party organization. Respondents answered either "Yes" (1) or "No" (0).

**Conformance requirements.** We assessed conformance requirements by way of two actions: corrective action reports and public reporting. Ecolabel managers were asked whether "your

ecolabel requires or recommends organizations that use the label on their products/services to issue corrective action reports.” Respondents answered either “Yes” (1) or “No” (0). Additionally, ecolabel managers were asked whether they required ecolabel users “to make their product assessments and/or audit reports available publicly.” Ecolabel managers answered “Yes” (1) or “No” (0).

## 4.2. Program Sponsorship

In its original survey of ecolabel managers, Ecolabel Index asked respondents to indicate whether their ecolabel was developed by an industry association, an independent sponsor, or government. Sponsorship information was not included for all but 12 of these ecolabels. We obtained the missing data for these ecolabels by way of information listed on each ecolabel’s website.

Of the 189 ecolabels in our sample, 16.4% (n=31) were sponsored by government, which is statistically similar (14.5%, n=41) to the proportion of government sponsored labels in the population. Independent sponsored labels accounted for 61.9% (n=117) in our sample as compared to 55.7% in the population ( $p < .01$ ), and 21.7% were industry sponsored as compared to 29.8% in the population ( $p < .01$ ). One possible reason for the underrepresentation of industry sponsored ecolabels in our sample is that industry managers may have been less willing to disclose information (Marquis *et al.* 2016) about their ecolabel designs unless they believe their ecolabel rules were sufficiently strong. If so, the industry sponsored ecolabels in our sample may have stronger rules than those in the broader population. By contrast, the overrepresentation of independent sponsors may be due to greater pressures for increasing their visibility which encourages their willingness to disclose information (Ebrahim 2003). Indeed, during the administration of our survey, independent ecolabel managers tended to provide more information about their labels, regardless of the actual strength of their ecolabel rules. We therefore have less concern about the overrepresentation of independent sponsored ecolabels in our sample and consequent possibility of fundamental differences in rule strengths between participants and nonparticipants.

In addition assessing the distribution of ecolabels across sponsorships, we also assessed the prevalence of sponsorship identification for each of the ecolabels in our sample. More about two-thirds (63%) of independent sponsored and 68% of industry sponsored ecolabels provide sponsorship information. By contrast, slightly more than one-third (39%) of government sponsored labels provide sponsorship information on their ecolabels.

## 4.3. Empirical Analyses

To assess variations in ecolabel design by program sponsor, we used an omnibus Fisher’s exact test (two-tailed). We then utilized Fisher’s exact pairwise comparisons (two-tailed) to draw comparisons among individual program sponsors. Fisher’s exact test is a nonparametric equivalent of the Chi-square test and determines statistical differences between two or more categorical variables. It is appropriate to use when frequencies in certain categories were small.

## 5. Results

Table 1 presents the frequencies of the rule structures for all ecolabels in our sample. Overall, a sizable proportion (84%) of the ecolabels require that participating companies provide specific environmental metrics or performance data. However, fewer (65%) actually assess participants’ environmental/social impacts associated with the ecolabel. Just over half (58%) of ecolabels have the more robust standard of requiring participating companies to improve their environmental/social performance over time. Related to monitoring criteria, 83% of ecolabels require participating companies to receive ongoing auditing, with 22% requiring second party audits and 61% requiring third party audits. Moreover, 85% of the ecolabels require external



certification from either second party (22%) or third party (63%). Finally, fewer ecolabels have conformance requirements – 75% require corrective action reports and only 34% require that assessment/audit reports be made publicly available.

**Table 1. Percentage of Ecolabels Containing Specific Design Rules**

<b>Ecolabel Design Rule</b>	<b>Percent (n=189)</b>
<b>Environmental Performance Standard</b>	
Specific metrics or performance data required	84%
Conducts assessments of environmental/social impacts	65%
Requires environmental/social performance improvements over time	58%
<b>Monitoring Criteria</b>	
Third party audit required	61%
External third party certification required	63%
<b>Conformance Requirement</b>	
Corrective action reports required	75%
Assessment/audit reports publicly available	34%

Table 2 examines whether ecolabel rule structures vary by type of sponsor. We find that industry sponsored ecolabels are as likely as governments to require reporting of specific environmental metrics or performance data in that 90% of government and 93% of industry sponsored ecolabels require that ecolabel users provide specific metrics or performance data. By contrast 79% of independent sponsored ecolabels have similar requirements ( $p < .10$ ). Moreover, independent sponsored (70%,  $p < .01$ ) and government sponsored (71%,  $p < .05$ ) ecolabels are significantly more likely than industry sponsored ecolabels (46%) to require environmental/social performance impacts of ecolabeled products. Independent sponsored ecolabels are more likely to require that ecolabeled products attain environment/social performance over time in that 62% of independent sponsored ecolabels require environmental/social performance improvements over time, while only 44% of industry ( $p < .05$ ) sponsored ecolabels have this requirement.

**Table 2. Differences among Ecolabel Design Rules by Sponsor**

<b>Ecolabel Design Rule</b>	<b>Ecolabel Sponsor:</b>			<b>Statistical Differences between:</b>		
	<b>Government (n=31)</b>	<b>Independent (n=117)</b>	<b>Industry (n=41)</b>	<b>Government/ Independent</b>	<b>Government/ Industry</b>	<b>Independent /Industry</b>
<b>Environmental Performance Standard</b>						
Specific metrics or performance data required	90%	79%	93%	--	--	†
Conducts assessments of environmental/social impacts	71%	70%	46%	--	*	**
Requires environmental/social performance improvements over time	61%	62%	44%	--	--	*
<b>Monitoring Criteria</b>						
Third party audit required	68%	64%	49%	--	†	*
External third party certification required	55%	68%	54%	†	--	*
<b>Conformance Requirement</b>						
Corrective action reports required	65%	80%	68%	†	--	--
Assessment/audit reports publicly available	36%	38%	24%	--	--	--

\*\*  $p < .01$ ; \*  $p < .05$ ; †  $p < .10$ . Significance is determined by using Fisher’s exact pairwise comparisons test, two-tailed. For instance, related to “Conducts assessments of environmental/social impacts,” 46% of industry sponsors require this rule, as opposed to 71% of government and 70% of independent sponsors. These comparative differences are statistically significant at  $p < .05$  and  $p < .01$ , respectively.

Table 2 also shows that independent sponsored ecolabels are more likely ( $p < .05$ ) to have stronger monitoring criteria than industry sponsored ecolabels. Sixty-eight percent of government sponsored ecolabels and 64% of independent sponsored ecolabels require that labeled products undergo third party ongoing audits to determine the extent to which ecolabel criteria are fulfilled. By contrast, 49% of industry sponsored ecolabels have this requirement. The pattern of results is somewhat different for the external certification monitoring criteria. Related to third party certification, independent sponsored ecolabels required it as compared to only 55% of government sponsored ecolabels ( $p < .10$ ) and 54% ( $p < .05$ ) of industry sponsored ecolabels.

Finally, Table 2 shows that independent sponsored ecolabels have stronger conformance requirements. Among independent sponsored ecolabels, 80% require corrective action reporting while government sponsored ecolabels require corrective action reports for 65% ( $p < .10$ ) of their ecolabels. The requirement that assessment/audit reports be made publicly available was the least often required rule standard in our sample. Only 34% of the ecolabels require firms to make publicly available their product assessments and/or audit reports and there were no statistically significant differences among program sponsors.

## 6. Discussion

Taken as a group, the results indicate that on balance ecolabels tend to have some type of environmental performance standard, monitoring criteria, and conformance requirement. Ecolabels tend to emphasize the provision of environmental metrics rather than conducting assessments of environmental/social impacts and more robust measures such as requirements to improve in environmental/social performance over time. Moreover, while a significant portion of the ecolabels incorporate monitoring criteria through ongoing audits and external certification, conformance expectations are fewer, and only about one-third of all the ecolabels require external transparency.

Our analyses also reveal important differences in ecolabels' rule structures across program sponsors. Although most industry sponsored ecolabels tend to require ecolabel users to report specific environmental metrics or performance data, they are less likely than government and independent programs to both conduct assessments of environmental/social impacts and undergo third party audits. Independent ecolabels are different from industry ecolabels in two other important ways. Independent ecolabels are more likely than industry sponsored labels to require both environmental/social performance improvements over time and third party certification. These findings may point to a potentially distinct role for industry sponsored ecolabels. These labels may be able to compel low performing firms to achieve relatively large environmental performance improvements. Alternatively, they may encourage firms to get on a pathway for greater environmental improvements which later encourages them to use government or independent sponsors' ecolabels. A more pessimistic view would suggest that they create opportunities for firms to symbolically respond to consumers' preferences for environmentally products by creating more of an appearance than substance of environmentally superior products.

Taken together, these findings offer evidence in support of Hypothesis 1, which states that compared to industry and government sponsored ecolabels, independent sponsored ecolabels have stronger rule structures.

It is worth noting that several of the relationships are significant at  $p < .10$ . On one hand, this confidence level falls outside the more conventional significance standard of  $p < .05$ . However, larger confidence levels can be justified in some circumstances (Fisher 1950; Thiese *et al.* 2016) such those in our study. The nature of our research design suggests the level of statistical significance may be understated for our particular findings and larger confidence levels have been used in applied social science research. Marquis *et al.* (2016) suggest that industry managers are less willing to disclose environmental information especially if they believe that this information is

less favorable. Lower response rates for industry ecolabels is likely to reflect industry sponsors' reticence to provide this information. The industry-sponsored ecolabels represented in our study therefore may have *stronger* rules than in the broader population. If so, the statistical differences between industry sponsored ecolabels and ecolabels sponsored by independent and government sponsors may be greater. However, such results and conclusions should be considered with due caution and future research should explore these questions further.

Additionally, our results suggest there is a 90% probability that independent ecolabels are designed with stronger monitoring criteria and conformance requirements than government sponsored programs in that they are more likely to require third party certification, in addition to corrective action reports. These findings offer weak support for Hypothesis 2, which states compared to government sponsored ecolabels, independent sponsored ecolabels have stronger rule structures.

## 7. Conclusion

Effective design is crucial to well-functioning institutions (Crawford & Ostrom 1995). Well-designed ecolabels can play a positive role in environmental governance, particularly in an era where government action has been sluggish, both on a global scale and within many countries. This study represents the first large scale investigation of the institutional rule structures of 189 prominent ecolabels.

Our results suggest two reasons for optimism about ecolabels' role in environmental governance. First, we find that as a group, ecolabels tend to have rule structures that previous research has identified as important criteria for effective programs (e.g., Prakash & Potoski 2006; Darnall & Carmin 2005; Darnall & Sides 2008; Matisoff *et al.* 2014). The vast majority of ecolabels have rules for environmental performance standards, monitoring criteria, and conformance requirements. Almost all the ecolabels require firms report specific environmental metrics or performance data for their ecolabeled products. The least frequently used rule structure relates to ecolabel transparency and the requirement to make assessment and audit reports publicly available.

A second reason for optimism is that the type of organization sponsoring the ecolabel seems to serve as a fairly accurate indicator of the quality of ecolabel's institutional design, and, more specifically, its rule strength. Sponsors design programs with stronger rule structures when they have stronger incentives for doing so. In this regard, independent sponsors, i.e., environmental NGOs and standard setting organizations, have the strongest ecolabel rule structures, followed by governments. Industry sponsored ecolabels have the weakest rule structures. Some may argue that the weak rule structures of industry sponsored ecolabels may hinge on the fact that our sample underrepresented industry sponsored ecolabels, implying a possible difference in the rule structures between responding and non-responding industry sponsors. However, as noted earlier, this concern is diminished when we consider the possible reason for the underrepresentation. Environmentally high-performing companies are more likely to disclose environmental information, whereas low performing companies are more likely to hide environmental information from external stakeholders (Marquis *et al.* 2016). Similarly, industry sponsors may be less likely to respond to a survey asking about their ecolabel rule structures when those rules are relatively weak. In other words, industry sponsored ecolabels in our sample may be skewed to those that have stronger rules than other industry labels. Since industry sponsored ecolabels generally have the weakest rule structures, we believe that the underrepresentation of industry sponsored ecolabels reinforces the significant variation in the rule strengths across sponsors, in particular between industry sponsors and independent sponsors. Moreover, there may be greater variation in the rule strength between government and industry sponsored ecolabels than we were able to capture with our data.

Combined these findings reinforce the notion that institutional rules are important mechanisms that underpin program design, and ecolabels more specifically. Since these rules differ by ecolabel sponsor, and because sponsoring information can be made more readily available on ecolabels than ecolabel rule structure information, independent sponsors (and to some extent government sponsors) have greater incentive to use their sponsorship as an important information cue that signals the higher quality of their ecolabel design, and their greater likelihood to require participating firms to adhere to environmental performance standards. At present, 37% of independent sponsors and 61% of government sponsors fail provide this information on their ecolabels.

These findings have important implications for future research. First, with burgeoning research analyzing the efficacy of individual ecolabels, this study offers support for the idea that we need more assessments that examine patterns across the population of ecolabels. Prospective research would benefit from identifying whether certain ecolabel rule structures are more effective in different circumstances by comparing multiple programs across a variety of settings. Additionally, future scholarship should consider rule efficacy by assessing whether stipulated rules are actually implemented. While the data demands for such studies can be significant, particularly given the challenges of identifying causality in field research, there remains room for improvement. For instance, independent sponsors can have different types of missions, funding sources, and independence from government and industry actors (Dichter 1999). Some independent sponsors could be captured by industry through financial dependence and therefore design and implement ecolabels with weaker rule structures. Future research would benefit from assessing within-sponsor variations across ecolabel rule structures.

Moreover, ecolabel institutional rules may also vary across different product types such as buildings, foods and electronic appliances as different products are associated with different environmental issues. Although, even within a single product category, there may be variations in the environmental impacts targeted (one emphasizes carbon whereas another emphasizes toxics), and so it is difficult to state definitively that one label requires more environmental improvement than another. By providing an in-depth comparison of ecolabels across a variety of settings, our aim is to set the stage for the next step of research by identifying key rule structures across a large number of prominent ecolabels. Future studies should consider other issues such as variations by country of origin, potential importance of quality implementation and enforcement for rule efficacy and suggest that future research should address this issue more directly

Finally, prospective research would benefit from understanding the extent to which different institutional rules affect environmental performance *outcomes*. Our research suggests that sponsorship may serve as an important information cue for an ecolabel's rule strength. However, while strong institutional rules of ecolabels may condition participating firms' adherence to environmental performance standards, they may not determine environmental performance *outcomes* of the ecolabel programs. Indeed, some aspects of institutional rules may be associated with greater environmental performance outcomes than other aspects. While we suggest that environmental performance standards, monitoring criteria, and conformance requirements work together to ensure that environmental goals are met, it could be that certain rules have a stronger role than others. Future research should consider these issues more formally.

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