WHEN ARE VOLUNTARY ENVIRONMENTAL PROGRAMS MORE EFFECTIVE? A META-ANALYSIS OF THE ROLE OF PROGRAM GOVERNANCE QUALITY

Abstract. We meta-analyze 103 studies of 23 voluntary environmental programs' (VEPs) to assess how their governance quality, or the rigor of their internal institutional mechanisms, drives their ability to improve their participants corporate environmental and financial performance. The goal of VEPs is to incentivize firms to reduce their environmental impacts by bolstering their reputations and helping them learn practices that improve their financial performance. Research on VEP effectiveness, however, is inconclusive, in part, because most studies sampled individual programs, and were therefore unable to analyze program characteristics that drive their effectiveness. We draw on institutional theory to argue that VEP governance quality determines whether they improve participants' environmental performance, and the natural resource-based view to argue that they improve their financial performance. Results confirm our predictions, and in doing so, help to establish a business case for VEPs with high quality governance.

Keywords: voluntary environmental programs; self-regulatory institutions; corporate environmental performance; corporate financial performance; meta-analysis

An inescapable conclusion of the corporate sustainability literature is that voids in environmental regulations enable businesses to externalize a wide range of disruptive impacts on essential macro-ecosystems like the climate, the oceans, and biodiversity (Aragon-Correa, Marcus & Vogel, 2020; Whiteman, Walker & Perego, 2013). In response, voluntary environmental programs (VEPs) have emerged to help resolve some of these externalities (Berchicci & King, 2007). VEPs are self-regulatory institutions developed by industry, non-governmental organizations and/or government agencies that provide firms a forum for collectively mitigating their environmental impacts (Barnett & King, 2008; Ostrom, 1990; van der Ven, 2019). Though they lack the coercive power of government, they attract corporations by giving them the ability to signal legitimacy-conferring stakeholders their commitment to being better stewards of the environment (Auld, 2014; Potoski & Prakash, 2005). In this way, VEP participation gives corporations a competitive rationale for improving their environmental performance (Lyon & Maxwell, 2007).

There is now a substantial body of research that has examined VEP effectiveness at improving both corporate environmental and financial performance (Aragón-Correa et al., 2020). Empirical research on this topic has, however, yielded mixed results and cast doubt on whether these programs can achieve their objectives (Aragón-Correa et al., 2020; Berchicci & King, 2008; Bowen, Bansal & Slawinski, 2018; Lyon & Maxwell, 2007). Further, no single study has examined whether VEPs can achieve their mandate of making it "pay-to-be-green" for their participants (Aragón-Correa et al., 2020). Our study helps to resolve the inconclusive and incomplete findings in the literature by meta-analyzing existing research on how VEPs impact both corporate environmental and financial performance.

Meta-analytical methods are appropriate for addressing these gaps in the literature for two reasons. First, the extant empirical literature has largely assessed the effectiveness of individual VEPs at improving corporate environmental or financial performance, which

precluded them from examining how program characteristics act as contingencies to their effectiveness (Aragón-Correa et al, 2020). Nonetheless, program characteristics are critical for understanding whether they induce better performance because they determine whether a VEP can induce different behavior from firms, as well as whether they confer competitive benefits to them, such as legitimacy or increased eco-efficiency (Berchicci & King, 2008; Castka & Corbett, 2016a; Judge-Lord, McDermott & Cashore, 2020; King & Lenox, 2000). Meta-analytical methods can address this issue by aggregating single VEP studies into a single sample, which then enables an analysis of how program attributes shape their effectiveness. Second, as mentioned previously, the existing literature has only considered the effects of VEP participation on corporate environmental or financial performance in separate studies, which means that it has yet to develop any evidence on how VEPs impact both outcomes. A meta-sample that includes studies considering both outcomes and the role of program-level contingencies in determining them can overcome this limitation.

In this meta-analysis, we identify one VEP characteristic that should be exceptionally consequential in their effectiveness: their governance design (e.g., Berchicci & King, 2007; Judge-Lord et al. 2020; Castka & Corbett, 2016; King & Lenox, 2000). Governance design refers to a VEP's system of rules that define the type of obligations placed on participating firms, and the compliance mechanisms (i.e., monitoring and enforcement) that induce fulfillment of those obligations (Cashore, Auld & Newsome, 2004; Darnall, Ji & Potoski, 2017; Potoski & Prakash, 2013). It has been widely assumed in the literature that governance design is a key factor in whether VEPs induce better environmental performance because it establishes whether they have substantive expectations and compliance mechanisms (Aragón-Correa et al., 2020; Darnall et al., 2017; Potoski & Prakash, 2013). Further, a substantial research stream has argued that VEP governance quality drives improvements in participants' financial performance because it shapes programs' legitimacy with external actors and the strength of

the natural resource-based advantages that they help firms develop (Prakash & Potoski, 2007).

Thus, our study considers how the quality of a VEP's governance design (hereafter, VEP governance quality) impacts each outcome. Our conceptual model draws on neo-institutional theory to characterize VEPs as extra-governmental self-regulatory institutions that firms join to appease institutional expectations for improving corporate environmental performance (Berchicci & King, 2007). It then explains how VEP governance quality should affect corporate environmental performance by establishing within-program institutional pressures on participating firms through their governance mechanisms. Next, it draws on the natural resource-based view of the firm to explain how governance quality impacts participating firms' financial performance by enhancing the legitimation and natural resource-based benefits to firms.

We make several contributions to research on VEPs and their effectiveness as self-regulatory institutions. First, our results show that higher quality VEP governance is associated with stronger positive effects on participating firms' environmental and financial performance. In doing so, they develop a business case for participating in well-governed VEPs. Prior research has shown that industry participants prefer poorly governed programs with lower compliance costs, because they believe the potential benefits of such programs can be obtained without making substantive improvements in their environmental performance (Aragón-Correa et al., 2020). Second, in showing that VEP governance quality can enhance both outcomes for participating firm, we help reconcile inconclusive results in the literature about their effectiveness. In doing so, we confirm that governance quality is an important determinant in whether these programs can be effective, and that weaker governance is more likely to generate only symbolic commitments to improving environmental performance by participating firms. Finally, we extend recent work by Tashman, Flankova, Van Essen and Marano (2020), who meta-analyzed how VEP governance quality affects the propensity for firms to participate in

VEPs. The present work builds on that study by showing quantitatively how the effect of VEP governance quality on motivating VEP participation varies from its effect on VEP outcomes.

The article proceeds as follows. First, we review the literature on VEPs and their impact on corporate environmental and financial performance. Next, we present hypotheses on how VEPs' governance quality affects corporate environmental and financial performance. We then explain our methods, results, and research implications.

The Emergence of VEPS

We are now in firmly in the "Anthropocene Era", a geological epoch characterized by strong and observable negative impacts of industrial-economic activity on macro-ecological systems (Hoffman & Jennings, 2018), as a result of vast regulatory voids in environmental governance (Whiteman et al. 2013). Such voids exist for many reasons, including the global scope of many environmental issues (Aravind & Christmann, 2011), polluting industries' efficacy at mounting political opposition to proactive environmental legislation (Hoffman, 2011), and the constraining effect of command-and-control regulations on firms' ability to respond to their idiosyncratic socioecological contingencies (Porter & Van der Linde, 1995). For these reasons, non-state actors have worked tirelessly to challenge the environmental legitimacy of corporate environmental degradation (Bansal & Clelland, 2004; Moon & de Leon, 2007). Environmental legitimacy refers to "the generalized perception or assumption that a firm's corporate environmental performance is desirable, proper, or appropriate" (Bansal & Clelland, 2004, p. 94). Environmental legitimacy is critical to maintaining vital stakeholder relationships, which drives firms to protect it through various means (Delmas & Keller, 2005; King & Lenox, 2000;).

In this context, VEPs have emerged to help fill voids in environmental governance systems by inducing firms to improve their environmental impacts with a promise of helping them protect their reputations (Lyon & Maxwell, 2007). VEPs take several forms, including

codes of conduct, written agreements, self-reporting schemes, and programs that mandate reaching environmental performance targets or adopting environmental management systems (Prado, 2013; Aragón-Correa et al., 2020). In each case, they function as self-regulatory institutions, or non-state market-driven governance organizations, that facilitate collective action on solving common problems for their members when uncoordinated individual actions fail to do so (Berchicci & King, 2007; Bernstein & Cashore, 2007; Cashore et al., 2004).

VEPs aim to address two collective action issues. First, for society-at-large, they incentivize firms to pursue environmental performance levels that go beyond legal expectations; and second, for firms, they address collective environmental legitimacy problems that are difficult for them to tackle individually because they can share collective environmental reputations (Bernstein & Cashore, 2007; Prakash & Potoski, 2007). This occurs because many legitimacy-conferring stakeholders, including consumers, non-governmental organizations, value-chain partners, and government agencies, frequently lack the capacity to monitor individual firm's environmental performance on their own (Barnett & King, 2008; Darnall, 2006). Thus, they often develop negative stereotypes about entire classes of firms, such as polluting industries, based on the poor behavior of some in their cohort, which makes it "difficult for any single firm to unilaterally reduce its pooled risk" (Lenox, 2006, p. 678). VEPs help mitigate this pooled risk by giving environmentally concerned stakeholders third-party warranties of firms' environmental performance that disassociate them from poor performers. The resulting improvements in environmental legitimacy should help firms manage their reputations and improve their competitiveness (Auld, 2014; Ponte, 2019).

Nonetheless, there is skepticism in the academic community over the effectiveness of VEPs at improving corporate environmental and financial performance because the extensive research on this topic is inconclusive (Aragón-Correa et al., 2020). Research has shown that VEP participation improves corporate environmental performance (e.g., Innes & Sam, 2008;

Potoski & Prakash, 2005), has no effect (e.g., Rivera & De Leon, 2004; Pizer, Morgenstern & Shih, 2011) or even leads to poor performance by attracting firms that shirk program obligations (e.g., Gamper-Rabindran & Finger 2013; King & Lenox, 2000). In addition, a separate research has shown that VEPs improve firm competitiveness (e.g., King & Lenox, 2002), have no effect (e.g., Heras-Saizarbitoria, Molina-Azorín & Dick, 2011), or have negative effects on it (e.g., Paulraj & de Jong, 2011). To make sense of these mixed findings on whether VEPs improve corporate environmental or financial performance, several scholars have suggested that VEP governance quality is a critical contingency that could affect both outcomes (e.g., Darnall & Sides, 2008, Darnall et al., 2017; Castka & Corbett, 2016; Judge-Lord et al., 2020; King & Lenox, 2000; Lyon & Maxwell, 2007; Prakash & Potoski, 2012). This factor, however, has received little empirical attention because most quantitative studies sample individual programs and/or do not statistically evaluate cross-program differences (Aragón-Correa et al., 2020).

Importantly, there are several cross-program empirical studies on how program-level characteristics impact VEP outcomes, but they are by-and-large qualitative, or they do not consider our focus on whether VEPs impact both corporate environmental and financial performance. For example, van der Ven (2019) studied how program funding criteria impact the credibility of different VEPs with consumers; Auld (2014) studied how the strategies of VEPs in the coffee, fisheries and forestry sectors have evolved differently over time due to unique contingencies of these sectors; Ponte (2019) considered how VEPs in the biofuels, coffee and wine sectors induced some environmental upgrading among suppliers, but found that the financial benefits of these upgrades accrue largely to buyer organizations, thereby discouraging substantive participation among suppliers. Further, to compare the quality of different VEPs in the forestry industry, Judge-Lord and colleagues (2020) theorized the concept of VEP stringency as the scope of environmental issues that a program can address, and the

nature and substance of the requirements it places on participants for each issue. In addition, Fransen's (2011) research in the clothing industry found that the consensual and contentious interactions between industry and activists during the formation of VEPs can lead to diverging standards, costs, and levels of participation. Finally, Gulbrandsen's (2010) qualitative assessment of the forestry and fishing industries found that more programs with stricter rules are more effective but attract fewer participants.

Therefore, to advance the conversation, our study builds on these works with a quantitative-deductive approach that clarifies the role that VEP governance quality plays in helping these programs meet their goals. Below, we further discuss the concept of VEP governance quality and present our hypotheses.

VEP Governance Quality

Like their public counterparts, private governance institutions like VEPs have varying levels of governance quality, which refers to the quality of the rule systems they use to induce behavioral changes from the entities they are trying to regulate (Gulbrandsen, 2010; Tashman et al., 2022). As VEPs lack coercive power of governmental regulatory authorities, they seek to influence firms through their ability to both provide and withhold reputational for improving environmental performance (Auld, 2014; Bernstein & Cashore, 2007). The strength of this influence, in turn, likely depends on the rule systems they use to motivate participating firms to improve their environmental impacts (van der Ven, 2019).

The scope and range of rules in VEP governance systems is contested in the literature, with scholars employing a wide variety of definitions (Judge-Lord et al., 2020). One reason for the lack of agreement is that different VEPs cover different parts of the value chain (suppliers, facilities, firms, products), and different issues with unique economic and environmental contingencies. Thus, they may require fundamentally different types of governance solutions (Wijen, 2014). Scholars, however, generally agree that the quality of a VEP's governance

depends on the strength of its substantive rules, which identify the behavioral changes that programs expect from firms, and procedural rules, which help establish and enforce its substantive rules (Auld, 2014; Cashore et al., 2004; Darnall Ji & Vázquez-Brust, 2018; Judge-Lord et al., 2020; King & Lenox, 2000; Prakash & Potoski, 2007).

Given our interest in comparing numerous VEPs that focus on different issues and parts of the value chain, we use the concept of governance quality that was developed in the recent meta-analysis on the drivers of VEP participation by Tashman and colleagues (2022), which is based on earlier conceptualizations by Darnall et al. (2018), King & Lenox (2000) and Koehler (2007). That conceptualization considers the strength of substantive rules as a function of whether VEPs require explicit environmental performance targets, or the adoption of management systems, practices and/or codes of conduct that provide some firms flexibility in achieved environmental performance. Further, it considers the strength of procedural rules as a function of the independence of third-party verification of firm compliance with VEPs and whether VEPs expel firms found out of compliance to withhold positive reputational benefits from being associated with the program. Accordingly, the literature has assumed that VEPs with better governance require firms to meet environmental performance targets rather than provide them flexibility, which can lead to shirking; have independent third-party oversight that is not subject to moral hazard; and expel non-compliant firms to provide a negative inducement for them to avoid underachieving program expectations (Darnall et al., 2018; King & Lenox, 2000; Koehler, 2007; Tashman et al., 2022). VEPs with better governance also have mechanisms that work together systematically. VEPs with strong monitoring and penalties and weak environmental performance standards may induce strong compliance with trivial standards (Darnall & Carmin, 2005). Similarly, exceptional standards may mean little if weak oversight and/or sanctions enable symbolic effort. Thus, it is important to consider the totality of VEPs' rules when assessing their effectiveness (Darnall et al., 2017; Tashman et al., 2022).

VEP Governance Quality and Corporate Performance

VEP Governance Quality and Institutional Pressures, and Corporate Environmental Performance

To explain how VEPs' impact corporate environmental performance depends on its governance quality, we draw on neo-institutional theory, which is concerned with how firms respond to various institutional pressures in order to maintain their legitimacy (Scott, 2013). As discussed above, VEPs and their governance mechanisms should influence participating firms' behavior in ways that address the collective action problems facing them (Bernstein & Cashore, 2007; Prakash & Potoski, 2007). We argue that VEPs with high quality governance are more likely to generate multifaced internal institutional pressures on firms through their substantive and procedural rules, which in turn are more likely to induce the environmental improvements from firms. For instance, environmental performance targets and independent verification both apply strong normative pressures on firms by, respectively, presenting clear and explicit expectations, and credible independent audits of their compliance with those standards that are not prone to moral hazard. Moreover, sanctions involving expulsion apply coercive pressure on firms by threatening to withhold the key reputational benefits that VEPs offer to protect their legitimacy.

However, programs with lower governance quality are more likely to facilitate symbolic efforts from participating firms for two main reasons. First, they often contain weak enforcement mechanisms that enable firms to shirk their commitments to improving corporate environmental performance by allowing them to exaggerate their efforts without accountability from independent verification or avoid negative consequences like expulsion if they are found to be out of compliance (King & Lenox, 2000; Prakash & Potoski, 2007). Second, VEPs lacking environmental performance targets allow firms to focus on improving procedures instead of outcomes, which makes them susceptible to decoupling. In particular, opportunistic

firms can adopt mandated practices or codes symbolically by focusing on making their practices appear robust rather than effective (Aravind & Christmann, 2011). Further, well-intentioned firms may inadvertently decouple VEP objectives from environmental performance improvements because the linkages between environmental practices and actual environmental performance improvements are often opaque (Bromley & Powell, 2012; Wijen, 2014). In sum, VEPs with lower quality governance should generate weaker internal normative and coercive pressures, which may be necessary for inducing substantive participation from firms. In light of these considerations, we predict that:

Hypothesis 1. Level of VEP governance quality positively moderates the effect of voluntary environmental program participation on corporate environmental performance.

VEP Governance Quality and Resource-based Advantages, and Corporate Financial Performance

To explain how VEPs' impact on corporate financial performance depends on their governance quality, we draw on the natural resource-based view of the firm (NRBV) (e.g., Hart, 1995). The overarching premise of the NRBV is that firms can derive competitive advantages through the development of environmentally responsible practices. Such practices take two forms. First, such practices can help firms reduce their natural resource input and output requirements (i.e., pollution prevention practices) in ways that provide long-term cost savings in a manner that outweighs the investments that are required to deploy these practices (Hart, 1995). Second, firms that invest in practices that reduce their natural resource input and output requirements throughout their supply and distribution chains (i.e., product stewardship practices) can preempt regulations and compliance costs and differentiate themselves as sustainable organizations, which allows them to charge product premiums (Baek, 2017; Berchicci & King, 2007; Darnall et al., 2017; Hart, 1995).

Drawing on the NRBV, we argue that the VEPs with better governance quality provide participating stronger financial benefits than those with weaker governance because they induce their participants to deploy more substantive environmental practices. In particular, we expect VEPs with explicit targets and credible compliance mechanisms to be better at motivating their participants to pursue practices that have a stronger likelihood of improving their environmental outcomes like pollution prevention and product stewardship practices. As participating firms develop the capabilities to deploy these practices, they should find opportunities to capture excess rents stemming from cost reductions and product premiums, respectively (Hart, 1995). Further, such practices can also generate within-firm knowledge spillovers that improve the value of other organizational capabilities such as total quality management systems that reduce non-environmental costs, external stakeholder management capabilities that improve corporate relationships, and even technological innovation activities (Henriques, Husted & Montiel, 2013; Moon, Bae & Jeong, 2014).

In addition, better governed VEPs may help improve corporate financial performance because they are more likely to help firms improve or protect their environmental reputations with environmentally concerned stakeholders. Such programs have more legitimacy with critical stakeholder groups such as consumers, NGOs, and investors, because many believe that VEP governance is critical to their effectiveness at inducing better environmental performance (Darnall et al., 2017). Since governance quality impacts a VEP's legitimacy with critical stakeholder groups, it should also affect how well firms can leverage their participation in programs to bolster their brands. In light of these arguments, we offer the following prediction:

Hypothesis 2. *VEP governance quality positively moderates the effect of voluntary environmental program participation on corporate financial performance.*

Methods

Literature Search and Coding

To maximize the number of articles about how VEPs influence corporate environmental and financial performance, we relied on five search strategies. First, we read several review articles (e.g., Berchicci & King, 2007; Borck & Coglianese, 2009; Carmin, Darnall & Mil-Homens, 2003; Castka & Corbett, 2016; Tuczek, Castka, & Wakolbinger, 2018) and one prior meta-analysis on this topic (Darnall & Sides, 2008), and collected all the relevant studies they cited and analyzed. Second, we searched Google Scholar, Business Source Premier, Web of Science, Evidensia, and EbscoHost (Business Source Complete) using the following keywords associated with VEP attributes: codes of conduct, eco-label, environmental certification, environmental self-regulation, environmental voluntary agreement, environmental management system, fair trade, multi-stakeholder partnership, VEP, voluntary environmental initiative, voluntary environmental program, voluntary environmental standard, sustainability standard, voluntary sustainability our initial article searches [i]. Our list of keywords and programs was informed by review articles on VEPs (e.g., Berchicci & King, 2007; Borck & Coglianese, 2009) and by Darnall & Carmin's (2005) work that includes an extensive list of VEPs. Third, we manually searched 30 journals from disciplines such as economics, environmental sciences, management, policy and political science that published articles on VEPs based on our initial article searches [ii]. Fourth, we used a "snowballing" technique to collect all relevant articles cited in the retrieved articles, as well as relevant articles citing them on Google Scholar (Davis & Rothstein, 2006). Finally, we inquired about unpublished empirical work that fit our search criteria through five Academy of Management listservs (Organization and the Natural Environment; Social Issues in Management; International Management Division; Organization and Management Theory; Business Policy and Strategy) to mitigate any "file drawer" problems (Rosenthal, 1979). Journals tend to publish studies with statistically significant results rather than non-significant results, which creates publication

bias. To avoid this bias (Steel, Beugelsdijk & Aguinis, 2021), our sample includes all primary studies on VEPs independent of journal quality, citation rate or discipline.

Because our study is a quantitative meta-analysis, primary studies in our sample had to report statistical information (e.g., t-statistic, correlation coefficient, F-statistic) for calculating effect sizes between VEP participation and corporate environmental or financial performance. If such information was not available, we contacted authors to obtain it, and if the data were not provided, we excluded the study in question. We also excluded studies if the participating firms' home country was not clearly identified as environmental and financial outcomes of VEP participation might be contingent on institutional characteristics of countries of origin of participating firms (Delmas, 2002; Prakash & Potoski, 2012). The literature search concluded in May of 2022 and yielded a sample of 23 VEPs in 103 primary studies (90 published and 13 unpublished papers), which used data from 1987 until 2019, and were published between 1999 and 2021. The full list of these primary studies is included in the Appendix. Table 1 lists each program in the sample.

Insert Table 1 About Here

To extract relevant data for all variables and study characteristics for the meta-analyses, we carefully examined and coded all sampled articles using a coding protocol based on Lipsey and Wilson's (2001) best practices. Since we rely on objective data for all variables, intercoder unreliability or subjectivity did not represent a concern. Nonetheless, we cross-checked our coding by having two authors code all effect sizes, and resolving differences via discussion until a consensus was reached (Stanley & Doucouliagos, 2012).

Variables

Our meta-analytical technique allows us to combine data extracted from primary studies (e.g., VEP participation - environmental performance effect size, medium year of sample

window, etc.) with additional variables that collected from secondary sources (e.g., VEP governance quality, meta-index based on the World Bank World Governance Indicators, etc.).

VEP participation. We included two operationalizations that are commonly used in the literature: a dummy variable (1 if a firm was a member, 0 if it was a non-member), and the percentage score for firms' probability of participation in the VEP. Many scholars use the latter measure in their primary studies to control for self-selection bias, which was calculated using either the Heckman procedure or propensity score matching in our sample.

Environmental performance. We identified six unique environmental performance measures commonly found in the literature: (1) *total emissions* (e.g., King & Lenox, 2000), (2) *difference between actual and predicted emissions* (e.g., Berrone, Fosfuri & Gelabert, 2017), (3) *environmental performance indices* (e.g., Russo & Harrison, 2005), (4) *environmental practices* such as adoption of pollution prevention technologies (e.g., Bi, Deltas & Khanna, 2011) and source reduction activities (e.g., Hoang, McGuire & Prakash, 2016) (5) amounts of *natural resource use* (e.g., Arimura, Darnall, Ganguli & Katayama, 2016), and (6) *survey-based measures of environmental performance* (e.g., Simpson, 2012), which capture respondents' perceptions of their firm's environmental performance. All other sparsely used measures were coded as *other* (reference group). Coefficients on measures of emissions and amounts of natural resource use were reverse coded so that higher values imply better environmental performance (i.e., lower emissions or use of natural resources).

Financial performance. We identified several financial performance measures from our sample of primary studies: (1) *financial market-based measures* (i.e., market-to-book ratio, stock performance, and Tobin's Q; e.g., Lenox, 2006); (2) *accounting-based measures* (i.e., profit margin, return on assets (ROA), return on sales (ROS); e.g., de Jong, Paulraj & Blome, 2014); (3) *survey-based measures* (e.g., Melnyk, Sroufe, Calanatone & Montabon, 2002), which capture respondents' perceptions of their firm's financial performance; and (4)

productivity-based measures (i.e., technical efficiency, crop yield; e.g., Sahu & Narayanan, 2016) (reference group).

VEP governance quality. We measured VEP governance quality following the procedure developed by Tashman et al. (2022), which is based on prior works in this area (i.e., Carmin, Darnall & Mil-Homens, 2003; Darnall & Carmin, 2005; Darnall et al., 2017). This approach identifies three types of rules that are important for VEP governance, namely: type of environmental performance standard, type of oversight on firm compliance with those standards, and type of sanction for firms that are found to be out of compliance. Further, it identifies higher quality rules as those involving substantive standards that require firms to (1) achieve specific environmental performance targets, (2) independent oversight of firm compliance that cannot be influenced by firms, industries, or programs, and (3) strict sanctions involving expulsion that can act as a credible deterrent for non-complying firms. We then followed the measurement approach outlined by Tashman et al., (2022) by developing a count score of VEP governance quality that had a range from 0-3 based on whether the program has (1) explicit environmental performance targets; (2) independent third-party verification; and, (3) expulsion mechanisms for non-compliance as procedural rules. We identified whether VEPs had any of these mechanisms by reviewing text in primary studies and VEP websites. Coding was performed by two authors who worked together to identify and resolve coding differences. A score of 3 would indicate that a VEP has a full set of high-quality governance mechanisms (i.e., explicit environmental performance targets, independent third-party verification, and a policy of expelling firms that do not comply with program mandates) and a score of 0 would indicate that a VEP had none of these mechanisms. Table 1 shows the governance quality score of each VEP in our sample.

Methodological and study artifacts. We included several methodological and study artifacts associated with each effect size as controls in our moderator analyses. First, we

controlled for the institutional quality in firms' home countries since their regulations, legal systems, and other institutional features may significantly impact whether firms substantively participate in VEPs (Aragón-Correa et al., 2020). We measured this control by developing a meta-index from the World Bank World Governance Indicators (WGI) (Globerman & Shapiro, 2003). The WGI are comprised of six indices that capture the quality of different dimensions of a country's institutional quality - *Voice and accountability*, *Political stability and absence of violence*, *Government effectiveness*, *Regulatory quality*, *Rule of law*, and *Absence of corruption*. In using these indices to measure home country institutional quality, we follow a large body of international business research (Cuervo-Cazurra, Gaur & Singh, 2019). Since each of the WGI are highly correlated among each other, our measure calculates a meta-index based on the first principal component of the six indices (Globerman & Shapiro, 2003; Tashman, Marano & Kostova, 2019).

We also controlled for whether the primary study was published or unpublished (reference group) with a dummy variable to account for publication bias associated with the "file drawer problem" (Gonzalez-Mulé & Aguinis, 2018; Havránek et al., 2020; Steel et al., 2021). Moreover, we controlled for whether coefficients were partial or bivariate (reference group) with a dummy variable called *Partial*, as well as whether the coefficient was based on cross-sectional or panel data (reference group). We included a dummy variable capturing whether the effect size was calculated with endogeneity control or not (reference group) (van Essen, Otten & Carberry, 2015). We controlled for each study's median year of sample window with a variable called *Time* to account for the timeframe in which each occurred.

Because VEPs can target different levels of analysis in organizations (i.e., whole organization, individual facilities, individual products), we controlled for whether VEPs applied to firms, facilities, and products (reference group) with dummy variables. We also controlled for the focal industries of each study using dummies: chemical, manufacturing,

service (present only in financial performance sample), energy (present only in financial performance sample), mixed/other (reference group) and environmental and financial performance measurements that were discussed in detail earlier.

Analysis

Hedges-Olkin type meta-analysis (HOMA). Prior to testing our hypotheses, we determined the meta-analytical mean correlations between VEP participation and corporate environmental and corporate financial performance using Hedges-Olkin type meta-analysis (HOMA) (Hedges & Olkin, 1985; Lipsey & Wilson, 2001; Geyskens, Krishnan, Steenkamp & Cunha, 2009). In the HOMA, we calculated meta effects of both Pearson product-moment correlations (r) and partial correlation coefficients ($r_{xy.z}$) as effect sizes. In line with recent guidelines, we used random effects techniques to account for heterogenous samples in primary studies (Lipsey & Wilson, 2001, Geyskens et al., 2009). If multiple effect sizes were reported in one study (e.g., different operationalizations of environmental or financial performance), we included all of them in the sample. To account for accuracy differences across effect sizes, we weighted each effect size by its inverse variance weight w, which is the inverse of the squared standard error (Lipsey & Wilson, 2001). We then used these weights to compute the standard error of the mean effect size and its corresponding confidence interval. In our HOMA, we meta-analyzed the relationship between VEP participation and corporate environmental and financial performance (1) for all studies, (2) only for studies that control for endogeneity, and (3) only for studies that do not control for endogeneity, in order to assess whether coefficient estimated without endogeneity controls produced biased aggregate results.

Meta-analytic regression analysis (MARA). To test our hypotheses, we relied on meta-analytic regression analysis (MARA), which is a weighted least squared-based technique that estimates the effect of moderator variables (e.g., VEP governance quality) on the main relationships of interest (Lipsey & Wilson, 2001). In the current study, the dependent variables

were estimates of relationships between VEP participation and corporate environmental and financial performance, respectively. MARA effect sizes indicate how given predictors impact (i.e., moderate) the relationships that are captured by the dependent variables. Accordingly, our main predictor variable was *VEP governance quality*. MARA also allows us to control for any bias introduced by methodological and study artifacts from individual studies in our sample. For this end, as discussed above in the measurement section, we included a range of methodological and study artifacts controlling whether a primary study was published or not, whether the effect size was based on partial or bivariate corrections and on cross-sectional or panel data, whether endogeneity controls were included and whether a VEP operated at the firm, facility or product-level, and for time. We also included environmental and financial performance operationalizations and industry controls.

We followed meta-analytic norms (Stanley & Doucouliagos, 2012) by estimating both (r) and ($r_{xy.z}$), and weighted these effect sizes by their inverse variance weight (w) to capture the differences in precision of the information contained in them (Aguinis, Gottfredson & Wright, 2011). We also employed random effect estimations in these analyses (Geyskens et al. 2009; Gonzalez-Mulé & Aguinis, 2018).

Results

HOMA Results

Table 2 reports the HOMA results for the relationships between VEP participation and corporate environmental performance for both Pearson product-moment correlations (r) and partial correlation coefficients ($r_{xy,z}$). These results show that VEP participation is associated with better environmental performance. The mean correlation r (0.09; s.e. = 0.02; p=0.000) and partial coefficient $r_{xy,z}$ (0.04; s.e. = 0.00; p=0.000) were both positive and significant. In addition, $r_{xy,z}$ was positive and significant for coefficients that were estimated with endogeneity

controls ($r_{xy,z}$ = 0.03; s.e.=0.00; p=0.000), as well as for those that were not ($r_{xy,z}$ = 0.03; s.e. = 0.00; p=0.000).

Insert Tables 2 and 3 About Here

Table 3 reports the HOMA results for the relationships between VEP participation and corporate financial performance. These results show that, overall, VEP participation is associated with higher levels of corporate financial performance as demonstrated by the estimated means of *r* (0.01; s.e. = 0.00; p=0.004) and $r_{xy,z.}$ (0.03; s.e. = 0.00; p=0.004). Studies that controlled for endogeneity ($r_{xy,z.}$= 0.04; s.e. = 0.01; p=0.000), and studies that did not ($r_{xy,z.}$= 0.03; s.e. = 0.01; p=0.000) both yielded positive and significant mean correlation coefficients.

MARA Results

The MARA results in Table 4 present the test of our hypothesis regarding how VEP governance quality impacts participants' environmental performance. Model 1 in Table 4 reports tests of Hypothesis 1, which predicted that VEP governance quality positively affects participants' environmental performance. Here, the coefficient is positive and statistically significant (β = 0.034; s.e.=0.007; p=0.000), providing support for Hypothesis 1.

Insert Table 4 About Here

Model 2 in Table 5 reports tests of Hypothesis 2 which predicted that VEP governance quality positively affects VEP participants' corporate financial performance. The coefficient of governance quality in Model 2 is positive and significant at 5% level (β = 0.044; s.e.=0.021; p=0.004), providing support for Hypothesis 2.

Insert Table 5 About Here

Robustness Tests

Alternative measures of VEP governance quality. First, we performed additional analyses using two alternative measures of VEP governance quality that provide more fine-grained assessments of the quality of VEP (1) program standards, (2) verification, and (3) sanctioning criteria by expanding the scale of each dimension. Specifically, we first measured the quality of VEP environmental performance standards on a scale of 0-2, where a program received a 2 if it had explicit environmental performance targets, a 1 if it mandated environmental management systems (EMS) or specific environmental practices that firms needed to adopt instead of setting specific targets, and 0 if VEPs required written commitments or adoption of codes of conduct. EMS and other mandated practices are lower quality than explicit environmental performance targets as they are vulnerable to decoupling (Wijen, 2014), and written commitments and codes are the most lenient type of program standards because decisions about changes are left to the firm's discretion (Darnall et al., 2017). Second, in terms of verification criteria, third party verification is the most stringent one (which was thus scored as a 2) due to its independence from corporate influence (Potoski & Prakash, 2005). Program verification, which refers to VEPs verifying progress of their participating firms, represents a medium level of governance quality in this category (1 point) because there is evidence that VEPs can be influenced by their participants (Darnall & Carmin, 2005). Lastly, industry-led, or self-verification is the most lenient verification approach since it is subject to moral hazard (Berchicci & King, 2007); thus, it was scored 0. Third, in terms of sanctioning mechanisms, expulsion of non-compliers is the most stringent since it results in a complete withholding of program benefits for participants (King & Lenox, 2000); thus, it was assigned a score of 2. Publishing lists of non-complying firms to shame them with interested stakeholders (Gunnigham, 1995) represents a medium level of governance quality and was assigned a score of 1, as it can have some effect on firm legitimacy, but still allows non-compliant organizations to remain VEP members (Potoski & Prakash, 2005). Absence of sanctions for non-compliers

is the most lenient form within this category (0 points). The resulting alternative measure of governance quality sums these three dimensions and yields a potential score ranging from 0 to 6, where 6 presents the highest quality governance while 0 represents that lowest quality. Tables 6 and 7 present results using this alternative measure of VEP governance quality. The results of these analyses in Model 1 (environmental performance; Table 6) and Model 3 (financial performance; Table 7) are consistent with our main results.

Our second alternative measure of VEP governance quality is a 0-7 count score. It builds on our 0-6 score by adding an additional criterion of VEP sponsorship which has been used by some researchers as a measure of VEP stringency (Darnall, Potoski & Prakash, 2010). VEP stringency refers to how strict program environmental performance targets are, where more stringent programs require more substantive improvements in participants environmental impacts (Judge-Lord et al., 2020). Specifically, prior research suggests that VEPs sponsored by NGOs, when compared with industry and government sponsored programs, tend have stricter environmental performance targets both in terms of the scope of environmental issues they require participants to address and the amount of improvement they require for each issue (Darnall et al., 2017; Fischer & Lyon, 2014; Judge-Lord et al, 2020; Reinecke, Manning & von Hagen, 2012). Thus, if a particular program is sponsored by an NGO, it received 1 point; 0 otherwise. Results in Models 2 (Table 6) indicate that VEP governance quality positively moderates VEP participation – environmental performance relationship, but the effect is not significant in financial performance analyses (Table 7, Model 2).

Overall, the alternative measures of VEP governance quality provide results that are mostly consistent with results based on our main measure (0-3 score), with the exception of the effect of the second alternative measure on the VEP participation – corporate financial performance relationship. We believe that the lack of support from this robustness check stems from a potential internal inconsistency in the dimensions for that measure of VEP governance

quality. In particular, that measure included a component for program sponsorship because several scholars have developed evidence that NGO sponsored VEPs are more stringent than government and industry sponsored VEPs. Stringency, however, is a distinct concept from governance quality, where the former describes the prescriptiveness and scope of the performance expectations of the program, where the latter refers to the quality of the rules that govern the program. As a result, the unsupported robustness check used a measure of VEP governance quality that had a theoretically questionable component.

Insert Tables 6 and 7 About Here

Additional robustness tests. We performed several additional analyses to address several problems that commonly affect meta-analyses; results from these additional tests are available upon request from the authors. First, we ran artifact-corrected meta-analytic methods to corroborate our HOMA (Hunter & Schmidt, 2004), which have been increasingly used in recent years. These results are similar to those of the HOMA analysis and support our findings. Next, we used Comprehensive Sensitivity Analysis Tool (CSAT) that includes an array of outlier and additional publication bias tests for meta-analyses and represents best practices in meta-analytical research (Field et al., 2018). Publication bias tests are necessary even when meta-analytical samples include both published and unpublished works because these studies are typically unable to include the entire population of these works. Thus, such bias can still be present in these cases. To begin, we conducted a one-sample removed analysis to assess the influence of each individual sample on the HOMA analysis (Borenstein, Hedges, Higgins & Rothstein, 2009) and to detect outliers. These results also indicate an absence of significant outliers in our sample. We then conducted CSAT's five publication bias assessments – namely, funnel plots, Duval and Tweedie's trim and fill technique (Duval & Tweedie, 2000; Duval, 2005), cumulative meta-analysis by precision (Kepes, Banks, McDaniel & Whetzel, 2012),

selection models (Harrison et al., 2017), and precision-effect test-precision with standard error analysis (PET-PEESE; Stanley & Doucouliagos, 2014). The advantageous feature of CSAT is that it estimates the combined effect of outliers and publication bias by providing publication bias test results before and after outlier removal. This is important as outlier-induced heterogeneity can influence the validity of publication bias tests which in turn threatens the validity of meta-analytical results (Field et al., 2018). The results of CSAT publication bias tests indicate absence of publication bias in our meta-analysis.

Discussion

Our main contributions are to research on the effectiveness of VEPs as self-regulatory institutions. The promise of VEPs depends on their ability to create market-based incentives for firms to improve their environmental performance without the sanctioning power of the state. Prior research has produced extensive but inconclusive results about VEP effectiveness from studies of individual programs, leaving open questions about whether program-level contingencies impact VEP effectiveness (Aragón-Correa et al., 2020). Our meta-analysis helps reconcile these results by aggregating the results of individual studies and assessing how VEP governance quality impacts the effectiveness of these programs in improving both the environmental and financial performance of VEP participants.

Research Implications

First, our results suggest that, generally, VEPs have shown some promise in motivating firms to improve their environmental performance in return for competitive benefits. The results of the HOMA, which aggregated effects from individual studies on specific programs, demonstrated that VEPs tend to have positive effects on both corporate environmental and financial performance. By implication, the results imply that VEPs do help fill regulatory governance voids that enable firms to externalize their negative environmental impacts (King, Prado & Rivera, 2012). At the same time, there is a large body of research that has documented

the numerous cases of individual programs that fail to improve corporate environmental performance because of "issues such as free-riding, adverse selection, moral hazard, and lack of accountability" (Aragón-Correa et al., 2020: 340). The presence of these issues in VEP participation suggests that program governance quality may be critical for ensuring that any individual program has both the intention and power to induce better corporate environmental performance from their participants, while still conferring them with financial benefits.

Second, our MARA results show that better VEP governance quality does make these programs more effective at improving both corporate environmental and financial performance. This helps confirm what scholars have theorized: that VEPs rely heavily on their internal institutional mechanisms to induce better environmental performance from their participants. In particular, results suggest that programs with higher quality systems of substantive and procedural rules generate stronger coercive and normative pressures on firms to make real improvements in their environmental outcomes. Conversely, as VEPs' rules become more lenient, firms gravitate towards more symbolic improvements in environmental performance including complying with weak mandates, decoupling practices from stronger mandates, misstating environmental performance efforts to auditors and external legitimacy-conferring stakeholders or ignoring mandates when VEP sanctions are weak.

Our MARA results also suggest that programs with higher quality systems of substantive and procedural rules provide firms with natural resource-based benefits that VEPs with weaker governance fail to offer, including enhanced legitimacy, better efficiency, and within-firm knowledge spillovers from environmental practices that enhance performance (Berchicci & King, 2007; Hart, 1995; Henriques et al., 2013; Vogel, 2018). This result suggests that firms have the most to gain from VEPs that have the power to induce them to make substantive improvements to their environmental performance, and that those improvements help firms develop competitively valuable resources. By implication, well-governed VEPs

offer firms the flexibility to develop substantive environmental practices that generate financial benefits for participants that outweigh program compliance costs. This stands in stark contrast to pervasive heuristics in industry that better VEP governance quality detracts from performance because it creates compliance costs that are a source of competitive disadvantage (Smith & Fischlein, 2010), or that stakeholders do not reward firms enough for joining well-governed VEPs (Vogel, 2005; 2007). Because of these heuristics, many firms seek out programs with weaker governance quality believing that can maximize the performance benefits of participating in VEPs by minimizing compliance costs (Fisher & Lyon, 2014). Therefore, our results offer an alternative business case for well-governed VEPs that can help to deconstruct these heuristics and strengthen VEPs' role as in filling environmental governance voids.

To help catalyze greater movement towards well-governed VEPs, we concur with VEP scholars who suggested that VEPs and policymakers need to collaborate more closely to help VEPs create better value for business and society. Those scholars have argued that VEPs work more effectively when the threat of regulatory action is higher or when regulations are more stringent (Khanna & Damon, 1999; Ostrom, 1990); that policymakers could establish regulations that mandate high governance quality; and, that they coordinate their efforts with VEPs so the former are responsible for setting explicit environmental performance targets and stringent compliance mechanisms, while VEPs could help firms design competitive and innovative responses to environmental regulation (Aragón-Correa et al., 2020). Our results suggest that a more effective approach could involve temporary government incentives for firms to join well-governed VEPs to bolster their position in the market, until such programs prove themselves to offer firms superior financial benefits to programs with weak governance. This prescription offers a more streamlined and politically feasible approach than trying to

institute more stringent environmental policy, which typically face hardened opposition that makes them difficult to enact (Hoffman & Ventresca, 1999).

Lastly, our work adds to recent efforts to study how cross-program variations governance quality affect VEP participation by looking at how VEP governance quality impacts the outcomes of such participation. In particular, Tashman et al. (2022) found that VEP governance quality had no effect on how prior environmental performance impacts VEP participation, in contrast to the current study, which finds it magnifies the effect of VEP participation on its current environmental performance. This suggests that better VEP governance quality does not discourage firms with stronger environmental performance from joining VEPs, but that it is critical for helping programs induce better environmental performance from their participants. At the same time, Tashman et al. (2022) find that VEP governance quality encouraged firms with stronger financial performance to join VEPs, and the current study finds that it further strengthens the financial performance of firms that participate in these programs. By implication, firms with stronger financial performance may seek out better governed programs by believing that they offer superior legitimation and resource-based benefits, and then appropriate stronger competitive benefits from their participation than rivals who choose more lenient programs.

Limitations and Future Research Directions

While our study is the most comprehensive investigation to date on how VEPs influence corporate environmental and financial performance, as well as how VEP governance quality shapes these relationships, it has several limitations. First, we were not able to simultaneously evaluate the relationship between how VEPs impact corporate environmental and financial performance, respectively, because of the paucity of existing studies that analyzed both effects. Future research could directly address this question to generate evidence on whether VEPs can meet their goal of creating win-win outcomes. Such research should involve a substantial cross-

section of programs like in our study, in order to account for the role of VEP governance in determining these relationships. Second, our study included only a limited number of effect sizes for VEPs that set explicit environmental performance targets due to lack of quantitative research on the effectiveness of such programs. In the future, as more research on these types of programs emerges, it will be important to continue to assess their relative effectiveness. Third, our sampling strategy allowed us to include only those primary studies where home country of participating firms was clearly identified. For example, we excluded certain facility-level studies if parent firms' home country was not mentioned as facilities can belong to firms headquartered in other countries. Future research on VEPs should clearly identify both the home and host countries of participating firms so that their analyses can account for the role of these institutional contexts.

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Table 1. VEPs in Meta-Analytical Sample

VEP Name	Environmental Performance Target Score	Monitoring Score	Sanctioning Score	Total VEP Governance Quality Score
1605(b)	0	0	0	0
33/50	0	1	0	1
Business for Social Responsibility	0	0	0	0
Chicago Climate Exchange	1	1	0	2
Climate Challenge	0	0	0	0
Climate Leaders	0	0	0	0
Eco-Management and Audit Scheme (EMAS)	0	1	1	2
Energy Star Buildings	1	0	1	2
Forest Stewardship Council	1	1	1	3
Fairtrade	1	1	1	3
Green Lights	0	0	0	0
Global Reporting Initiative	0	0	0	0
ISO 14001	0	1	1	2
Leadership in Energy and Environmental Design (LEED)	1	1	1	3
Marine Stewardship Council	1	1	1	3
Rainforest Alliance	1	1	1	3
Responsible Care	0	0	0	0
Sustainable Slopes	0	0	0	0
Tox-Minus	0	0	0	0
United Nations Global Compact	0	0	0	0
UTZ Certified	0	0	0	0
U.S. Coal Combustion Products Partnership	0	0	0	0
Waste Wise	0	0	0	0

Table 2. Hedges and Olkin Meta-analysis (HOMA) Results for the VEP Participation – Environmental Performance Relationship

Analysis group	Pearson product-moment correlation (*r*)									
	k	N	Mean	SE	p-val.	95% c.i. low	95% c.i. hi	Q test	p-val.	I^2
All studies	29	811758	0.09***	0.02	0.000	0.06	0.12	1244.85	0.000	98%
Studies that control for endogeneity	NA									
Studies that do not control for endogeneity	NA									
Analysis group	Partial correlation coefficient ($r_{xy.z}$)									
	k	N	Mean	SE	p-val.	95% c.i. low	95% c.i. hi	Q test	p-val.	I^2
All studies	542	12869127	0.04***	0.00	0.000	0.03	0.04	10158.96	0.000	95%
Studies that control for endogeneity	249	4888843	0.03***	0.00	0.000	0.03	0.04	2414.00	0.000	90%
Studies that do not control for endogeneity	293	7980284	0.03***	0.00	0.000	0.02	0.03	7696.01	0.000	96%

Note. Mean = mean effect sizes; *k* = number of effect sizes; *N* = total sample size; SE = the standard error of mean correlation; *Q* = Cochran's homogeneity test statistic; I^2 = scale-free index of heterogeneity; NA means that no effect sizes were available for a specific operationalization of a given variable in a specific analysis.
***p<0.001; ** p<0.01; * p<0.05; ǂp<0.1.

Table 3. Hedges and Olkin Meta-analysis (HOMA) Results for the VEP Participation – Financial Performance

Analysis group	Pearson product-moment correlation (*r*)									
	k	N	Mean	SE	p-val.	95% c.i. low	95% c.i. hi	Q test	p-val.	I^2
All studies	577	317291	0.01**	0.00	0.004	0.00	0.02	1312.03	0.000	56%
Studies that control for endogeneity	NA									
Studies that do not control for endogeneity	NA									
Analysis group	Partial correlation coefficient ($r_{xy.z}$)									
	k	N	Mean	SE	p-val.	95% c.i. low	95% c.i. hi	Q test	p-val.	I^2
All studies	196	778216	0.03**	0.00	0.004	0.03	0.04	1476.09	0.000	87%
Studies that control for endogeneity	75	222723	0.04***	0.01	0.000	0.02	0.05	524.95	0.000	86%
Studies that do not control for endogeneity	121	555493	0.03***	0.01	0.000	0.02	0.04	932.11	0.000	87%

Note. Mean = mean effect sizes. *k* = number of effect sizes; *N* = total sample size; SE = the standard error of mean correlation; *Q* = Cochran's homogeneity test statistic; I^2 = scale-free index of heterogeneity; NA means that no effect sizes were available for a specific operationalization of a given variable in a specific analysis.
***p<0.001; ** p<0.01; * p<0.05; ǂp<0.1.

Table 4. Meta-analytic Regression Analysis (MARA) Results for Environmental Performance

	Model 1
VEP governance quality	0.034***
	(0.007)
WGI index	-0.013***
	(0.002)
Published study	0.045***
	(0.007)
Partial correlation	0.043***
	(0.010)
Cross-sectional	0.046***
	(0.005)
Endogeneity control	-0.000
	(0.005)
Time	0.002**
	(0.001)
Firm	0.157***
	(0.024)
Facility	0.111***
	(0.018)
Chemical	0.056***
	(0.012)
Manufacturing	-0.031***
	(0.005)
Energy	0.038*
	(0.017)
Service	-0.050
	(0.033)
Total emissions	0.050***
	(0.010)
Difference in emissions	0.016
	(0.014)
Environmental performance indices	0.101***
	(0.013)
Environmental practices	0.100***
	(0.010)
Natural resource use	0.115***
	(0.019)
Survey-based measures	0.136***
	(0.018)
K	571
Q_{model} *(p)*	897.47 (0.00)
$Q_{residual}$ *(p)*	5680.43 (0.00)
V	0.00079

Note. Standard errors are in parentheses. ***p<0.001; ** p<0.01; * p<0.05; ǂp<0.1.

Table 5. Meta-analytic Regression Analysis (MARA) Results for Financial Performance

	Model 2
VEP governance quality	0.044*
	(0.021)
WGI index	-0.006*
	(0.003)
Published study	-0.031***
	(0.008)
Partial correlation	0.018ǂ
	(0.010)
Cross-sectional	0.002
	(0.009)
Endogeneity control	-0.003
	(0.010)
Time	-0.004**
	(0.001)
Firm	0.215**
	(0.066)
Facility	0.038ǂ
	(0.023)
Chemical industry	-0.030
	(0.046)
Manufacturing industry	0.006
	(0.011)
Energy industry	0.131***
	(0.033)
Service industry	0.030
	(0.020)
Financial market-based measures	-0.026*
	(0.013)
Accounting- based measures	0.000
	(0.011)
Survey-based measures	0.120***
	(0.035)
K	773
Q_{model} *(p)*	122.40 (0.00)
$Q_{residual}$ *(p)*	1055.06 (0.00)
V	0.00220

Note. Standard errors are in parentheses. ***p<0.001; ** p<0.01; * p<0.05; ǂp<0.1.

Table 6. Meta-analytic Regression Analysis (MARA) Results for Environmental Performance with Different Operationalizations of VEP Governance Quality

	Model 1 VEP governance quality score (0-6)	Model 2 VEP governance quality score (0-7)
VEP governance quality	0.012***	0.013***
	(0.002)	(0.002)
WGI index	-0.015***	-0.015***
	(0.002)	(0.002)
Published study	0.047***	0.047***
	(0.007)	(0.007)
Partial correlation	0.041***	0.039***
	(0.010)	(0.010)
Cross-sectional	0.045***	0.046***
	(0.005)	(0.005)
Endogeneity control	-0.002	-0.002
	(0.004)	(0.004)
Time	0.002**	0.001**
	(0.001)	(0.001)
Firm	0.117***	0.132***
	(0.020)	(0.021)
Facility	0.092***	0.103***
	(0.017)	(0.017)
Chemical industry	0.047***	0.048***
	(0.012)	(0.012)
Manufacturing industry	-0.033***	-0.034***
	(0.005)	(0.005)
Energy industry	0.014	0.016
	(0.015)	(0.015)
Service industry	-0.045	-0.041
	(0.033)	(0.033)
Total emissions	0.058***	0.060***
	(0.010)	(0.010)
Difference in emissions	0.019	0.021
	(0.014)	(0.014)
Environmental performance indices	0.112***	0.111***
	(0.013)	(0.013)
Environmental practices	0.105***	0.108***
	(0.011)	(0.011)
Natural resource use	0.123***	0.124***
	(0.020)	(0.020)
Survey-based measures	0.151***	0.153***
	(0.018)	(0.018)
K	571	571
Q_{model} *(p)*	890.21 (0.00)	898.97 (0.00)
$Q_{residual}$ *(p)*	5677.22 (0.00)	5671.22 (0.00)
V	0.00079	0.00079

Note. Standard errors are in parentheses. ***p<0.001; ** p<0.01; * p<0.05; ǂp<0.1.

Table 7. Meta-analytic Regression Analysis (MARA) Results for Financial Performance with Different Operationalizations of VEP Governance Quality

	Model 3 VEP governance quality score (0-6)	Model 4 VEP governance quality score (0-7)
VEP governance quality	0.044*	0.012
	(0.021)	(0.011)
WGI index	-0.006*	-0.006*
	(0.003)	(0.003)
Published study	-0.031***	-0.033***
	(0.008)	(0.008)
Partial correlation	0.018ǂ	0.019ǂ
	(0.010)	(0.010)
Cross-sectional	0.002	0.003
	(0.009)	(0.009)
Endogeneity control	-0.003	-0.000
	(0.010)	(0.010)
Time	-0.004**	-0.003**
	(0.001)	(0.001)
Firm	0.346**	0.163*
	(0.128)	(0.076)
Facility	0.038ǂ	0.015
	(0.023)	(0.020)
Chemical industry	0.058	-0.050
	(0.079)	(0.050)
Manufacturing industry	0.006	0.006
	(0.011)	(0.011)
Energy industry	0.131***	0.130***
	(0.033)	(0.033)
Service industry	0.029	0.034ǂ
	(0.020)	(0.020)
Financial market-based measures	-0.026*	-0.030*
	(0.013)	(0.013)
Accounting- based measures	0.000	-0.003
	(0.011)	(0.011)
Survey-based measures	0.120***	0.116***
	(0.036)	(0.035)
K	773	773
Q_{model} *(p)*	122.40 (0.00)	119.18 (0.00)
$Q_{residual}$ *(p)*	1055.06 (0.00)	1056.98 (0.00)
V	0.00220	0.00220

Note. Standard errors are in parentheses. ***p<0.001; ** p<0.01; * p<0.05; ǂp<0.1.

Appendix
Primary Studies Included in the Analysis

Author	Year	Title	Journal
1. Aarts F. M. & Vos E.	2001	The Impact of ISO Registration on New Zealand Firms' Performance: a Financial Perspective	TQM Magazine
2. Akoyi K. T. & Maertens M.	2016	Private Sustainability Standards in the Ugandan Coffee Sector: Empty Promises or Catalysts for Development?	unpublished
3. Arimura T.H., Darnall N. & Katayama H.	2011	Is ISO14001 a Gateway to More Advanced Voluntary Action? The Case of Green Supply Management	Journal of Environmental Economics and Management
4. Arimura T. H., Hibiki A. & Katayama H.	2008	Is a Voluntary Approach an Effective Environmental Policy Instrument? A Case for Environmental Management Systems	Journal of Environmental Economics and Management
5. Arnould E., Plastina A. & Ball D.	2009	Does Fair Trade Deliver on Its Core Value Proposition? Effects on Income, Educational Attainment, and Health in Three Countries	Journal of Public Policy and Marketing
6. Baek K.	2015	The Diffusion of Voluntary Environmental Programs: The Case of ISO 14001 in Korea, 1996-2011	Journal of Business Ethics
7. Baek K.	2014	The Adoption and Outcomes of ISP14001 across Korean Business Firms	unpublished
8. Barham B. L. & Weber J. G.	2012	The Economic Sustainability of Certified Coffee: Recent Evidence from Mexico and Peru	World Development
9. Barla P.	2007	ISO 14001 Certification and Environmental Performance in Quebec's Pulp and Paper Industry	Journal of Environmental Economics and Management
10. Bechetti & Castriota	2009	Is Fair Trade Honey Sweeter? An Empirical Analysis on the Effect of Affiliation on Productivity	unpublished
11. Berrone P., Fosfuri A. & Gelabert L.	2017	Does Greenwashing Pay Off? Understanding the Relationship Between Environmental Actions and Environmental Legitimacy	Journal of Business Ethics
12. Bi X. & Khanna M.	2012	Reassessment of the Impact of the EPA's Voluntary 33/50 Program on Toxic Releases	Land Economics
13. Bi X. & Khanna M.	2013	Preventing vs Recycling of Toxic Releases: Role of the 33/50 Voluntary Environmental Program	unpublished

14. Bi X. & Khanna M.	2017	Inducing Pollution Prevention Adoption: Effectiveness of the 33/50 Voluntary Environmental Program	Journal of Environmental Planning and Management
15. Bi X., Deltas G. & Khanna M.	2011	Adoption of Pollution Prevention: The Role of Information Spillover, Mandatory Regulation, and Voluntary Participation	unpublished
16. Blackman A.	2012	Does Eco-certification Boost Regulatory Compliance in Developing Countries? ISO 14001 in Mexico	Journal of Regulatory Economics
17. Blackman A., Goff L. & Rivera Planter M.	2018	Does Eco-certification Stem Tropical Deforestation? Forest Stewardship Council Certification in Mexico	Journal of Environmental Economics and Management
18. Boiral O. & Henri J.-F.	2012	Modelling the Impact of ISO 14001 on Environmental Performance: A Comparative Approach	Journal of Environmental Management
19. Canon-de-Francia J. & Garces-Ayerbe C.	2009	ISO 14001 Environmental Certification: A Sign Valued by the Market?	Environmental Resource Economics
20. Charmakar S., Oli B. N., Joshi N. R., Maraseni T. N. & Atreya K.	2021	Forest Carbon Storage and Species Richness in FSC Certified and Non-certified Community Forests in Nepal	Small-scale Forestry
21. Dangelico R. M. & Pontrandolfo P.	2015	Being "Green and Competitive": The Impact of Environmental Actions and Collaborations on Firm Performance	Business Strategy and the Environment
22. de Jong P., Paulraj A. & Blome C.	2014	The Financial Impact of ISO 14001 Certification: Top-Line, Bottom-Line, or Both?	Journal of Business Ethics
23. Delmas M. A. & Montes-Sancho M.J.	2010	Voluntary Agreements to Improve Environmental Quality: Symbolic and Substantive Cooperation	Strategic Management Journal
24. Dick G., Heras I. & Molina-Azorin J. F.	2008	Cause and Effect? ISO 14001 Certification and Financial Benefits	unpublished
25. Dutt N. & King. A.	2014	The Judgment of Garbage: End-of-Pipe Treatment and Waste Reduction	Management Science
26. Elder S. D., Zerriffi H. & Le Billon P.	2013	Is Fairtrade Certification Greening Agricultural Practices? An Analysis of Fairtrade Environmental Standards in Rwanda	Journal of Rural Studies
27. Ferron R., Funchal B., Nossa V. & Teixeira A.	2012	Is ISO 14001 Certification Effective? An Experimental Analysis of Firm Profitability	Brazilian Administration Review
28. Fisher-Vanden K. & Thornburn K. S.	2011	Voluntary Corporate Environmental Initiatives and Shareholder Wealth	Journal of Environmental Economics and Management
29. Fort R. & Ruben R.	2009	The Impact of Fair Trade on Banana Producers in Northern Peru	unpublished

30. Gamper-Rabindran S.	2006	Did the EPA's Voluntary Industrial Toxics Program Preduce Emissions? A GIS Analysis of Distributional Impacts and by-Media Analysis of Substitution	Journal of Environmental Economics and Management
31. Garcia-Pozo A., Sanchez-Ollero J.L. & Mechante-Mera A.	2014	Environmental Good Practices, Quality Certifications and Productivity in the Andalusian Hotel Sector	International Journal of Environmental Research
32. Griffith C., Wheeler W. & Wolwerton A.	2016	Evaluating the Effectiveness of Voluntary Programs: Did Ohio's Tox-Minus Initiative Affect Participants` TRI Emissions?	unpublished
33. Goettsche M., Steindl T. & Gietl S.	2016	Do Customers Affect the Value Relevance of Sustainability Reporting? Empirical Evidence on Stakeholder Interdependence	Business Strategy and the Environment
34. Hatakeda T., Kokubu K. Kajiwara T. & Nishitani K.	2012	Factors Influencing Corporate Environmental Protection Activities for Greenhouse Gas Emission Reductions: the Relationship Between Environmental and Financial Performance	Environmental Resource Economics
35. Hazudin S. F., Mohamad S. A., Daud R. & Paino H.	2015	ISO 14001 and Financial Performance: Is the Accreditation Financially Worth it for Malaysian Firms	Procedia Economics and Finance
36. He W., Liu C., Lu J. & Ca J.	2015	Impacts of ISO 14001 Adoption on Firm Performance: Evidence from China	China Economic Review
37. Heras-Saizarbitoria I., Molina-Azorín J. F. & Dick G. P. M.	2011	ISO 14001 Certification and Financial Performance: Selection-effect versus Treatment-effect	Journal of Cleaner Production
38. Hoang P. C., McGuire W. & Prakash A.	2016	Is there Life after Death? The Enduring Effects of the 33/50 Program on Emission Reductions	unpublished
39. Hoang P.C., McGuire W. & Prakash A. (2018)	2018	Reducing Toxic Chemical Pollution in Response to Multiple Information Signals: The 33/50 Voluntary Program and Toxicity Disclosures	Ecological Economics
40. Innes R. & Sam A. G.	2008	Voluntary Pollution Reductions and the Enforcement of Environmental Law: An Empirical Study of the 33/50 Program	Journal of Law and Economics
41. Jena P. R., Stellmacher T. & Grote U.	2017	Can Coffee Certification Schemes Increase Incomes of Smallholder Farmers? Evidence from Jinotega, Nicaragua	Environment, Development, Sustainability
42. Khanna M. & Damon L. A.	1999	EPA's Voluntary 33/50 Program: Impact on Toxic Releases and Economic Performance of Firms	Journal of Environmental Economics and Management

43. King A. & Lenox M.	2000	Industry Self-regulation Without Sanctions: the Chemical Industry's Responsible Care Program	The Academy of Management Journal
44. King A., Lenox M. J. & Terlaak A.	2005	The Strategic Use of Decentralized Institutions: Exploring Certification with the ISO 14001 Management Standard	Academy of Management Journal
45. Kube R., von Graevenitz K., Loschel A. & Massier P.	2019	Do Voluntary Environmental Programs Reduce Emissions? EMAS in the German Manufacturing Sector	Energy Economics
46. Kuzey C. & Uyar A.	2017	Determinants of Sustainability Reporting and Impact on Firm Value: Evidence from the Emerging Market of Turkey	Journal of Cleaner Production
47. Lange I.	2009	Evaluating voluntary measures with treatment spillovers: The case of coal combustion products partnership	BE Journal of Economic Analysis & Policy
48. Lee Y.-C., Hu J.-L. & Ko J.-F.	2008	The Effect of ISO Certification on Managerial Efficiency and Financial Performance: An Empirical Study of Manufacturing Firms	International Journal of Management
49. Lenox M.	2006	The Role of Private Decentralized Institutions in Sustaining Industry Self-Regulation	Organization Science
50. Li D., Tang F. & Jiang J.	2019	Does Environmental Management System Foster Corporate Green Innovation? The Moderating Effect of Environmental Regulation	Technology Analysis & Strategic Management
51. Liang D. & Tiu L.	2017	Does Environmental Management Capability of Chinese Industrial Firms Improve the Contribution of Corporate Environmental Performance to Economic Performance? Evidence from 2010 to 2015	Journal of Cleaner Production
52. Lo C.K.Y., Yeung AC.L. & Cheng T.C.E.	2012	The Impact of Environmental Management Systems on Financial Performance in Fashion and Textiles Industries	International Journal of Production Economics
53. Luan C-j., Tien C. & Wu P-h.	2013	Strategizing Environmental Policy and Compliance for Firm Economic Sustainability: Evidence from Taiwanese Electronics Firms	Business Strategy and the Environment
54. Matisoff D.	2012	Privatizing Climate Change Policy: Is there a Public Benefit?	Environmental and Resource Economics
55. McGuire W.	2014	The Effect of ISO 14001 on Environmental Regulatory Compliance in China	Ecological Economics
56. Melnyk S.A., Sroufe R. P., Calantone R. L. & Montabon F. L.	2002	Assessing the Effectiveness of US Voluntary Environmental Programmes: An Empirical Study	International Journal of Production Resources

57. Melo C. & Wolf S.	2005	Empirical Assessment of Eco-Certification	Organization & Environment
58. Miret-Pastor L., Peiro-Signes A., Segarra-Ona M. & Herrera-Racionero P.	2014	Empirical Analysis of Sustainable Fisheries and the Relation to Economic Performance Enhancement: The Case of the Spanish Fishing Industry	Marine Policy
59. Mitiku F., de Mey Y., Nyssen J. & Maertens M.	2015	Do Private Sustainability Standards Contribute to Poverty Alleviation? A Comparison of Different Coffee Certification Schemes in Ethiopia	unpublished
60. Moon S., Bae S. & Jeong M-G.	2014	Corporate Sustainability and Economic Performance: An Empirical Analysis of a Voluntary Environmental Program in the USA	Business Strategy and the Environment
61. Mungai E. M., Ndiritu S. W. & Rajwani T.	2020	Raising the Bar? Top Management Teams, Gender Diversity, and Environmental Sustainability	Africa Journal of Management
62. Narasimhan R., Schoenherr T. & Jacobs B. W.	2015	The Financial Impact of FSC Certification in the United States: A Contingency Perspective	Decision Sciences
63. Nee G. Y. & Wahid N. A.	2010	The Effect of ISO 14001 Environmental management System Implementation on SMEs Performance: an Empirical Study in Malaysia	Journal of Sustainable Development
64. Nemati M., Zhen Y. & Hu W.	2019	The ISO 14001 Standard and Firms' Environmental Performance: Evidence from the U.S. Transportation Equipment Manufacturers	unpublished
65. Nga J.	2009	The influence of ISO 14000 on firm performance	Social Responsibility Journal
66. Nishitani K.	2011	An Empirical Analysis of the Effects on Firms' Economic Performance of Implementing Environmental Management Systems	Environmental Resource Economics
67. Nishitani K., Kaneko S., Fujii H. & Komatsu S.	2012	Are Firms' Voluntary Environmental Management Activities Beneficial for the Environment and Business? An Empirical Study Focusing on Japanese Manufacturing Firms	Journal of Environmental Management
68. Noh Y.	2012	The Effect of Environmental Management on U.S. Public Firms' Financial Performance and Equity Structure: a Longitudinal Analysis Using ISO 14001	unpublished
69. Paulraj A. & de Jong P.	2011	The Effect of ISO 14001 Certification Announcements on Stock Performance	International Journal of Operations & Production Management

70. Pizer W., Morgenstern R. & Shih J.-S.	2011	The performance of Industrial Sector Voluntary Climate Programs: Climate Wise and 1605(b)	Energy Policy
71. Potoski M. & Prakash A.	2005	Covenants with Weak Swords: ISO14001 and Facilities' Environmental Performance	Journal of Policy Analysis and Management
72. Potoski M. & Prakash A.	2005	Green Clubs and Voluntary Governance: ISO 14001 and Firms' Regulatory Compliance	American Journal of Political Science
73. Prasad M. & Mishra T.	2017	Low-carbon Growth for Indian Iron and Steel Sector: Exploring the Role of Voluntary Environmental Compliance	Energy Policy
74. Riaz H., Saeed A. Baloch M., Nasrullah & Khan Z.	2018	Valuation of Environmental Management Standard ISO 14001: Evidence from an Emerging Market	Risk and Financial Management
75. Riaz H. & Saeed A.	2020	Impact of Environmental Policy on Firm's Market Performance: The Case of ISO 1400	Corporate Social Responsibility and Environmental Management
76. Rivera J. & de Leon P.	2004	Is Greener Whiter? Voluntary Environmental Performance of Western Ski Areas	Policy Studies Journal
77. Rivera J., de Lean P. & Koerber C.	2006	Is Greener Whiter Yet? The Sustainable Slopes Programme After Five Year	Policy Studies Journal
78. Robinson S. & Singh A.J.	2019	The Impact of Green Labels on U.S. Hotel Net Operating Income: Operating Statements Analyses	Journal of Sustainable Real Estate
79. Robinson S., Singh A.J. & Das P.	2016	Financial Impact of LEED and Energy Star Certifications on Hotel Revenues	Journal of Hospitality Financial Management
80. Ruben R. & Fort R.	2012	The Impact of Fair Trade Certification for Coffee Farmers in Peru	World Development
81. Russo M.	2009	Explaining the Impact of ISO 14001 on Emission Performance: a Dynamic Capabilities Perspective on Process and Learning	Business Strategy and the Environment
82. Russo M. V. & Harrison N. S.	2005	Organizational Design and Environmental Performance: Clues from the Electronics Industry	The Academy of Management Journal
83. Sahu S. K. & Narayanan K.	2016	Environmental Certification and technical Efficiency: A Study of Manufacturing Firms in India	Journal of Industry, Competition and Trade
84. Sam A. G., Khanna M. & Innes R.	2009	Voluntary Pollution Reduction Programs, Environmental Management, and Environmental Performance: an Empirical Study	Land Economics

85. Sarumpaet S.	2005	The Relationship Between Environmental Performance and Financial Performance of Indonesian Companies	Jurnal Akuntansi dan Keuangan
86. Schadewitz H. & Niskala M.	2010	Communication via Responsibility Reporting and its Effect on Firm Value in Finland	Corporate Social Responsibility and Environmental Management
87. Segarra-Oña M., Peiró-Signes A., Verma R. & Miret-Pastor L.	2012	Does Environmental Certification Help the Economic Performance of Hotels? Evidence from the Spanish Hotel Industry	Cornell Hospitality Quarterly
88. Simpson D.	2012	Knowledge Resources as a Mediator of the Relationship Between Recycling Pressures and Environmental Performance	Journal of Cleaner Production
89. Song D.	2019	Effects of the ISO 14001 Voluntary Environmental Program on Economic and Environmental Performance	unpublished
90. Takahashi R.& Todo Y.	2013	The Impact of a Shade Coffee Certification Program on Forest Conservation: A Case Study from a Wild Coffee Forest in Ethiopia	Journal of Environmental Management
91. Takahashi R.& Todo Y.	2017	Coffee Certification and Forest Quality: Evidence from a Wild Coffee Forest in Ethiopia	World Development
92. Tashman P. & Rivera J.	2010	Are Members of Business Social Responsibility More Responsible?	Policy Studies Journal
93. Teng M-J & Wu S-Y.	2018	Sustainable Development and Competitive Advantages–Utilizing Matching to Overcome Sample Selection Bias	Corporate Social Responsibility and Environmental Management
94. Teng M-J.	2011	The effects of an environmental management system on intangible assets and corporate value: Evidence from Taiwan's manufacturing firms	Asian Business & Management
95. Testa F., Rizzi F., Daddi T., Gusmerotti N. M., Frey M. & Iraldo F.	2014	EMAS and ISO 14001: the Differences in Effectively Improving Environmental Performance	Journal of Cleaner Production
96. Turk, A. M.	2009	The Benefits Associated with ISO 14001 Certification for Construction Firms: Turkish Case	Journal of Cleaner Production
97. Vidovic N. & Khanna N.	2007	Can Voluntary Pollution Prevention Programs Fulfil their Promises? Further Evidence from the EPA's 33/50 Program	Journal of Environmental Economics and Management
98. Vidovic N. & Khanna N.	2012	Is Voluntary Pollution Abatement in the Absence of a Carrot or Stick Effective? Evidence from Facility Participation in the EPA's 33/50 Program	Environmental Resource Economics

99. Welch E. W., Rana A. & Mori Y.	2003	The Promises and Pitfalls of ISO 14001 for Competitiveness and Sustainability	Greener Management International
100. Wiengarten F., Humpfreys P. Onofrei G. & Fynes B.	2017	The Adoption of Multiple Certification Standards: Perceived Performance Implications of Quality, Environmental and Health & Safety Certifications	Production Planning & Control
101. Xu X. D., Zeng S. X., Zou H. L. & Shi J. J.	2016	The Impact of Corporate Environmental violation on Shareholder's Wealth: a Perspective Taken from Media Coverage	Business Strategy and the Environment
102. Zaro E. S., Zaro C. S., Richartz F., Borgert A. & van Bellen H. M.	2015	The Impact of Certification on Cost Behavior of Petrochemical Companies Listed in the BM&FBOVESPA Stock Exchange	Environmental Quality Management
103. Zhou R., Bi X. & Segerson K.	2019	Evaluating Voluntary Environmental Programs with Spill Over Effects	Journal of the Association of Environmental and Resource Economists

Notes

[i] We searched the following 46 program names: Alliance for Environmental Innovation, Audubon Cooperative Sanctuary Program, Building America, Business Charter for Sustainable Development, Business for Social Responsibility, Caux Roundtable, Certified Environmental Drycleaner, Chemical Strategies Partnership, Climate Challenge Program, Coalbed Methane Outreach Program, Coalition for Environmentally Responsible Economies, Coatings Care, Commuter Choice Leadership Initiative, Energy Star, Environmental Leadership Program, Environmental Technology Verification Program, Forest Stewardship Council, Global e-Sustainability Initiative, Global Reporting Initiative, Great Lakes Automotive Pollution Prevention Project, Great Printers Project, Green Power Market Development Group, Hospitals for a Healthy Environment, International Hotels Environment Initiative, ISO 14001, Kimberly Accords, Landfill Methane Outreach Program, Marine Stewardship Council, Mercury Challenge Program, Merit Partnership for Pollution Prevention, Mobile Air Conditioning Climate Protection Partnership, National Environmental Performance Track, National Waste Minimization Partnership Program, Project XL, Rainforest Alliance, Recycled Paper Coalition, Responsible Care, Sustainable Apparel Coalition, Sustainable Forestry Initiative, the Natural Step, UN Global Compact, US Automotive Pollution Prevention Project, UTZ, Waste-Wise, Water Alliances for Voluntary Efficiency, and 33/50.

[ii] The journals in our search list were Academy of Management Journal, American Economic Review, American Journal of Political Science, American Political Science Review, Business and Politics, Business and Society, Ecological Economics, Environmental and Resource Economics, Global Environmental Change, Governance: An International Journal of Policy, Administration, and Institutions, Journal of Business Ethics, Journal of Cleaner Production, Journal of Economics and Management Strategy, Journal of Environmental Economics and Management, Journal of Management, Journal of Policy Analysis and Management, Journal of the Association of Environmental and Resource Economists, Nature, Nature Climate Change, Nature Ecology & Evolution, Nature Energy, Nature Reviews Earth & Environment, Nature Sustainability, Organization and Environment, Organization Science, Policy Sciences, Policy Studies Journal, Regulation & Governance, Review of Economics and Statistics, Strategic Management Journal.