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Green clubs

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ABSTRACT

This paper treats programs in which firms voluntarily agree to meet environmental standards as "green clubs": clubs, because they provide non-rival but excludable reputation benefits to participating firms; green, because they also generate environmental public goods. The model illuminates a central tension between the congestion externality familiar from conventional club theory and the free-riding externality familiar from the theory on private provision of public goods. We compare three common program sponsors—governments, industry, and environmental groups. We find that if monitoring of the club standard is perfect, a government constrained from regulating club size may prefer to leave sponsorship to industry if public-good benefits are sufficiently low, or to environmentalists if public-good benefits are sufficiently high. If monitoring is imperfect, an important question is whether consumers can infer that a club is too large for its standard to be credible. If they can then the government may deliberately choose an imperfect monitoring mechanism as a way of regulating club size indirectly. If they cannot then this reinforces the government's preference for delegating sponsorship.

1. Introduction

Eco-certification programs – programs in which firms volunteer to meet environmental-performance standards in return for the right to display an eco-label or logo on their products or advertising materials – are by now a well-established part of the environmental-policy toolkit. Börkey et al. [8] count over 50 programs in the U.S., over 300 in the E.U., and over 30,000 (mostly local ones) in Japan. In a more recent survey, Carmin et al. [11] count as many as 150 U.S. programs. Government-sponsored programs include the Voluntary Reporting of Greenhouse Gases Program of the Department of Energy (DOE) and the Energy Star program of the Environmental Protection Agency (EPA) and DOE jointly. Industry-sponsored programs include the Encouraging Environmental Excellence (E3) program of the American Textile Manufacturers Institute and the Sustainable Forestry Initiative of the American Forestry and Paper Association. Programs sponsored by third-party NGOs include the Cooperative Sanctuary Program (for golf courses) of the Audubon Society and the Alliance for Environmental Innovation Program of the Environmental Defense Fund.

Concurrent with this development, a large literature has emerged to analyze these programs.[1] Focusing here on the theoretical literature, a central question is why firms might voluntarily commit to exceed regulatory requirements. Suggested benefits include pre-emption of future regulations [48,33], higher willingness to pay of "green consumers" [3,30,7], reduced

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[1] For excellent reviews, see [27,28,35].

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shirking by more motivated "green employees" [9], and lower financing costs required by "green investors" [22,5]. Other issues that have been examined are the difficulty of monitoring and verification [25,36], trade implications [23,24], and potential perverse effects [37,16,45].

Except for informal discussions by Börkey et al. [8] and some empirical analysis by Carmin et al. [11], however, the literature has to our knowledge never examined the potential implications of the fact – evident from the examples above – that program sponsors tend to fall into three groups: government agencies, industry associations, and third-party NGOs (usually environmental groups). Our aim in this paper is to tease out some of these implications, using a very simple theoretical model.[2] We thereby draw on an important insight from the political-science literature on environmental governance, namely Prakash's [43] observation that the economic theory of clubs can be brought to bear on voluntary environmental programs.[3]

Sandler and Tschirhart [47,46] define a club as "a voluntary group deriving mutual benefit from sharing one or more of the following: production costs, the members' characteristics, or a good characterized by excludable benefits." To see the parallel with eco-certification programs, consider the example of a program that promotes sustainable forest practices. The program establishes a benchmark of best practices, and if a firm volunteers to satisfy the benchmark (become a club member), it may seek certification and thereby the right to display the program's eco-label. This comes at a cost (the membership fee), but also confers a "goodwill" or branding benefit on the firm (the non-rival but excludable good shared by club members); specifically, if consumers know about and trust the certification program, they may be willing to pay a premium for products that bear its eco-label.

Note also that consumers are more likely to know about a program when more firms participate in it. The per-firm cost of promoting the program's logo therefore likely declines with program size, as of course does each firm's share of any fixed program costs. Other program costs, however, such as those of overhead, negotiation, certification, and monitoring, may well eventually increase with program size, even on a per-firm basis.[4] Additionally, per-consumer benefits from buying the green product (and thereby the premium that consumers are willing to pay) may decline in program size for reasons such as lower "eco-snob" appeal of widely available green products, or lower perceived impact of their purchase on the environment.[5] These features parallel two further standard characteristics of a club, namely initial economies of scale in production of the club good, but eventual congestion that diminishes net benefits per member.

To emphasize these many parallels, we hereafter refer to eco-certification programs as "green clubs." Not surprisingly, what Sandler and Tschirhart [46] term the two "basic premises" of club theory are central to our analysis. First, congestion brings with it a need to restrict club size. Second, the "membership condition" determining the optimal club size is interdependent with the "provision condition" determining the optimal supply of the shared good—in our case, the optimal strictness of the club's environmental performance standard.

Sandler and Tschirhart note also that the importance of institutional structure has been a central theme in club theory, as has the related question of what objective function to apply in deriving the optimal membership and provision conditions. Some studies, including the seminal one by Buchanan [10], adopt the "within-club" viewpoint, which considers only the utility of the average club member; others adopt the "total-economy" viewpoint, which also takes into account the utility of non-members. In our context, the within-club viewpoint seems natural when considering industry-sponsored green clubs, while the total-economy viewpoint is more natural when considering government-sponsored ones.

There is, however, one key feature that differentiates green clubs from those conventionally studied in club theory: in addition to providing their members with the club good of a reputational benefit, green clubs also generate environmental benefits. Forest certification programs, for example, aim to preserve habitat and thereby protect biodiversity; energy-efficiency programs aim to reduce emissions and other harms associated with energy production and use. Moreover, these environmental benefits are a public good: they accrue to individuals regardless of whether they purchase program-certified products.

Incorporating this additional feature significantly alters both the provision and membership conditions for government-sponsored clubs. In particular, in addition to the congestion externality familiar from conventional club theory, the external environmental benefit generated by the club gives rise to a free-riding externality familiar from the theory on private provision of public goods.[6] Moreover, these externalities pull in opposite directions, implying that if the public environmental benefit is sufficiently large, government sponsors may wish to actively encourage rather than restrict entry

[2] A closely related model is that by Heyes and Maxwell [26], which compares NGO sponsorship of a voluntary eco-certification program with a mandatory standard set by a world environmental organization (WEO). Heyes and Maxwell do not, however, consider the possibility of WEO or industry sponsorship of voluntary eco-certification programs.

[3] In an edited volume by Potoski and Prakash [42] targeted at a political-science audience, we contribute a chapter [31] in which we sketch out some of the ideas that we develop formally and expand upon here.

[4] On higher negotiation costs, see [21,39]. On higher costs of monitoring due to greater incentives to free-ride, see [44,14,15]. Note also that many programs hire outside certifiers; if those certifiers are heterogeneous, the program faces an upward-sloping supply curve of certification inputs. Another possible reason why larger programs may face higher per-firm costs is that key inputs into green production may be in limited supply.

[5] On eco-snobbery, see [38,6]. On the effect of perceived impact on voluntary provision of public goods, see [17,41] and more indirectly [2]. Another possible reason why large programs may generate lower per-consumer benefits is that smaller programs may be able to provide "side" benefits that larger programs cannot. A small organic label, for example, may provide consumers with not just perceived benefits from consuming organic products, but also satisfaction or "warm glow" from knowing that the good is locally grown, by farmers perhaps known personally to the consumer.

[6] Cornes and Sandler [13] review both theories. See [29,30] for applications of the theory on private provision of public goods to green markets.

into the club. A further implication of the environmental benefit is that a third, "public" viewpoint becomes relevant, namely one that emphasizes the public benefit over private ones generated by the club. This viewpoint seems most natural when considering green clubs sponsored by environmental groups.

A final issue studied in club theory that is also central to our analysis concerns the club's exclusion mechanism. Sandler and Tschirhart note that some clubs charge a toll or congestion price to limit membership, in which case the further question arises whether the club is self-financing. In the case of green clubs, industry- and environmentalist-sponsored clubs in practice neither subsidize nor tax club membership, in the sense of charging fees significantly below or above those required to cover the club's expenses. Any exclusion of members must therefore be direct, taking the form of simply refusing to accept more firms once the desired club size has been reached. Whether doing so is feasible for industry sponsors, however, will depend on the strictness of antitrust law, or on whether governments can be persuaded to provide exemptions to such law.[7] As for government sponsors, it seems clear that legal requirements of "equal treatment" preclude these from directly regulating club size, through either prohibiting or mandating firm entry. Moreover, if the very reason for establishing a "voluntary" club is to provide an *alternative* to government regulation, then government sponsors may be constrained from regulating club size even indirectly, through taxes or subsidies.[8] In such cases, the government's role is limited to establishing a voluntary standard that all firms in an industry are invited to meet.[9]

After laying out the model in the next section and solving for the socially optimal club configuration in Section 3, we consider in Section 4 what club size emerges under open access. Sections 5, 6, and 7 then examine the club configurations that emerge under government, environmentalist, and industry sponsorship, respectively, and how each compares to the socially optimal configuration. Section 8 extends the model to allow for imperfect enforcement of the club standard. Section 9 concludes.

2. Model setup

Consider an industry with N identical firms, each of which produces one unit of a particular consumption good, using either a conventional production technology or a "green" technology. Let $\theta \geq 0$ denote a firm's chosen level of environmental friendliness, where $\theta = 0$ corresponds to conventional production. Green production is assumed to be more costly: each firm's cost of producing a unit of output is $d + \alpha\theta$, where d is the unit cost of conventional or "dirty" production and α is the additional marginal cost of green production.

Demand for the industry's output comes from N identical consumers, each of whom purchases one unit of the good and has preferences of the form

$$U(\theta) = b + f(\theta) + \beta g(\Theta).$$

The utility function has three components, which we treat as additively separable for simplicity: b is the consumer's private benefit from consuming the conventionally produced good; $f(\theta)$ is the additional private benefit from green consumption, such as warm glow or improved health; and $g(\Theta)$ is the public-good benefit derived from the aggregate green consumption Θ of all consumers combined. The parameter $\beta \geq 0$ is a shift parameter, capturing the relative importance of the public benefits of green consumption. Both $f(\cdot)$ and $g(\cdot)$ are assumed to be strictly increasing and strictly concave, with $f(0) = g(0) = 0$ and $f'(0) > \alpha$. To simplify the exposition, we assume that $b = d$, so that the conventionally produced good yields no surplus and must be priced at cost d. The green good is priced at $d + p$, so that p denotes the green price premium.

We assume that green production is not observable to consumers, and that it is not credible for producers to claim green production at any level unless they are certified by a green club.[10] It follows that, without a club, producers would never engage in green production (i.e., they would choose $\theta = 0$), as they would be unable to charge a price premium to cover their additional cost of $\alpha\theta > 0$.

We consider the case of a single green club that requires its members to meet a benchmark standard of θ. We assume initially that the club can perfectly monitor and enforce its standard, thereby making its members' green production at

[7] Vedder [49] provides an in-depth discussion of this issue and mentions several cases where the Dutch Competition authority waived antitrust restrictions on voluntary industry agreements, arguing that the environmental benefits of these agreements were sufficiently large to outweigh any anticompetitive effects.

[8] As noted by Carmin et al. [11], voluntary environmental programs "emerged as an alternative means for improving environmental conditions *outside* the regulatory development process" (emphasis added). Similarly, Lyon and Maxwell [33], citing a report by the U.S. EPA [18], point out that government agencies often promote voluntary environmental agreements precisely because they lack the statutory authority to establish a mandatory program.

[9] A case in point is the Energy Star program, which was established in 1992, but significantly expanded after the Clinton administration's failed attempt to introduce a BTU tax. The program allows any manufacturer of a wide range of products to display the Energy Star logo, as long as the product meets specific energy-efficiency standards. Importantly, our analysis does not apply to programs where the government does not even set a specific environmental standard, but merely encourages participating firms to set their own environmental-performance goals, in exchange for technical assistance and perhaps some favorable publicity. See [34] for a review of such programs.

[10] Our setup of consumer preferences and producer costs is similar to that in Besley and Ghatak's [7] model of corporate social responsibility. Besley and Ghatak, however, treat green goods as experience goods rather than credence goods, implying that consumers can monitor each firm's θ directly (albeit possibly imperfectly) and do not need certifying organizations.

level θ fully credible to consumers. There are, however, costs $C(n)$ associated with managing the club, which increase in the number of member firms n.[11] Included in $C(n)$ are fixed costs of establishing the club standard, as well as variable costs of promoting the club logo and of certifying and monitoring club members. We assume members share these costs equally, so that each member's cost share $c(n)=C(n)/n$ can be thought of as the club's membership fee.

As noted in the introduction, the net benefits that green clubs provide may for a variety of reasons eventually decrease with club size, implying that congestion becomes an issue. Some of these reasons have to do with higher per-firm club costs, others with lower per-consumer club benefits. Purely for expositional reasons, we represent congestion in our model as if it arises only on the cost side, by assuming that average club costs initially decline in n because of economies of scale but eventually increase in n. That is, we assume that $c(n)$ is U-shaped, reaching an interior minimum at a club size denoted $\check{n}$. Nothing of substance would change in our analysis, however, if we instead (or in addition) assumed that congestion arises on the benefit rather than the cost side. That is, we could equally well assume average club costs to be an L-shaped (convex and declining) function $\ell(n)$ of club size, but write average consumer benefits from the green good as $f(\theta)-j(n)$, with $j(n)$ a J-shaped (convex and eventually increasing) function. The loss of *net* club benefits with increasing club size would then equal $\ell(n)+j(n)$, and would under weak assumptions still be U-shaped.

Note that, by our assumptions, a club with n members can supply only n consumers. This implies that the level of the public good it provides is $\Theta=n\theta$.

3. Social planner

We first derive the socially optimal club standard and size, which maximize welfare

$$W=n[f(\theta)-\alpha\theta-c(n)]+N\beta g(n\theta). \tag{1}$$

The first term represents the net private benefit from the club, while the second term represents the public benefit, enjoyed by all N consumers.

The first-order conditions characterizing an interior maximum of W with respect to θ and n (termed the ''provision'' and ''membership'' conditions in conventional club theory) are

$$f'(\theta)+N\beta g'(n\theta)=\alpha, \tag{2}$$

$$f(\theta)+N\beta g'(n\theta)\theta=\alpha\theta+c(n)+nc'(n). \tag{3}$$

Condition (2) equates the marginal benefits – both private and public – of green consumption to the marginal costs of green production. Condition (3) equates the marginal benefits and costs of increasing the club size. The latter costs include the change $c(n)+nc'(n)$ in *total* club costs that results from an additional member joining. Defining $B\equiv N\beta$, we can write the solution to the social planner's problem as $(\theta^s(B),n^s(B))$.[12] The parameter B is useful because it captures the weight of the public-good benefit in the welfare function, which depends on the number of consumers in the economy and those consumers preferences for the public good.[13] It is straightforward to show that the socially optimal club standard and size are both increasing in this weight, and thereby in the aggregate benefits of any public-good spillover from green production.

4. Open-access equilibrium

We now consider the club size n under open access to the club. We do so initially without specifying how θ is determined, but then consider in particular the socially optimal standard θ^s. This allows us to highlight some of the tensions at play in our subsequent analysis.

The open-access club size depends on the standard θ and the good's price premium p. Firms have an incentive to join the club as long as $p\geq\alpha\theta+c(n)$, while consumers have an incentive to purchase the certified good as long as $f(\theta)\geq p$. Note that the public-good benefit does not factor into the consumers' willingness to pay, because the public good can be enjoyed even without purchasing the club-certified good; those who do not purchase the green good simply free-ride on the public-good provision by others.[14] For a given standard θ, the club will expand until both inequalities bind, so that

$$f(\theta)-\alpha\theta-c(n)=0. \tag{4}$$

Expansion then stops, as the surplus available to cover club costs has been dissipated.

[11] To avoid integer problems, we treat n as continuous, and therefore the output produced by a single firm or consumed by a single consumer as infinitesimal.

[12] A sufficient condition for the welfare maximum to be interior is that over some discrete interval $(\underline{\theta},\overline{\theta})$ of θ values, the private benefits of green consumption net of production costs strictly exceed the club costs at $\check{n}$: that is, $f(\theta)-\alpha\theta-c(\check{n})>0$. Hereafter, we assume this to be the case. Condition (3) then implies that $n^s>\check{n}$.

[13] Note, however, that, although the B components N and β enter the welfare function in the same way, the special case where $B=0$ – implying that green production generates only private benefits – can only arise if $\beta=0$.

[14] Recall from footnote 11 that any single consumer's purchase of the green good is infinitesimal, and therefore has a negligible effect on the overall level of the public good.

Eq. (4) implicitly defines a function $\hat{n}(\theta)$ that maps any given club standard to the resulting equilibrium club size under open access.[15] This function has slope

$$\hat{n}'(\theta) = \frac{f'(\theta) - \alpha}{c'(\hat{n}(\theta))} \quad (5)$$

is strictly concave, and has an interior maximum where $f'(\theta) = \alpha$. The function is shown in Fig. 1, the other parts of which we will return to shortly. Note that the open-access club size is not monotonic in the standard; in general, two different standards give rise to green clubs of the same size. This follows simply because the surplus $f(\theta) - \alpha\theta$ available to cover given club costs is inversely U-shaped in the standard.

Consider now the club size $\hat{n}(\theta^s)$ that emerges under open access if the club standard is set at the socially optimal level for a given value of B, and consider how it compares to the socially optimal club size n^s. The socially optimal club size is determined by Eq. (3), which has two additional terms that do not appear in Eq. (4). These terms reflect the social marginal benefit of an increase in club size from higher provision of the public good, $Bg'(n\theta)\theta$, and the social marginal cost from higher club administration costs, $nc'(n)$. Corresponding to these terms are two externalities that arise under open access, which have opposite effects on the equilibrium club size. Specifically, $Bg'(n\theta)\theta$ corresponds to the standard *public-good externality* from the theory on private provision of public goods: consumers' free-riding on such provision through other consumers' purchases creates a tendency for the open-access club to be suboptimally small. On the other hand, $nc'(n)$ corresponds to the standard *congestion externality* from club theory: firms' ignoring the increase in club management costs imposed on other firms when they join the club creates a tendency for the club to be suboptimally large.

This suggests the interesting possibility that the two externalities may exactly offset each other at the socially optimal standard, in which case open access will give rise to the socially optimal club size. It can be shown that this condition does in fact hold at a particular value B^c of the weight placed on the public-good benefits.

Fig. 1 illustrates this special case and shows more generally when open access will result in a club that is suboptimally small or large. As mentioned previously, the inversely U-shaped curve represents the open-access equilibrium condition, tracing out the locus of (θ,n) combinations at which per-firm net private benefits are zero (hereafter, we drop the qualifier "net" as understood). Everywhere inside the curve, these benefits are positive; everywhere outside, they are negative. The upward-sloping curve traces out the locus of (θ,n) combinations that are socially optimal at different values of B. Recall that both the socially optimal standard θ^s and the socially optimal club size n^s increase in B, so that the bottom-left point $(\theta^s(0),n^s(0))$ of the locus is the social optimum with no public benefits at all. Equivalently, this is the point where total *private* benefits are maximized. The point where the two curves intersect implicitly defines the critical weight B^c referred to above.

If the club standard is set at the socially optimal value θ^s given $B = B^c$, then the club size that emerges under open access, $\hat{n}(\theta^s)$, is the socially optimal size n^s. In effect, consumers' free-riding is exactly offset by firms' ignoring congestion costs. If $B < B^c$, however, public-good benefits are relatively small, so that the congestion externality dominates and open-access results in a club that is too large. Alternatively, if $B > B^c$, the public-good externality dominates and open-access results in a club that is too small.

5. Government clubs

The first institutional arrangement we examine is a government-sponsored club, which we assume aims to maximize social welfare (i.e., adopts the "total-economy" viewpoint of club theory). As discussed in the introduction, a government sponsor cannot in practice regulate club size directly, by either prohibiting or mandating firm entry. Whether it can regulate club size indirectly, through taxes or subsidies, will depend on the political environment. If the government's main rationale for promoting a voluntary club is that it lacks political support for a mandatory program, then the club may be limited to setting a voluntary standard that all firms are invited to meet.[16]

If the government *is* able to use incentives, one incentive it might use is an admission fee τ over and above the average club administration costs $c(n)$. Equilibrium condition (4) then becomes

$$f(\theta) = \alpha\theta + c(n) + \tau, \quad (6)$$

and comparing this with first-order condition (3) shows that the government can implement the socially optimal club by setting the standard at θ^s and the fee at level

$$\tau^s = n^s c'(n^s) - Bg'(n^s\theta^s)\theta^s. \quad (7)$$

[15] Strictly speaking, $\hat{n}(\theta)$ is a correspondence rather than a function, because for given θ, condition (4) holds at two values of n: one where average club costs are declining ($n < \check{n}$) and one where they are increasing ($n > \check{n}$). We ignore the former value, because under open access it does not represent a stable equilibrium: any accidental entry at $n < \check{n}$ will reduce average club costs and thus make club surplus – the left-hand side of (4) – positive. This will then attract further entry until $n > \check{n}$. Note also that the function is defined only on the interval $[\underline{\theta},\overline{\theta}]$, where $f(\underline{\theta}) - \alpha\underline{\theta} - c(\check{n}) = f(\overline{\theta}) - \alpha\overline{\theta} - c(\check{n}) = 0$.

[16] Importantly, even if political constraints prevent the government from taxing or subsidizing club members overtly, it may be still be able to "disguise" such incentives, for example by charging above-cost certification fees or offering free publicity of members' compliance.

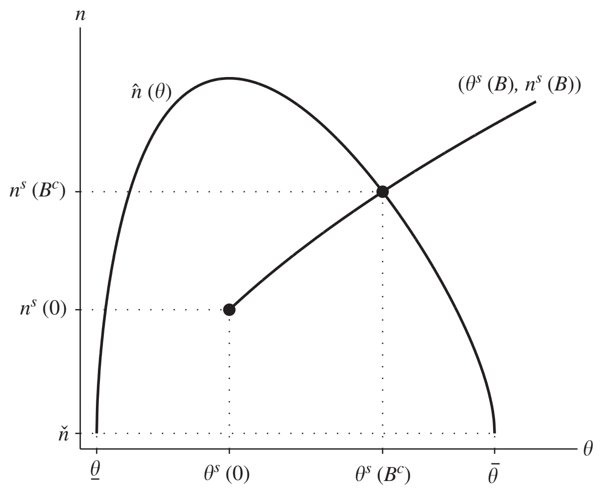

Fig. 1. Locus of open-access equilibrium club sizes $\hat{n}(\theta)$ given different standards θ, and locus of socially optimal standards and club sizes $(\theta^s(B), n^s(B))$ given different weights B on public-good benefits.

In effect, the admission fee forces entering firms to internalize the net effect of both externalities associated with membership. Note that τ^s may be either positive or negative depending on whether the congestion externality or the public-good externality dominates. In the latter case, the optimal policy would be to subsidize club membership, in order to promote more public-good provision.

If the government is *not* able to use incentives, its only instrument is the club standard, with the club size determined under open access. Hereafter, we refer to this as the "constrained government" case. How this constraint affects the club outcome depends on the degree to which the green good provides public-good benefits, as parameterized by B. To see this, note that the constrained government's optimization problem can be written as

$$\max_{\theta,n} W = n[f(\theta) - \alpha\theta - c(n)] + Bg(n\theta) \quad \text{s.t.}\ f(\theta) - \alpha\theta - c(n) = 0, \tag{8}$$

which is equivalent to

$$\max_{\theta} W = Bg(\hat{n}(\theta)\theta). \tag{9}$$

Clearly, if the green good provides no public-good benefits ($B = 0$), the sponsor will be indifferent between all feasible club standards, and even indifferent about establishing a club in the first place. The reason is simply that, under open access, all private benefits from the club are dissipated. As a result, the open-access club makes no contribution to social welfare, at any standard.

The dissipation of private benefits also implies that if the green good does provide public-good benefits ($B > 0$), the sponsor will choose θ so as to maximize those benefits alone. Moreover, since the parameter B enters the objective function in (9) as a multiplicative constant, the solution must be independent of its value. That is, regardless of how important public-good benefits are, the government sponsor will choose the *same* standard θ^g, resulting in the same open-access club size $n^g = \hat{n}(\theta^g)$.

Fig. 2 illustrates the government's optimization problem by adding level curves representing combinations of θ and n that yield the same level of public-good spillovers $n\theta$. The government chooses the highest level curve subject to the open-access constraint represented by the $\hat{n}(\theta)$ curve, and because neither these level curves nor the constraint depend on B, the solution is always the same point (θ^g, n^g).

The figure shows also that this solution lies exactly at the crossing point of the locus of social optima with the open-access constraint, i.e., at the critical point $(\theta^s(B^c), n^s(B^c))$ discussed in the previous section. To see why this must be the case, recall that B^c is the critical weight on public-good benefits where, if the standard is set at the socially optimal value $\theta^s(B^c)$, open access gives rise to the socially optimal club size. Mathematically, this implies that at B^c, the combination $(\theta^s(B^c), n^s(B^c))$ must solve problem (8), and must therefore coincide with the government's solution at any B. More generally, we can see that the government's solution is socially optimal *only* at B^c, and the constant standard θ^g and club size n^g are both suboptimally low (high) if $B > (<) B^c$.

Summarizing, we find the following[17]:

Proposition 1. *If the government can regulate club size indirectly through a tax or subsidy on club membership or the green good, then it can implement the socially optimal club. If it cannot regulate club size, then it will be indifferent between sponsoring*

[17] Full proofs of all propositions are available upon request.

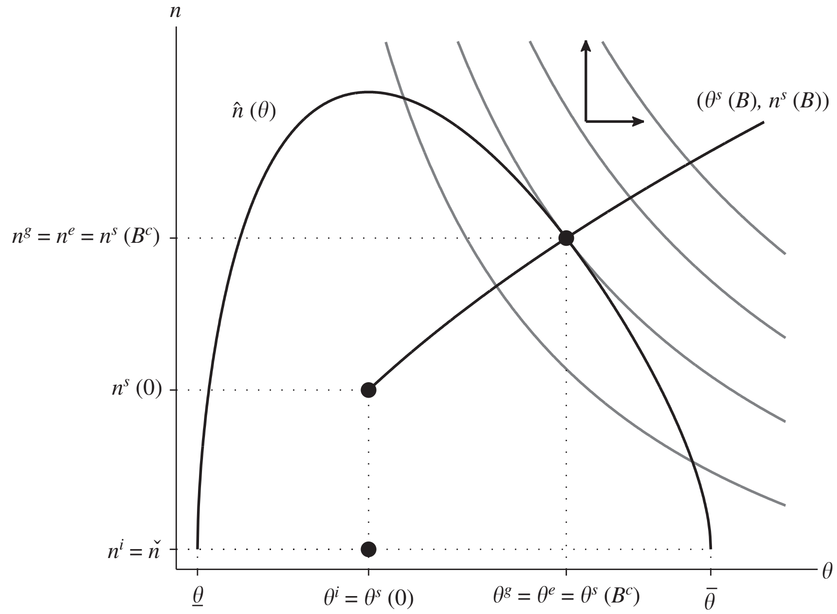

Fig. 2. Optimum (θ^g, n^g) for a government club if regulating club size is not feasible, (θ^e, n^e) for an environmentalist club, and (θ^i, n^i) for an industry club.

a club or not having one at all if $B=0$. *If* $B>0$, *however, the government prefers establishing a club and always chooses the same standard, which results in the same club size. The government club is socially optimal if* $B=B^c$, *but yields a too low (high) standard and club size if* $B>(<)B^c$.

6. Environmentalist clubs

We next consider a club sponsored by an environmental group, which we assume aims to maximize $\Theta = n\theta$, the level of the environmental public good.[18] In principle, the group may be able to choose not just the club characteristics (θ, n), but also the premium p charged for the club-certified good. In doing so, however, it is constrained by the requirements that consumers must be willing to buy the green good, so that p cannot exceed their willingness to pay $f(\theta)$, and that firms must be willing to join the club, so that p must cover their average production and club costs $\alpha(\theta)+c(n)$.

At any solution to the club's problem, both constraints must bind. This implies that the optimal premium and club size, conditional on the standard, are precisely those that result from open-access entry of firms to the club, as analyzed in Section 4. The club's optimization problem can therefore be written as

$$\max_{\theta,n} E = n\theta \quad \text{s.t. } f(\theta)-\alpha\theta-c(n)=0, \tag{10}$$

or equivalently

$$\max_{\theta} E = \hat{n}(\theta)\theta. \tag{11}$$

Clearly, the solution (θ^e, n^e) is independent of B. Moreover, just as we found was true of the government club's solution, the environmentalist club's solution coincides with the social optimum at critical weight B^c. Underlying this is again the fact that open access fully dissipates the club's net private benefits, leaving only the public benefits $Bg(n\theta)$. But since those benefits increase monotonically in the level $n\theta$ of the public good, the environmentalist club's problem of maximizing the latter along the $\hat{n}(\theta)$ curve must yield the same solution as the social planner's problem at B^c.

Proposition 2. *If an environmentalist group sponsors the club, then it chooses the same standard at all* $B>0$, *resulting in the same club size. The environmentalist club is socially optimal at* B^c, *but yields a too low (high) standard and club size at* $B>(<)B^c$.

Combining Propositions 1 and 2 yields the following additional result:

[18] Strictly speaking, since environmentalists are part of society, their preferences should be incorporated in the welfare function. This could be done, for example, by writing the public-good component of welfare as $(N+M)\beta g(n\theta)$, with M the number of environmentalists, and then defining $B \equiv (N+M)\beta$. Qualitatively, much of our analysis would go through unchanged if we assumed that environmentalists derive utility from consuming the green good as well, but merely place a greater *relative* weight on utility from the public good.

Proposition 3. *If an environmentalist group sponsors the club, then its optimum at all $B>0$ coincides with that of a government constrained from regulating club size.*

This latter result suggests an alternative policy option available to the constrained government: instead of creating and administering the club itself, it can simply encourage an environmentalist group to do so. In fact, if direct government sponsorship of a club gives rise to any transaction or political costs that a non-government sponsor can avoid, then this alternative option will be *strictly* preferable.

7. Industry clubs

Industry-sponsored clubs are focused on the profits of their members. We assume an industry club will want to expand its membership only if doing so increases the profits of existing members. Equivalently, its objective is to maximize average club profits (corresponding to the "within-club" viewpoint of club theory).

A key question is whether the industry club can in practice restrict its membership without falling afoul of antitrust laws. It seems reasonable to assume that it cannot, but then, under the baseline assumptions of our model, the industry solution becomes trivial: since open access dissipates all profits, no industry has an incentive to create a green club.

Under certain circumstances, however, a constrained government may be inclined to waive antitrust restrictions, in order to induce an industry to form a club. To show this, we consider the optimization problem of an industry club that *can* restrict membership,

$$\max_{p,\theta,n} \pi = p-\alpha\theta-c(n), \quad \text{s.t.}\, f(\theta)\geq p.$$

Since the club has no reason to leave the consumer with any surplus, the constraint must bind at the solution. Substituting it into the objective function leaves the problem

$$\max_{\theta,n} \pi = f(\theta)-\alpha\theta-c(n),$$

with first-order (provision and membership) conditions

$$f'(\theta)=\alpha, \tag{12}$$

$$c'(n)=0. \tag{13}$$

Condition (12) shows that the industry club will choose the socially optimal standard $\theta^s(0)$ that would apply if the green good provided only private benefits. Intuitively, this standard maximizes those benefits given any club size. Condition (13) shows that the club will choose the club size $\check{n}$ that minimizes per-member club management costs.

Because public-good spillovers have no effect on consumers' willingness to pay for the green good, and therefore no effect on firm profits, the solution is independent of B. In effect, the industry club is the polar opposite of the environmentalist club; whereas the latter focuses solely on public-good benefits, the industry club focuses solely on private benefits.

Nevertheless, because the industry club maximizes average rather than total private benefits, its solution $(\theta^i,n^i)=(\theta^s(0),\check{n})$ is never socially optimal, even when $B=0$. This is because the industry club has no reason to expand the club beyond $\check{n}$, given that doing so increases average club costs and thereby reduces existing members' profits.

Proposition 4. *If industry sponsors the club and is able to restrict the club size, then it chooses standard $\theta^s(0)$, which equals (is less than) the social optimum at $B=(>)0$, and it chooses club size $\check{n}$, which is lower than the social optimum at any B.*

As with the environmentalist-club solution, it is again of interest to compare the industry-club solution to that of a constrained government. Key to this comparison is that, whereas all private benefits are dissipated at the government's solution, the industry solution has strictly positive private benefits. As a result, when $B=0$, so that private benefits are all that matters to the government, it strictly prefers the industry solution. When $B=B^c$, on the other hand, welfare is strictly higher at the government's own solution, since that solution coincides with the social optimum. By continuity, there must be an intermediate weight $\hat{B}\in(0,B^c)$ at which both solutions yield the same welfare. It can be shown, moreover, that welfare increases more rapidly with B when evaluated at the government solution than when evaluated at the industry solution.[19] It follows that the industry-club solution dominates at all $B<\hat{B}$, but the government's own solution dominates at all $B>\hat{B}$.

Combined with our earlier result that the constrained government solution coincides with the environmentalist-club solution, this result implies that the conclusion at the end of the previous section must be amended:

Proposition 5. *A constrained government is indifferent between sponsoring its own club and encouraging an environmentalist club only if B exceeds a critical value $\hat{B}\in(0,B^c)$. At lower B values, it instead strictly prefers encouraging an industry-sponsored club over either alternative.*

[19] Letting W^g denote the former and W^i the latter, we have that $\partial W^g/\partial B = g(n^g\theta^g) > g(\check{n}\theta^s(0)) = \partial W^i/\partial B$, since $g(\cdot)$ is increasing and $n^g\theta^g = n^s(B^c)\theta^s(B^c) > \check{n}\theta^s(0)$.

Intuitively, encouraging an industry-sponsored club allows the government to indirectly restrict club size and thereby minimize private-benefit dissipation. Even though the industry club will ‘‘undershoot’’ by restricting club size further than is socially optimal, the resulting welfare loss is at low B values smaller than that from the open-access ‘‘overshoot’’ that arises with the government or environmentalist clubs.

8. Monitoring and enforcement

Up to this point, we have assumed that whereas green production is not verifiable by consumers, a green club can and does perfectly monitor compliance with its benchmark standard. In practice, however, the stringency of monitoring is clearly a choice variable of the club. Moreover, if the club chooses to monitor imperfectly, member firms may have an incentive to produce at a lower standard, denoted $\tilde{\theta}$, to save on production costs.

To see the implications of imperfect club monitoring, consider the simplest case where (i) the club can commit to a monitoring regime under which cheating by any given member firm is detected with probability q at the beginning of each period, and any firm found cheating is expelled from the club forever[20]; (ii) the detection probability q does not depend on $\tilde{\theta}$; and (iii) the marginal cost of achieving detection probability q is constant, equal to m per period, per firm. Assumption (ii) implies that a cheating firm optimally sets $\tilde{\theta}=0$. Assumption (iii) can be captured mathematically by redefining $c(n)$ to exclude variable monitoring costs mq, and treating the latter as an additional cost incurred by club members.

All three assumptions combined imply a minimum premium that a firm must receive to be deterred from cheating. To see this, let $\delta \equiv 1/(1+r)$ denote a firm's discount factor. Now compare the present value of its infinite stream of rents if it always complies with the club standard,

$$V_0 \equiv [p-\alpha\theta-c(n)-mq]+\delta V_0 = \frac{p-\alpha\theta-c(n)-mq}{1-\delta}, \tag{14}$$

with the present value of its expected stream of rents if it cheats for just one period, but then reverts to complying with the standard,[21]

$$V_1 \equiv (1-q)[p-c(n)-mq+\delta V_0]. \tag{15}$$

The standard ‘‘one-stage-deviation principle’’ of multi-stage games (see [19]) implies that a firm is deterred from cheating any number of times if it is deterred from cheating just once, i.e., if $V_0 \geq V_1$. Substituting from (14) and (15) and recognizing that any equilibrium will have $f(\theta)=p$ yields the equivalent inequality

$$f(\theta)-\alpha\theta-c(n)-mq \geq \frac{(1-\delta)(1-q)}{q}\alpha\theta \equiv x(q,\delta)\alpha\theta. \tag{16}$$

That is, as long as member firms earn rents of at least $x(q,\delta)\alpha\theta$ when they comply, the risk of losing these rents forever with probability q will be sufficient to deter them from cheating.

A final assumption, which turns out to be of crucial importance to the types of equilibria that arise with imperfect monitoring, concerns the ability of consumers to observe whether or not firms have in fact been expelled from the club for cheating. Below, we first consider the case where consumers are ‘‘uninformed,’’ in the sense that they do not observe such expulsions, and then the case where consumers are ‘‘informed.’’ Which of these cases applies in practice will depend on the prominence of the club's eco-label, and thereby on the likelihood that instances of cheating will be widely publicized by the news media.

For each information case we also consider how the equilibrium changes with the marginal monitoring cost m. We do so because, for some green products, it is reasonable to assume that this marginal cost is close to zero, while for others it may be quite large. In particular, if a product's claimed environmental friendless is based on design features, as with energy-efficient buildings, low-flow toilets, or easily recyclable appliances, then verifying these claims may require just a single inspection when the product is first launched, whereby the marginal cost of increasing the probability q of detecting any cheating may be quite low. In contrast, if a product's claimed environmental friendless is based on the manner in which it is produced, as with organically grown food, shade-grown coffee, or sustainably harvested wood, then verifying these claims likely requires repeated and involved inspections of production sites. The probability q of detecting cheating then clearly depends on the frequency and intensity of such inspection visits, implying that marginal costs of increasing q may be quite high.

Mathematically, m affects the equilibrium through its effect on the ‘‘no-cheating constraint’’ (16). Evaluated at equality, this constraint implicitly defines a maximum club size $\hat{n}(\theta,q,m)$ at which firms will still optimally comply with a standard θ,

[20] If there are any costs associated with monitoring or expelling firms, the club must be able to commit to the regime ex ante. This is because the sponsor otherwise has an incentive to monitor less intensely ex post if all firms are induced to comply, or to renegotiate punishment ex post if a firm is caught cheating. For discussion of how such commitment may be achieved in practice (for example by delegating actual implementation of the monitoring regime to an outside auditor), see [40]. Importantly, as pointed out by Lenox and Nash [32], expulsion may be the only punishment available to voluntary programs, since members can simply leave the program to avoid other forms of punishment.

[21] If inspections occurred at the end rather than the beginning of each period, the expression would be $V_1 = p-c(n)+(1-q)\delta V_0$. Qualitatively, our results would go through unchanged.

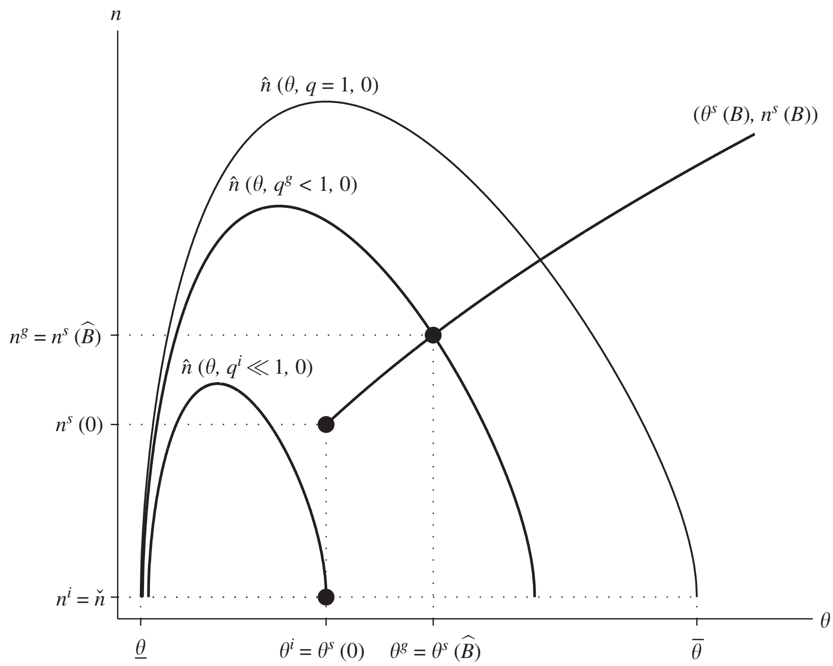

Fig. 3. Effect of imperfect monitoring on the maximum feasible club size when marginal monitoring costs are zero.

conditional on detection probability q and monitoring cost m. If monitoring is perfect ($q=1$) and involves only fixed costs ($m=0$), the function $\hat{n}(\theta,1,0)$ coincides with $\hat{n}(\theta)$ in the previous sections.

Implicit differentiation of (16) evaluated at equality yields

$$\frac{\partial \hat{n}(\theta,q,m)}{\partial q} = \frac{-m - x_q(q,\delta)\alpha\theta}{c'(n)}, \tag{17}$$

whereby both the denominator on the right-hand side and the $-x_q(q,\delta)\alpha\theta$ term in the numerator are positive. This implies that when m is zero, reducing the detection probability q has the effect of reducing the maximum feasible club size at any given standard, as illustrated by the curves labeled $\hat{n}(\theta,q=1,0)$, $\hat{n}(\theta,q^g<1,0)$, and $\hat{n}(\theta,q^i \ll 1,0)$ in Fig. 3. Intuitively, reducing the detection probability increases firms' incentive to cheat, thereby raising the minimum rents $x(q,\delta)\alpha\theta$ required to deter cheating. For a given standard θ, with the premium already at its upper bound $p=f(\theta)$, the only way to increase rents is to reduce the number of firms in the club, thereby reducing average club costs $c(n)$.

When m is positive, however, reducing q has the additional effect of reducing monitoring costs, which all else equal permits an increase in average club costs $c(n)$ consistent with keeping rents at a given level. Eq. (17) shows that at large m – large enough to make the numerator on the right-hand side positive – this additional effect will dominate. Reducing q will then increase the maximum feasible club size, as illustrated in Fig. 4. (The dashed line in the figure shows the effect of the monitoring-cost reduction alone, before adjusting rents to $x(q,\delta)\alpha\theta$.)

8.1. *Uninformed consumers*

Consider first the case where consumers observe the club's monitoring commitment, but cannot observe expulsions of cheating firms. An immediate implication is that, unless club managers can regulate club size directly, the only feasible club involves perfect monitoring. The reason is simply that, under open access, firms will have no reason *not* to enter beyond the club size $\hat{n}(\theta,q,m)$. Doing so will cause the no-cheating constraint to fail, but unless monitoring is perfect, so $x(1,\delta)\alpha\theta=0$, firms' expected rents from entering and cheating will be positive up to a larger club size.[22] Anticipating this, consumers will rationally refuse to buy from any club that commits to less-than-perfect monitoring, unless that club can combine this with restrictions on firm entry so as to keep the no-cheating constraint satisfied.

It follows that for the constrained government and industry clubs, allowing for imperfect monitoring essentially makes no difference: the analysis of Sections 5 and 7 goes through unchanged. For environmentalist clubs, the same is true provided monitoring costs are low enough for $\partial\hat{n}/\partial q$ to be positive under perfect monitoring ($q=1$). This follows because, if imperfect monitoring reduces the maximum feasible club size, it can only reduce the maximum feasible level of public-good provision $\hat{n}(\theta,q,m)\theta$, which can only hurt the environmentalist club. Conversely, if $\partial\hat{n}/\partial q$ is negative, switching to

[22] The club size at which rents are driven to zero given cheating is implicitly defined by $f(\theta)-c(n)-mq=0$.

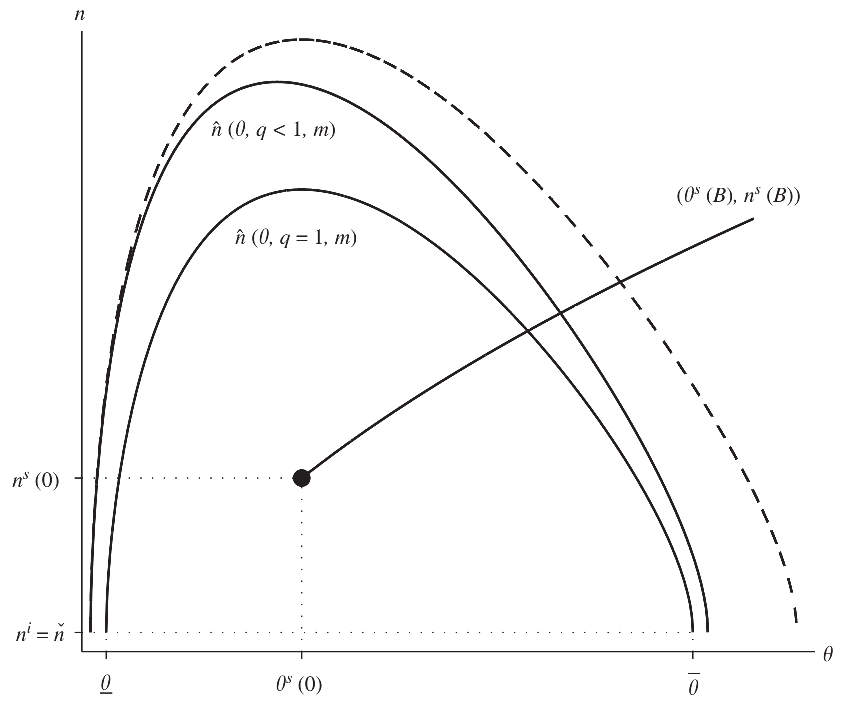

Fig. 4. Effect of imperfect monitoring on the maximum feasible club size when marginal monitoring costs are large.

imperfect monitoring while restricting entry to club size $\hat{n}(\theta,q,m)$ must benefit the club. That is, if m is large enough, an environmentalist club optimally monitors imperfectly. Note that it does so not to save on monitoring costs directly—after all, such costs do not enter its objective function. Rather, it does so because reducing monitoring costs for member firms allows it to both expand the club and set a higher standard, thereby achieving a higher level of public-goods provision.

This in turn has implications for optimal delegation by the government. Specifically, since rents are fully dissipated at the constrained government solution, and since the no-cheating constraint always binds at the environmentalist solution, the difference between welfare at the two solutions can be written as

$$W^e - W^g = n^e x(q^e,\delta)\alpha\theta^e + B[g(n^e\theta^e) - g(n^g\theta^g)].$$

Whenever monitoring costs are high enough for the environmental group to choose imperfect monitoring ($q^e < 1$), the first term on the right-hand side is strictly positive. Moreover, by revealed preference on the part of the environmental group, $n^e\theta^e \geq n^g\theta^g$, so that the second term is non-negative. It follows that $W^e > W^g$.

Proposition 6. *When consumers are uninformed and monitoring is sufficiently costly, an environmentalist club optimally monitors imperfectly. A constrained government then strictly prefers delegating sponsorship to the environmentalist club over sponsoring its own club.*

Intuitively, if a government club would have to monitor perfectly at very high cost, the government may prefer "borrowing" the environmentalist club's ability to save on monitoring costs by regulating club size directly. Similarly, the government may also prefer delegating sponsorship to an industry club, in this case after *endowing* the club with the same ability by waiving antitrust restrictions. If the industry club is allowed to regulate its size, the difference between welfare at the industry and government solutions can be written as

$$W^i - W^g = \check{n}x(q^i,\delta)\alpha\theta^i + B[g(\check{n}\theta^i) - g(n^g\theta^g)].$$

When monitoring is costly, the first term on the right-hand side is strictly positive, so that $W^i > W^g$ at sufficiently low values of B.[23]

Proposition 7. *When consumers are uninformed and monitoring is costly, an industry club that can regulate its size optimally monitors imperfectly. A constrained government may then strictly prefer waiving antitrust restrictions and delegating sponsorship to an industry club over sponsoring its own club.*

[23] If $m > 0$, the industry club's optimization problem $\max_{\theta,n,q} \pi = f(\theta) - \alpha\theta - c(n) - mq$ subject to (16) has solution $n = \check{n}$, $\theta^i < \theta^s(0)$, and $q^i < 1$. The final inequality implies that $x(q^i,\delta) > 0$.

8.2. Informed consumers

Consider next the case where consumers, in addition to observing the club's monitoring commitment, *do* observe any expulsions of cheating firms, and assume for simplicity that they do so instantaneously, i.e., immediately when expulsions occur. This seemingly minor change in consumer information turns out to have important implications.

The reason is that now, even under open access and even with imperfect monitoring, firms will not enter beyond the club size $\hat{n}(\theta,q,m)$ that maintains compliance with a given standard θ. Once the club has grown to this size, outside firms will realize that further entry, by increasing club costs and thereby driving per-firm rents below $x(q,\delta)\alpha\theta$, would only induce all member firms to start cheating. Since consumers, as soon as they observe the resulting firm expulsions, would stop buying from the club, entering firms would have no hope of covering their club costs.

None of this matters to environmentalist clubs, since open access does not concern them. For industry and constrained government clubs, however, the situation changes significantly. This is because, through purposely monitoring imperfectly and thereby shrinking the open-access constraint $\hat{n}(\theta,q,m)$ in the manner of Fig. 3, these clubs now *can* in effect restrict club size (without, in the case of industry clubs, falling afoul of antitrust regulations) and thus deliver positive private rents to their members.

More specifically, if marginal monitoring costs are zero, the industry club can now set its standard optimally at $\theta^i = \theta^s(0)$ and achieve its optimal size $\check{n}$ by purposely choosing the imperfect detection probability q^i such that $\hat{n}(\theta^s(0),q^i,0) = \check{n}$. If marginal monitoring costs are positive, it can be shown that the club will optimally relax its standard somewhat in order to save on monitoring costs, i.e., choose $\theta^i < \theta^s(0)$, but will still set the same optimal club size by choosing q^i such that $\hat{n}(\theta^i,q^i,m) = \check{n}$.[24]

Similarly, if marginal monitoring costs are zero, the government club may now set its standard at the socially optimal level $\theta^g = \theta^s(B)$ and achieve the socially optimal club size $n^s(B)$ by purposely choosing the imperfect detection probability q^g such that $\hat{n}(\theta^s(B),q^g,0) = n^s(B)$. Note, however, that this is possible only for welfare weights $B < B^c$ such as $\widehat{B}$ in Fig. 3. For weights $B \geq B^c$, the social optimum lies on or outside the open-access constraint with perfect monitoring, so that shrinking the constraint through imperfect monitoring is of no use. The best the government can do in such cases is still to either monitor perfectly or delegate to an environmentalist club.

If marginal monitoring costs are positive, matters are complicated by the fact that, even when the social optimum $(\theta^s(B),n^s(B))$ with perfect monitoring lies inside the open-access constraint with perfect monitoring, and is therefore in principle achievable, the government club will nevertheless optimally relax its standard and choose a smaller club size than this social optimum, in order to save on monitoring costs. It remains true, however, that for weights below some upper bound $\overline{B}$, the government will optimally monitor imperfectly, while for higher weights it will optimally either monitor perfectly or delegate.[25] Moreover, it can be shown that if variable monitoring costs are so large that even an environmentalist club will monitor imperfectly, the upper bound $\overline{B}$ becomes infinite. The government club will then always monitor imperfectly, at any weight B, but also always prefer sponsoring its own club over delegating sponsorship to environmentalists.

The following proposition summarizes these results:

Proposition 8. *When consumers are informed, both an industry club and a government club may deliberately monitor imperfectly, even if marginal monitoring costs are zero. For the government, imperfect monitoring is optimal if B is below an upper bound $\overline{B}$, which goes to infinity if monitoring is sufficiently costly. In all such cases, the government strictly prefers sponsoring its own club over delegating sponsorship to an environmentalist club.*

9. Conclusion

The model developed in this paper treats voluntary eco-certification programs as green clubs: clubs, because they provide non-rival but excludable reputation benefits to participating firms; green, because they also generate environmental public goods. The model illuminates a central tension between the congestion externality familiar from conventional club theory and the free-riding externality familiar from the theory on private provision of public goods. We have used this model to examine how three common types of program sponsors – government agencies, industry associations, and environmental groups – are likely to differ in terms of their management decisions, and how the resulting club configurations compare to the social optimum. Our findings have implications for optimal government delegation of sponsorship to other groups, optimal application of antitrust restrictions to industry clubs, optimal stringency of monitoring compliance with club standards, and optimal dissemination of information about clubs to consumers.

Our analysis highlights three key factors that drive our results. One is the weight on public-good benefits in the social welfare function, which determines the socially optimal club standard and size. Because the environmentalist club cares only about the public good, its optimum is independent of this weight; as a result, the environmentalist club maximizes

[24] The club's optimal detection probability need not decline monotonically with m, however, it can be shown (by example) that, because of the ambiguous effect of higher m on the no-cheating constraint, the club may paradoxically increase its monitoring effort when monitoring costs increase.

[25] As with the industry club, the government club's optimal detection probability q^g need not decline monotonically with m.

welfare only if the weight happens to take on a critical value. Similarly, because the industry club cares only about per-firm profits, its optimum is independent of the weight as well, and is never socially optimal.

The second factor is whether the government club can regulate club size, either directly or through taxes and subsidies. If political constraints prevent such regulation, then under our baseline assumption of perfect monitoring, open access dissipates all private benefits from the club, leaving it to maximize public-good provision alone. This implies that the government may be indifferent about leaving club sponsorship to an environmental group if the welfare weight on public-good benefits is high. It also implies that, since private benefits are not dissipated at the industry optimum, the government may strictly prefer leaving club sponsorship to an industry association if the welfare weight on public-good benefits is low. Doing so may require waiving antitrust restrictions.

The third factor plays a role only if monitoring of the club standard is potentially imperfect. It concerns the ability of consumers to observe whether firms have been caught and expelled from the club for cheating. If consumers *can* observe expulsions, then club rents are no longer fully dissipated under open access, and stringency of monitoring becomes an instrument to affect club size indirectly. Government and industry clubs may now attain their respective optima by deliberately monitoring imperfectly, and the government will therefore strictly prefer sponsoring its own club over leaving sponsorship to others. If consumers *cannot* observe expulsions, then we are back to full rent dissipation under open access. This leaves firms with no incentive to comply with any standard unless cheating is detected with certainty, possibly at great cost. The government may then strictly prefer leaving sponsorship to others over sponsoring its own club. An obvious further implication is that both government and industry sponsors can benefit from mechanisms that inform consumers about enforcement actions.

We believe that our model provides a useful starting point for further analysis of the institutional arrangements of green clubs. Future work might consider different sources of private benefits captured by these clubs, such as avoided costs of mandatory regulations, or dynamic benefits from learning by doing. It might also consider different sources of club congestion, such as free-riding by late entrants on efforts by earlier ones, or lower willingness to pay by consumers for products of less "select" clubs. Generalizing our model to allow for heterogeneity of consumers and/or firms would permit analysis of the quite common practice of offering a "menu" of standards, such as the certified, silver, gold, and platinum standards offered by the Leadership in Energy and Environmental Design (LEED) program.

Two particularly interesting issues that we have abstracted from are possible competition between multiple clubs in a market, as well as possibly imperfect competition between firms. Examples of markets in which multiple clubs operate include the green-building market, where the industry-sponsored Green Globes and National Green Building programs compete with the NGO-sponsored LEED program, and the sustainably harvested wood market, where the industry-sponsored Sustainable Forestry Initiative competes with the NGO-sponsored Forest Stewardship Council. As for imperfect competition between firms, an important strand of the eco-labeling literature (e.g., [3,4,1,12,20]) has focused on implications of such competition, while taking as given that green firms can credibly certify whatever level of environmental performance they choose. A richer, more realistic model might combine elements of this approach with ours, recognizing that firms (both green and brown) may have market power, while recognizing also that green firms often cannot self-certify, and may therefore need to join some green club.

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