Credence Attributes, Voluntary Organizations, and Social Pressure

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I. Introduction

In addition to their physical and performance characteristics products have unobservable credence attributes that consumers cannot learn through search or experience. Such attributes could include the conditions under which the product is produced, including any externalities associated with production, how workers are treated and how well they are paid, hidden hazards associated with consumption of the product, and whether the product is made from sustainable inputs. Consumers may value credence attributes and be willing to pay a premium for their supply. Firms then have an incentive to add those attributes to their products as a form of product differentiation. Even if they are not consumers of the product, citizens can value credence attributes that represent positive social externalities or redistribution to preferred recipients, and they can generate social pressure on firms to supply more of those attributes. Credence attributes thus can be supplied as a result of demand pull from consumers and the push from social pressure.

This paper provides a theory of the voluntary supply of credence attributes in the presence of both consumers' willingness to pay and social pressure. The supply of credence attributes is made credible because firms can form a voluntary organization, referred to as a club, that establishes a standard and verifies that the standard is met; i.e., the attributes are actually provided. When consumers are willing to pay a premium for a product that meets the standard, the standard allows the club firms to differentiate their products from firms that do not meet the standard. Entry into the club is free, but meeting the standard is costly, and that cost can differ among firms. The size of the club is limited not only by the costs of meeting the standard but also by the intensity of competition among the club firms.

In choosing the standard, the club may be able to divert social pressure to the firms that do not join the club and produce the basic product without credence attributes. The club and its member firms then have a strategic game with the agents of social pressure who choose which firms to target. For some parameter values the firms meeting the standard can prefer to be the target of

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social pressure, since that preserves product differentiation. Those firms then sacrifice themselves to avoid the worse fate of reduced product differentiation and the associated more intense price competition with products with less differentiation. If successful social pressure would result in a large increase in the supply of credence attributes, the club firms can prefer a low standard so as to commit themselves to fight hard against the social pressure. This can shift social pressure to the firms producing the basic product.

The club is strategic in both its market and nonmarket environments. In the market environment the club allows product differentiation by its members. In the nonmarket environment the club both influences the locus of social pressure and also counters the social pressure if it is targeted. The club firms choose the credence standard taking into account the incentives provided in both environments. In the market environment the incentives arise from consumer preferences for credence attributes, and in the nonmarket environment the incentives come from the potential impact of social pressure on the product differentiation.

Social pressure is directed at firms through both public or private politics. Public politics takes place in government institutional arenas and can result in legislation mandating the supply of credence attributes, the promulgation of regulations by agencies, and decisions by courts about rights and entitlements pertaining to those attributes. In addition to pursuing their objectives through public politics, citizens can use private politics to pressure firms to supply credence attributes. Private politics is the direct application of social pressure outside of government institutions in an attempt to change the behavior of economic agents.[2] Non-governmental organizations (NGOs) and social activists are frequently the agents of social pressure. That is, they are funded by citizens and draw their influence from the support of citizens for their causes. Empirical studies have documented the impact of NGOs on environmental performance (see Hamilton (1993), King and Soule (2007), Lyon and Maxwell (2004)), although the studies typically do not distinguish between the underlying public and private politics (see Binder and Newmayer (2005), for example).

Firms have formed private organizations to promulgate voluntary standards and certify that their products meet those standards. In the footwear and apparel industry a group of firms and NGOs formed the Fair Labor Association that promulgates standards for working conditions in overseas factories and sponsors independent inspections of those factories to verify compliance. In response to demands that timber companies comply with the standards of the NGO-sponsored Forest Stewardship Council (FSC), U.S. timber companies formed the Sustainable Forest Initiative

[2] Baron (2001)(2003) introduced the concept of private politics.

(SFI) that establishes standards and provides for independent inspections for compliance.[3] In the aftermath of the Bhopal tragedy a group of chemical companies formed Responsible Care to promote safety and environmental protection in their firms (King and Lenox (2000)(2002)). Many chemical companies, however, chose not to participate. Under pressure from NGOs, project finance banks formed the Equator Principles governing environmental and worker standards for the projects, such as dams, pipelines, roads, and telecommunications systems, they finance in developing countries. These organizations typically adopt less stringent standards than demanded by the NGOs. For example, when the Fair Labor Association was formed, some NGOs and labor unions refused to participate and instead formed the Workers Rights Consortium to campaign for stronger worker rights in the footwear and apparel industries. Similarly, the NGOs backing the FSC criticized the SFI for its standards and the absence of mandatory independent inspections. Environmental NGOs have also criticized the Equator Principles because they do not go far enough to protect the environment.[4]

This paper focuses on the formation of such voluntary organizations, their choice of a standard for the credence attributes of the products of their members, and how that choice and participation in the club are affected by social pressure. In the case of the SFI, the standard pertains to timber sustainability practices, certification, and verification by the club and its member firms. The organizations considered are assumed to assure credibly compliance with the standard, although, as Prakash and Potoski (2007) discuss, shirking is an important concern.[5] The certification by the club allows the members to differentiate their products, and they have an incentive to make certain that no firm shirks, since shirking by one firm could destroy the credibility of all firms. Assurance could be provided by government, an independent third party, or by the club if it can credibly certify products meeting the standard. NGOs can also provide credible certification through independent monitoring and inspection. The information provided ensures that the standard is met or that any unintended shortcomings will be quickly corrected. The certification the product receives provides an excludable benefit for the club members.

In the model the only reward for supplying a product with credence attributes comes from the

[3] Such organizations have also been formed in other timber producing countries. Virtually the entire U.S. timber industry participates in the SFI, in part because its formation was facilitated by the American Forest & Paper Association which required participation in SFI for membership in the Association. See Cashore, Auld, and Newson (2005) and Sasser, et.al. (2006).

[4] For example, the NGOs want "no-go zones" for certain ecosystems.

[5] King and Lenox (2000) found no evidence that the firms participating in Responsible Care had improved their safety and environmental performance relative to those firms that did not participate. Responsible Care had no inspection or compliance mechanisms at the time.

price premium consumers pay, although rewards could take other forms such as regulatory relief. The club is assumed to be formed by the firms in the industry, but a club could also be formed by activists and NGOs as in the case of the FSC. A club could also form at the initiative of the government as in the case of the voluntary programs sponsored by the Environmental Protection Agency. Government-sponsored programs are often intended to attract good performers to set an example in the hope that others will follow. In the model the club itself serves as an intermediary between citizens who are willing to reward firms for the credence attributes of their products and the firms that seek to supply those attributes credibly through the club.

With regard to social pressure the objective is to examine three questions about its effect on club formation and conduct. The first is whether a club would be formed in the absence of social pressure, and, if so, which firms would join and what credence standard they would choose? Second, if a club would form in the absence of social pressure, is its standard or composition affected by the presence of social pressure? For example, does the club set a higher standard when it faces social pressure than when social pressure is absent, and does social pressure affect how many and which firms join the club? The third pertains to the locus of social pressure. That is, under which conditions is social pressure directed at the club firms or at those firms that do not join the club? For example, an NGO could opportunistically target the club firms because they are viewed as soft because they are more likely to concede to the social pressure. Argenti (2004) concluded that the selection of Starbucks as a target by the NGO Global Exchange was because Starbucks was viewed as soft and responsive.

Cornes and Sander (1996) present the economics theory of clubs. Prakash and Potoski (2006) consider voluntary environmental agreements from the perspective of club theory. Clubs have also been studied in the context of political federations or unions such as the European Union or international unions such as international trade agreements (Alesina, Angeloni, and Etro (2005), Burbridge, DePater, Myers, and Sengupta (1997)). In these models the benefits from club participation accrue to the members, whereas here benefits also accrue to consumers who reward the firms for providing the benefits. In addition, the firms that do not join the club can benefit because of the product differentiation provided by the credence standard. Harstad (2005) considered a club model in which utility is transferable as in the case of the member states in the European Union that have available both taxation and redistribution instruments.[6] The collective choice of the club is then efficient, and the governing coalition is unique. Here, utility is not transferable,

[6] Harstad (2006) extends the model to consider the possibility of an inner club formed under mandatory or minimum participation requirements.

since transfers among the firms could be viewed by antitrust authorities as indicative of market collusion.

Feddersen and Gilligan (2001) provide an incomplete information theory in which an activist provides information to the public about credence attributes of products. Battega and DeFreitas (2006) study a monopolist that can supply credence attributes of its product. They consider a minimum quality standard imposed by a regulator, as well as an NGO-sponsored label certifying the attributes. They focus on the welfare properties of the equilibria and show that NGOs decrease the scope for public regulation.

Kotchen and van 't Veld (2009) present a theory of clubs in which a social planner or administrator forms a club that maximizes social welfare. They then contrast the chosen standard and the club size with those resulting when an environmentalist organizes a club to maximize environmental benefits. In the model considered here, firms form a club to maximize their expected profits taking into account the strategic interactions among the firms that join the club and those that do not. The firms may form a club voluntarily in the absence of social pressure and also in the presence of social pressure led by an activist. The club can fight the social pressure, but if the activist campaign is successful, a higher standard results. The social pressure can induce a higher standard intended to reduce the likelihood that the campaign will succeed.

The response of firms to the threat of private or public politics pressure has been studied in the self-regulation literature. Hamilton found that firms take into account social pressure on siting hazardous waste disposal facilities. Lyon and Maxwell and Maxwell, Lyon, and Hackett (2000) provide theory and empirical evidence on self-regulation by firms. King and Lenox and Lenox and Nash (2003) provide empirical studies of industry self-regulation programs. Arora and Cason (1996) and Delmas and Montes (2006) studied the performance of firms participating in voluntary programs sponsored by the Environmental Protection Agency. Baron (2007, 2008, 2009) presents theories of self-regulation in the form of corporate social responsibility. Kotchen (2006) and Calveras, Ganuza, and Llobet (2007) provide theories of self-regulation by individual consumers. Bagnoli and Watts (2003) consider consumers who have warm glow preferences for the public good aspects of the private goods provided by firms.

The paper develops a number of potentially testable results. When consumers value the credence attributes of products, firms have an incentive to form a club to assure the supply of those attributes that allow product differentiation and a price premium. Although consumers value a higher standard, the quantity sold by the club firms is decreasing in the standard, since

the effect of the price premium outweighs the credence effect of a standard. The market share of the club firms thus is decreasing in the standard.

The firms with the strongest incentive to join the club are those with the lowest fixed costs, and some firms do not join because their costs of meeting the standard are too high. Clubs with higher standards are thus smaller than clubs with lower standards. The lower standard need not, however, be the "lowest common denominator," and here the club is assumed to maximize the aggregate profit of its member firms. Although higher fixed costs tend to result in (weakly) smaller clubs, a variety of clubs can result in equilibrium. Clubs can be composed of efficient firms or inefficient firms.

In the presence of social pressure the probability that an activist campaign succeeds when targeting the club firms is decreasing in the club standard when the fixed cost functions are sufficiently convex. The club firms then have an incentive to choose a higher standard in anticipation of being targeted, so as to reduce social pressure; i.e., to reduce the incentive of the activist to contest the campaign. If the firms producing the basic product will be targeted by the activist, the club firms have an incentive to choose a lower standard unless doing so would shift social pressure to them.

The activist does not necessarily target the worst offender. Instead, it takes into account the quantities produced by the club firms and the firms producing the basic product. The activist's choice of a target thus depends on both the standard and the size of the club which affects the intensity of competition and hence the quantities of credence attributes. The club firms choose their standard anticipating the targeting choice of the activist. If the club chooses a high standard, the activist prefers to target the other firms, whereas a low standard leads the activist to target the club firms. As will be illustrated, the club firms can sacrifice themselves to make themselves the target so as to avoid the risk of reduced product differentiation in the event that a campaign against the firms producing the basic product is successful.

The paper is organized as follows. The next section introduces the model, and the following section considers the product market equilibrium. The formation of a club in the absence of social pressure is then considered in Section IV. Social pressure and the activist are introduced in Section V, and the equilibrium campaigns against the club firms and the firms producing the basic product are characterized. The influence of social pressure on the club's choice of a standard is also considered. Section VI considers the activist's choice of a target, and conclusions are offered in the final section.

II. The Model

The model includes a set of firms in an industry, a continuum of consumers, and an activist that is the agent of social pressure. The firms produce a basic good to which credence attributes can be attached. The credence attributes could be a reduction in pollution, better working conditions in factories, paying a wage above the market wage, or the sustainability of production, as examples. The supply of these attributes is assumed to be beyond the requirements of law and regulation. Consumers must be confident of the firm's claims about those attributes before they will pay a premium for the product. A firm's claims, as in its advertisements, are assumed to lack credibility unless they are verified or confirmed. The firms can, however, establish a club with a standard for the credence attributes, ensure compliance, and credibly make compliance with the standard public information. Credibility could be assured through monitoring and on-site inspections by independent third-party organizations and by public disclosure of the results. For example, the Fair Labor Association uses independent third-party organizations to conduct inspections, and members of SFI can elect to use independent third-party monitors. NGOs could also certify the credence attributes of a product and make that information public. To focus on the strategic aspects of the supply of credence attributes, the costs of assuring credibility are assumed to be zero, and shirking is assumed to be prevented.

Producing a product with credence attributes is costly in terms of both the cost of production and the fixed costs of meeting the standard, and those costs are assumed to be increasing in the stringency of the standard. The firms participating in the club are assumed to act jointly in choosing the standard and monitoring compliance with it, but they compete in the marketplace. The firms that do not participate in the club are assumed not to have access to a mechanism that would verify any claims they might make about the credence attributes of their products. Those firms then produce the basic product. The club thus provides product differentiation that segments the market into a product that meets a standard and a product that does not.

Two standard models are used to study the formation and operation of a club with a credence standard in the presence of social pressure. One is a (vertical) product differentiation model from industrial organization, where differentiation on the credence attributes dimension is analogous to quality differences among products. The other is a contest model used in political economy in which the probability of the activist or the club winning the social pressure campaign is determined by the resources each commits to the contest, as well as other factors such as reputation and trust. The combination of these two models is complex, so examples ares used to evaluate properties of

the equilibria.

Credence attributes are provided in a competitive environment, so strategic considerations affect their supply. One strategic factor is the intensity of competition, which in the model depends on the number of firms in the club. That number is endogenous, since firms choose whether to join the club and hence whether to produce a product with credence attributes. Another factor is the valuation of the credence attributes by consumers, which affects the incentives for product differentiation based on those attributes. As in the theory of quality differentiation the smaller is the product differentiation the more intense is price competition, with no differentiation corresponding to Bertrand competition. Product differentiation benefits not only the firms that join the club but the other firms as well, since they benefit when the club firms charge a high price to exploit the willingness to pay of consumers. Strategic considerations thus are present both within the club and between those firms and the firms producing the basic product without credence attributes. Consumers select between the two products based on prices and their preferences for the credence attributes.

A third strategic consideration affects the locus of private politics social pressure. The activist is assumed to maximize the supply of credence attributes by targeting either the club firms or the firms producing the basic product. This choice is conditioned on the standard adopted by the club, since, for example, if it chooses a high standard the activist would have little to gain by targeting the club and hence could prefer to target the non-club firms. If the activist campaign is successful and forces the non-club firms to supply credence attributes, product differentiation can be reduced as can the profit of the club firms. This risk can be avoided by the club firms by inducing the activist to target themselves. The club firms thus may sacrifice themselves to avoid the risk that product differentiation would be reduced if the firms producing the basic product were targeted. They do so by choosing a lower standard than they otherwise would.[7] When targeted, the club firms still have an incentive to contest the private politics campaign, since if the campaign were successful they would be forced to provide too much product differentiation relative to the cost of supplying the credence attributes. The club firms thus can have an incentive to sacrifice themselves to avoid the risk that their strategic advantage obtained through product differentiation might be lost, but that sacrifice comes at the cost of possibly higher, more costly credence attributes in addition to the cost of contesting the campaign.

[7] From the perspective of the activist, its inability to commit to which firms it will target creates a moral hazard problem that can result in a lower standard.

Consumers: Consumers are represented as a continuum of mass N. A consumer has a type $w \in [0, \bar{w}]$, which is assumed to be uniformly distributed, reflecting her warm glow or altruistic preferences for the credence attributes of the good. Each consumer is assumed to have a demand for one unit of the good and a willingness to pay u given by

$$u = \bar{w}_o + ws,$$

where $s \in [0, \bar{s}]$ is the credence attributes standard; e.g., the FSC standard, and $\bar{w}_o$ is the willingness to pay for a unit of the basic product, which meets a standard normalized to 0. Hiscox and Smyth (2006), Elfenbein and McManus (2007), and Casadesus-Masanell, Crooke, Reinhardt, and Vasishth (2009) present empirical studies indicating that some consumers are willing to pay a premium for goods that have credence attributes attached to them.

The basic product is assumed to be produced in a globally competitive industry with a world price w_o, which is less than $\bar{w}_o$, so consumer surplus is $\bar{w}_o - w_o$ for the basic product. The price p_c of a product with standard s is established in the market for the product with credence attributes.

Firms: The industry is composed of n identical firms that produce a homogenous physical product, and entry into the industry is assumed to be prohibited by sunk costs. A group of firms can form a club C and choose a standard s_c for the product produced by its m members. The choice criterion used by the club firms is assumed to be the maximization of the aggregate profit of the members. Once the standard has been chosen, the club firms engage in Cournot competition. The firms in the club produce a homogeneous product, and meeting the standard entails a common marginal cost $c(s_c)$ that is assumed to be increasing and convex in the standard with $c(0) = c_o$, which is the marginal cost of the basic product. Once chosen the club firms are assumed to be publicly committed to the standard, since the product must be branded and differentiated and production facilities and practices must be established. Once established the standard is changed only when the firms are forced to do so by social pressure.

A club firm $i \in C$ also incurs a fixed cost of developing the capability to meet the standard, monitoring compliance, and enforcing the standard. The fixed costs can differ among the firms, as Sasser, et.al. (2006) discuss in the context of the timber industry. For example, International Paper purchases timber from a large number of small, independent timber producers and would incur high costs of establishing a stringent chain of custody tracking system, whereas Domtar owns or has long-term leases covering most of its timber sourcing, so its chain of custody costs would be low. If, as seems reasonable, it is relatively more costly to meet higher standards than lower

standards, the fixed cost functions would be strictly convex. The fixed cost $K_i(s)$ of firm i is thus assumed to be strictly increasing, strictly convex, and differentiable with $K_i(0) = 0$. The fixed cost functions are assumed to be orderable in s, so identify the firms by their fixed costs so that

$$0<K_1(s)<K_2(s)<\cdots<K_n(s), \forall s \in (0, \bar{s}).$$

The firms producing the basic product incur no fixed costs.

The profit $\Pi_{ci}(s_c)$ of a club firm is

$$\Pi_{ci}(s_c) = \pi_{ci}(s_c) - K_i(s_c), \tag{1}$$

where $\pi_{ci}(s_c) = (p_c - c(s_c))q_{ci}$ is the operating profit and q_{ci} is the quantity sold by firm $i \in C$. The operating profit $\pi_{nj}(s_c, 0)$ of a firm $j \in \mathcal{N}$, the set of firms producing the basic product with standard 0, is

$$\pi_{nj}(s_c, 0) = (w_o - c_o)q_{nj}, \tag{2}$$

where q_{nj} is the quantity. So that the firms producing the basic product can earn rents, let $w_o \geq c_o$. The non-club firms are assumed to have an equal share of the residual demand.

The Activist: The activist could be an individual NGO or a coalition.[8] Prior to the club being formed, the activist makes a demand that firms meet a standard s_A for credence attributes, where s_A is assumed to be a principled demand rather than a bargaining position. For example, in the timber industry environmental NGOs demand that U.S. timber producers meet the standards adopted by the FSC. As in the case of the FSC the demand could be an invitation to join an organization that would meet the standard s_A. If the firms do not concede to the demand or reject the invitation, the activist subsequently chooses a target and conducts a private politics campaign against the target. The campaign is assumed to represent a threat to the target as in the case of a boycott (Innes (2006), Chavis and Leslie (2009)), damage to a reputation, or harm to brand equity. The activist chooses between targeting the club firms and targeting the non-club firms producing the basic product, depending on which yields the higher expected supply of aggregate credence attributes. The demand is that all targeted firms meet the standard s_A, which could differ depending on whether the activist anticipates targeting the club firms or the non-club firms.

The Nonmarket Contest: The target can counter the private politics campaign, in which case a contest ensues. If the campaign fails; i.e., the potential harm to the target does not materialize and the targeted firms maintain their pre-campaign standard. If the campaign succeeds; i.e.,

[8] Whitford (2003) studied coalitions of NGOs that participated as *amicus curiae* in environmental litigation against firms.

the potential harm materializes, the targeted firms choose not to bear the harm and implement the standard s_A and incur the corresponding fixed cost and the higher marginal cost. As in the case of the FSC the activist certifies the standard s_A to consumers and monitors the firms for compliance. For example, the Rainforest Action Network trains volunteers who walk the aisles of Home Depot stores looking for lumber made from old-growth timber.

The outcome of the private politics campaign is assumed to be determined by a contest function that depends on the campaign expenditures A by the activist and the campaign expenditures of the firms. The expenditures A may be thought of as reflecting social pressure that could harm the targeted firms. In the data collected by Lenox and Eesley (2009), compliance with the activist's demand had a correlation of 0.59 with the harm delivered by an activist. This is consistent with the contest specification in (3) below in which the probability of a successful campaign is increasing in A. This component of the campaign has a public goods property in the sense that criticism, allegations, and demands can be directed at all firms in the group.

If it is targeted, the club counters the activist by expending an amount r per member. The probability ρ_c that the campaign succeeds is specified as

$$\rho_c = \frac{\beta A}{\beta A + mr}, \tag{3}$$

where $m = |C|$ is the size of the club and β>0 is a parameter that reflects the public sentiment for the activist's cause relative to the public sentiment for the target. The parameter β also could reflect the quality of the activist, where higher quality activists have at their disposal more effective tactics. Eesley and Lenox (2006) found that the probability that the target complied with a demand was greater the more harmful the tactics used by the activist. For example, boycotts and protests were more effective than proxy measures and letter writing but less effective than civil lawsuits. Alternatively, β could reflect characteristics of the target, such as a brand or a public reputation, that can be damaged by a campaign. A more vulnerable target corresponds to a higher β. Higher values of β thus reflect an advantage for the activist. Forty-four percent of the firms targeted in Eesley and Lenox's data base acquiesced to the activist's demand.

The activist is assumed to maximize the expected aggregate supply of credence attributes. The expected utility EU_A^C of the activist when the club is targeted is thus

$$EU_A^C = \rho_c s_A Q(s_A, s_n) + (1 - \rho_c) s_c Q(s_c, s_n) - A + (n - m) s_n, \tag{4}$$

where $Q(s_A, s_n)$ is the quantity when the club firms meet the standard s_A and the non-club firms

have standard s_n if the campaign succeeds, and $Q(s_c, s_n)$ is the quantity if the campaign fails.[9]

The club firms choose their expenditures r to maximize their expected profits less their expenditures on the contest. The (aggregate) expected profit $E\Pi_C$ of the club is

$$E\Pi_C = \rho_c \sum_{i \in C} \Pi_{ci}(s_A) + (1 - \rho_c) \sum_{i \in C} \Pi_{ci}(s_c) - rm. \tag{5}$$

The preferences of the firms producing the basic product when they are the target are similar and are presented in Section V along with the expected utility of the activist when those firms are targeted.

Timing: The model consists of four stages. In the first stage given a demand s_A, a collection of firms forms a club that chooses a credence standard s_c. In the second stage the activist chooses a target for its private politics campaign targeting the club firms or the non-club firms. Third, the activist and the target contest the campaign, and the success or failure of the campaign is realized. Fourth, firms compete in the product market with the credence standards resulting from the outcome of the campaign. The equilibrium concept is subgame perfect Nash.

III. Product Market Equilibrium

In the final stage after the club has formed and chosen a standard and the campaign has been conducted, the club firms and the firms producing the basic product compete. This section characterizes the product market equilibrium for the case in which the club firms with standard s_c compete against the firms producing the basic product with standard $s_n = 0$. If the activist targets the club and the campaign succeeds, the club standard is s_A, and the product market equilibrium is the same as that characterized in this section with s_A replacing s_c. If the activist targets the firms producing the basic product and the campaign succeeds, the competition is between the club firms with standard s_c and the other firms with standard s_A. The product market equilibrium for this case is characterized in the Appendix.

So that the activist has a choice among potential targets, the focus is on parameter values such that both the basic product and the product meeting the club standard are produced in equilibrium. A consumer purchases from a firm in the club rather than a firm producing the basic product if

$$\bar{w}_o + ws_c - p_c \geq \bar{w}_o - w_o.$$

[9] This formulation is equivalent to one in which the activist expends an amount A directed at all the club firms plus an amount a directed at each club firm, where the probability of a successful campaign depends on $A + ma$ rather than A in (3).

Letting $w^*(s_c, s_n = 0) \equiv \frac{p_c - w_o}{s_c}$ denote the consumer who is indifferent between the club product and the basic product, the demand q_c for the product of the club firms is[10]

$$q_c = N\Big(1 - \frac{w^*(s_c, 0)}{\bar{w}}\Big),$$

where N is the total number of consumers.

The inverse demand function for the club product is

$$p_c = w_o + \bar{w}s_c - \frac{\bar{w}s_c}{N}q_c,$$

and the equilibrium output q_{ci}, where $\sum_{i \in C} q_{ci} = q_c$, for a firm $i \in C$ is

$$q_{ci} = \frac{(w_o + \bar{w}s_c - c(s_c))N}{(m+1)\bar{w}s_c},$$

which is nonnegative for $w_o + \bar{w}s_c - c(s_c) \geq 0$. The price is then

$$p_c = \frac{1}{m+1}(w_o + \bar{w}s_c + mc(s_c)),$$

which is independent of the size of the market and decreasing in m reflecting the competitive effect on price of more producers of the club product. The price is strictly increasing in the standard because of both the greater willingness to pay ws_c of consumers and the higher marginal cost $c(s_c)$.[11] The club firms thus exploit consumers' willingness to pay through a higher price.

The indifferent consumer is then

$$w^*(s_c, 0) = \frac{\bar{w}s_c - m(w_o - c(s_c))}{(m+1)s_c}. \tag{6}$$

For an equilibrium in which both products are sold, $w^*(s_c, 0)$ must be nonnegative which from (6) requires that $\bar{w}s_c \geq m(w_o - c(s_c))$, which is equivalent to the price p_c of the club product being at least w_o. The equilibria to be considered are those for which the parameters of the model are such that $p_c \geq w_o$.

[10] This formulation can be generalized to accommodate a mass point at $w = 0$, representing consumers who do not value the credence attributes. Letting η denote the mass, the demand for the club product is $q_c = (1 - \eta)N(1 - \frac{w^*(s_c,0)}{\bar{w}})$.

[11] The price premium $\Delta p(s_c)$ for the club product over the price of the basic product is

$$\begin{aligned}\Delta p(s_c) &\equiv p_c - w_o \\ &= \frac{\bar{w}s_c}{m+1} - \frac{m}{m+1}(w_o - c(s_c)),\end{aligned}$$

which is increasing in the standard and the cost, decreasing in m, and decreasing in w_o.

To make more precise statements, let the marginal cost $c(s)$ be $c(s) = c_o + \gamma s$, where $0<\gamma\leq\bar{w}$. The assumption that $\gamma\leq\bar{w}$ means that there is some consumer who values an increase in the standard by as much as the marginal cost γ.[12] With this specification the minimum standard s_c^- such that $w^*(s_c, 0)\geq 0$ is

$$s_c \geq s_c^- \equiv m\Big(\frac{w_o - c_o}{\bar{w} + m\gamma}\Big),\ \forall m \leq n, \tag{7}$$

where the right side is assumed to be less than $\bar{s}$ so that a standard can be adopted that results in both products being produced. The condition in (7) will be assumed and is satisfied in the examples presented below.[13]

The supply of credence attributes by the club firms is $S = s_c m q_{ci}$, which is

$$S = \frac{(w_o + \bar{w}s_c - c(s_c))mN}{(m+1)\bar{w}}.$$

The supply is increasing in he standard if $\bar{w}\geq c'(s_c)$. The pull from demand corresponds to $\bar{w}>0$, and S is strictly increasing in $\bar{w}$ if

$$\frac{dS}{d\bar{w}} = \frac{(c(s_c) - w_o)mN}{(m+1)\bar{w}^2} > 0,$$

or[14]

$$c(s_c) - w_o > 0.$$

The pull from demand on the supply of credence attributes thus need not be monotone in $\bar{w}$.

A higher standard increases consumers' willingness to pay but results in a higher price which decreases the quantity purchased. The former is a *credence effect*, and the latter is a *price effect*. The indifferent consumer $w^*(s_c, 0)$ is increasing in $\bar{w}$, since $c'(s_c) + w_o - c(s_c)\geq 0$ for $c(s_c)$ convex. Since $w^*(s_c, 0)$ is strictly increasing in s_c, the quantity produced by the club firms must decrease in s_c, so the price effect outweighs the credence effect. The market share of the club firms thus is decreasing in the standard. Although the club firms exploit the consumers' willingness to pay through a higher price resulting in a market share that is decreasing in the standard, an increase in the standard can result in an increase in the supply of credence attributes as indicated above.

[12] The condition $\gamma\leq\bar{w}$ is necessary for the club firms to be profitable for all $w_o\geq c_o$.

[13] A club could choose a standard below s_c^-. Lowering the standard below s_c^- reduces the margin $p_c - c(s_c)$, and the quantity produced is unaffected since $w^*(s_c, 0)$ is increasing in s_c and $w^*(s_c^-, 0) = 0$. Lowering the standard, however, reduces fixed costs. In the example presented below, the lower fixed costs do not offset the effect of the lower margin.

[14] This condition is sufficient for $w^*(s_c, 0)>0$, $p_c>w_o$, and for q_{ci} to be increasing in $\bar{w}$.

The operating profit $\pi_{ci}(s_c)$ of a club firm i is

$$\begin{aligned}\pi_{ci}(s_c) &= \frac{\bar{w}s_c}{N}q_{ci}^2 \\ &= \frac{(w_o + \bar{w}s_c - c(s_c))^2 N}{(m+1)^2 \bar{w}s_c},\end{aligned} \tag{8}$$

which is the same for all $i \in C$. Since the firms differ only in their fixed costs of meeting the standard, the subscript i will be omitted from the operating profit. The effect of the standard on the operating profit is characterized in the next section.

As in the standard Cournot model the operating profit is a decreasing function of the size of the club and an increasing function of the size N of the market. A shift in consumer preferences that increases demand pull as indexed by $\bar{w}$ has two effects analogous to those for a change in the standard. First, the price increases, and second consumers' preferences for credence attributes are stronger. A shift in consumers' willingness to pay for the standard thus increases operating profit π_c.[15] If some proportion η of consumers do not value the credence attributes, the size of the market is $(1-\eta)N$. The equilibrium price is unaffected, but the quantity q_{ci} and operating profit are lower by a factor of $1-\eta$.

Consumers with $w<w^*(s_c, 0)$ purchase from one of the $n-m$ firms producing the basic product, and the aggregate demand q_n is

$$q_n = N\frac{w^*(s_c, 0)}{\bar{w}}.$$

The firms producing the basic product are assumed to share equally the demand, so the operating profit of a firm $j \in \mathcal{N}$ is from (2)

$$\pi_{nj}(s_c, 0) = \frac{(w_o - c_o)N}{(n-m)(m+1)\bar{w}s_c}\big(\bar{w}s_c - m(w_o - c(s_c))\big), \tag{9}$$

which is nonnegative when (7) is satisfied. Since the profit is the same for all firms producing the basic product, the subscript j will be dropped. The effect of the club standard on the profit $\pi_n(s_c, 0)$ is the opposite of the effect on the demand for the club product. Since q_{ci} is decreasing in s_c, the profit of the non-club firms is increasing in the club standard. That is, for the credence good the price effect exceeds the credence effect, so more consumers purchase the basic product.

The principal results of this section are summarized in the following proposition.

[15] The derivative is

$$\frac{d\pi_c}{d\bar{w}} = \frac{N(\bar{w}^2 s_c^2 - (w_o - c(s_c))^2)}{(m+1)^2 s_c \bar{w}^2},$$

which is positive when $w^*(s_c, 0) \geq 0$ in (6).

Proposition 1: (A) A credence standard provides product differentiation, and consumers with a high willingness to pay for credence attributes purchase from the club firms and those with a low willingness to pay purchase the basic product. (B) The price of the club product is increasing and the quantity is decreasing in the standard, so a higher standard causes some consumers to shift from the club product to the basic product. The market share of the club is decreasing in the standard. (C) The profit of the firms producing the basic product is increasing in the club standard.

IV. Club Formation in the Absence of Social Pressure

A. Equilibrium Concept

A set of firms would voluntarily participate in a club in the absence of social pressure provided that consumers reward them sufficiently for the credence attributes of their products. That is, the supply of credence attributes could be due solely to demand pull. A club must be an equilibrium club with respect to the choice of a standard, the participation of the firms in the club, and the non-participation of firms not in the club. Thus, an equilibrium requires that the standard be an equilibrium choice given the firms participating in the club, and given an equilibrium standard, the set of firms that join the club must be identical to those that would choose the equilibrium standard. That is, given the equilibrium standard, the profit of a club firm must be at least the profit it could earn if it quit the club and produced the basic product and the remaining members of the club chose a new standard. In addition, given an equilibrium standard and set of club firms, no firm not in the club can prefer to join the club taking into account the new standard that would be chosen by the larger club.[16]

B. The Club Standard

No theory is provided to explain the process by which the club is formed. One possibility is that a firm initiates the formation of an open club and announces a choice rule. Firms then participate and those participating choose a standard according to the choice rule. As in the case of the SFI an industry association could initiate formation. The club is assumed to be formed with a charter that specifies how its members choose the credence standard. The choice rule could be unanimity or majority rule or it could specify an objective to be maximized. Acemoglu, Egorov, and Sonin (2008) study the dynamics of choice rules when in each period an organization can choose both an outcome and a distribution of power for the next period. Here, the club is assumed

[16] The former is referred to as internal stability, and the latter as external stability.

to maximize expected aggregate club profits, so in the absence of social pressure the club C chooses a standard $s_c^*(C)$ according to

$$s_c^*(C) \in \arg\max_{s_c} \sum_{i \in C} \Pi_{ci}(s_c).$$

If the fixed cost functions are relatively flat, the optimal standard could be at the minimum or the maximum of the operating profit function. The case considered here is that in which the fixed cost functions are sufficiently convex, that the optimal club standard satisfies the first-order condition for a club of size m for the specification $c(s) = c_o + \gamma s$, which is

$$\frac{d\sum_{i \in C} \Pi_{ci}(s_c)}{ds_c}_{|s_c = s_c^*(C)} = \frac{mN\left((\bar{w} - \gamma)^2 s_c^*(C)^2 - (w_o - c_o)^2\right)}{(m+1)^2 \bar{w} s_c^*(C)^2} - \sum_{i \in C} K_i'(s_c^*(C)) = 0. \tag{10}$$

The first term on the right side is the effect of the standard on the operating profit $m\pi_c(s_c)$ of the club firms, and this is positive for high standards and negative for low standards when $w_o > c_o$. A moral detailed characterization is presented in Section IV.D for a particular specification of the fixed cost functions.

C. Participation

The participation of firms in the club is endogenous and depends both on the reward by consumers for the credence attributes and on the competition among the firms. In the absence of social pressure firms would remain in a club with a standard s_c if consumers were willing to reward them sufficiently for doing so. Competition, however, drives down operating profits, so the reward depends on the size of the club as well as on the club standard.

Since the operating profit of all club firms is the same, the firms with the strongest incentives to join the club are those with the lowest fixed costs. Firms with high fixed costs of meeting the standard can avoid those costs by producing the basic product. Firms thus can be viewed as self-selecting into the club based on the fixed cost of meeting the standard, as well as on the operating profit. Because the number of firms is discrete, there are multiple club equilibria, some of which include high cost firms.

Let $s_c^*(C^*)$ denote the standard chosen by an equilibrium club C^*. A pure strategy equilibrium $(C^*, s_c^*(C^*))$ for the marginal cost function $c(s_c) = c_o + \gamma s_c$ satisfies

$$\begin{aligned} &\frac{N(w_o - c_o + (\bar{w} - \gamma)s_c^*(C^*))^2}{(|C^*| + 1)^2 \bar{w} s_c^*(C^*)} - K_i(s_c^*(C^*)) \geq \\ &\frac{(w_o - c_o)N(\bar{w} s_c^*(C_{-i}^*) - |C_{-i}^*|(w_o - c_o - \gamma s_c^*(C_{-i}^*)))}{(n - |C_{-i}^*|)(|C_{-i}^*| + 1)\bar{w} s_c^*(C_{-i}^*)}, \ \forall i \in C^*, \end{aligned} \tag{11}$$

where $C^*_{-i} = C^* - \{i\}$, and

$$\frac{N(w_o - c_o + (\bar{w} - \gamma)s_c^*(C^*_{+j}))^2}{(|C^*_{+j}| + 1)^2 \bar{w} s_c^*(C^*_{+j})} - K_j(s_c^*(C^*_{+j})) < \frac{(w_o - c_o)N(\bar{w}s_c^*(C^*) - |C^*|(w_o - c_o - \gamma s_c^*(C^*)))}{(n - |C^*|)(|C^*| + 1)\bar{w}s_c^*(C^*)}, \ \forall\ j \notin C^*, \tag{12}$$

where $C^*_{+j} = C^* + \{j\}$. The condition in (11) requires that each firm $i \in C^*$ prefers to remain in the club with a standard $s_c^*(C^*)$ rather than quit and produce the basic product where the remaining club firms choose $s_c^*(C^*_{-i})$. The condition in (12) requires that each firm $j \notin C^*$ prefers to produce the basic product than to join the club and meet the standard $s_c^*(C^*_{+j})$. If the club is efficient, then $C^* = \{1, \ldots, m^*\}$, when $m^* = |C^*|$.

A pure strategy equilibrium need not exist, and a club equilibrium need not be unique. Moreover, there can be more than one equilibrium efficient club. Club composition thus can be varied. Clubs could be composed of efficient or inefficient firms or a mix of both. King and Lenox (2000) found that the firms that participated in the chemical industry's Responsible Care were dirtier on average than the industry as a whole.

The focus here is on pure strategy equilibria and primarily on efficient clubs $C^*(m^*)$ composed of the m^* firms with the lowest fixed costs.[17] Since fixed costs are strictly increasing in the standard, the higher the standard the (weakly) smaller will be the efficient club. Cleaner clubs are thus smaller than dirtier clubs. The characterization of the participation in the club is summarized in the following proposition.

Proposition 2: For an efficient club composed of firms with the lowest fixed costs, the optimal standard $s_c^*(C^*(m^*))$ is strictly decreasing in m, so larger clubs have lower standards. Higher fixed cost functions $K_i(s), i = 1, \ldots, n$, result in a (weakly) smaller club.

[17] The conditions for an efficient club $C^*(m^*)$ of m^* firms are

$$\frac{N(w_o - c_o + (\bar{w} - \gamma)s_c^*(C^*(m^*)))^2}{(m^* + 1)^2 \bar{w} s_c^*(C^*)} - K_{m^*}(s_c^*(C^*(m^*))) \geq \frac{(w_o - c_o)N(\bar{w}s_c^*(C^*(m^* - 1)) - (m^* - 1)(w_o - c_o - \gamma s_c^*(C^*(m^* - 1))))}{(n - m^* + 1)m^*\bar{w}s_c^*(C^*(m^* - 1))} \tag{11a}$$

and

$$\frac{N(w_o - c_o + (\bar{w} - \gamma)s_c^*(C^*(m^*)))^2}{(m^* + 1))(m^* + 2)^2 \bar{w} s_c^*(C^*} - K_{m^*+1}(s_c^*(C^*(m^* + 1))) < \frac{(w_o - c_o)N(\bar{w}s_c^*(C^*(m^*)) - m^*(w_o - w_o - \gamma s_c^*(C^*(m^* + 1))))}{(n - m^*)(m^* + 1)\bar{w}s_c^*(C^*(m^*))}. \tag{12a}$$

D. An Example

As an example, let $K_i(s) = \frac{1}{2}b_i s_c^2$, where $b_1 < b_2 < \ldots < b_n$.[18] If a club C has an ideal standard $s_c^*(C) \in (s_c^-, \bar{s})$, it satisfies the first-order condition

$$\frac{d\sum_{i\in C}\Pi_{ci}(s_c)}{ds_c}\,|_{s_c=s_c^*(C)} = \frac{mN((\bar{w}-\gamma)^2 s_c^*(C)^2 - (w_o-c_o)^2)}{(m+1)^2\bar{w}s_c^*(C)^2} - m\bar{b}(C)s_c^*(C) = 0, \tag{13}$$

where $\bar{b}(C) \equiv \frac{1}{m}\sum_{i\in C} b_i$ is the average parameter of the fixed cost functions for the club firms. The second-order condition requires

$$\frac{2N(w_o-c_o)^2}{(m+1)^2\bar{w}s_c^*(C)^3} - \bar{b}(C) < 0, \tag{14}$$

which evaluated at the s_c^* satisfying (13) requires

$$s_c^*(C) > \sqrt{3}\Big(\frac{w_o-c_o}{\bar{w}-\gamma}\Big) = \sqrt{3}s_c^o.$$

If $w_o = c_o$, the second-order condition is satisfied.

The standard $s_c^*(C)$ is greater than the standard s_c^o at which operating profit is a minimum, since operating profit is increasing in the standard at s_c^*(C). The equilibrium standard $s_c^*(C)$ satisfying (13) and (14) is strictly decreasing in γ. The standard $s_c^*(C)$ is strictly increasing in the size N of the market and in the maximum willingness to pay of consumers.[19] Similarly, the optimal standard is decreasing in $\bar{b}(C)$ and in the margin $w_o - c_o$ on the basic product.

The club standard is a normal good in the sense that it is increasing in consumers' willingness to pay and decreasing in the cost γ. The effect of club size on the standard for an efficient club can be identified by observing that $\bar{b}(C)$ is increasing in m, since the lowest cost firms join the club. The standard $s_c^*(C)$ thus is strictly decreasing in the size m of an efficient club, so if m were exogenous, larger clubs would have lower standards.[20] This results because the marginal operating

[18] Garcia-Gallego and Georantzis (2009) also assume a quadratic cost of meeting a standard. See also Lutz, Lyon, and Maxwell (2000).

[19] Garcia-Gallego and Georantzis (2009) consider the effects of a shift in consumers' willingness to pay on welfare where one firm produces a credence good and another firm can enter the market. They show that when the number of firms producing the credence good is endogenous social welfare can decrease when consumers' willingness to pay increases. The quality of the credence good, however, is fixed in their model.

[20] Viewing the number m of firms in the club as a continuous variable,

$$\frac{ds_c^*(C)}{dm} = -\frac{1}{(\frac{2N(w_o-c_o)^2}{(m+1)^2\bar{w}s_c^*(C)^3} - \bar{b}(C))}\Big(-\frac{2N((\bar{w}-\gamma)^2 s_c^*(C)^2 - (w_o-c_o)^2)}{(m+1)^3\bar{w}s_c^*(C)^2}\Big) < 0.$$

profit is decreasing in m due to more intense competition, so the reward to an individual firm from a higher standard is lower. Aggregate club profit is also strictly decreasing in club size, since competition is more intense the larger the club.[21] A limit on club size thus can come from more intense (Cournot) competition.[22]

These results are summarized in the following proposition.

Proposition 3: Let $K_i(s) = \frac{1}{2}b_i s^2, i = 1, \ldots, n$ and $b_1 < b_2 < \ldots < b_n$.[23] If $s_c^* \in (s_c^-, \bar{s})$, the operating profit is strictly increasing in the standard when evaluated at $s_c^*(C)$. The club standard is increasing in N and $\bar{w}$ and decreasing in $(w_o - c_o)$, γ, and $\bar{b}(C)$. Also, larger clubs have lower standards.

If the competitive fringe of firms producing the basic product earns no profits ($w_o = c_o$), closed form expressions can be given for the example. Then, the price for the credence product depends on the standard, but the quantity and market share are independent of the standard. The operating profit of a firm in the club is linear in the standard, and the aggregate profit of the club firms is

$$\sum_{i \in C} \Pi_{ci}(s_c) = \frac{m(\bar{w} - \gamma)^2 s_c N}{(m+1)^2 \bar{w}} - \frac{1}{2} m \bar{b}(C) s_c^2.$$

The standard chosen by the club firms is then

$$s_c^*(C) = \frac{(\bar{w} - \gamma)^2 N}{(m+1)^2 \bar{w} \bar{b}(C)}. \tag{15}$$

The standard depends on the club size in two ways. The first is a competitive effect, represented by the term $(m+1)^2$ in the denominator of (15), which reflects the effect of the lower price resulting from more intense competition the larger is the club. The second is a cost effect, represented by $\bar{b}(C)$. If $\bar{b}(C)$ is nondecreasing in club size, the standard is lower the larger is the club.

The supply of credence attributes is $S = s_c^*(C) Q(s_c^*(C), 0)$, where the quantity produced by the club firms is[24]

$$Q(s_c^*(C), 0) = \frac{(\bar{w} - \gamma) m N}{(m+1)\bar{w}}.$$

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[21] Viewing the size of the club as a continuous variable,

$$\frac{d \sum_{i \in C} \Pi_{ci}}{dm} = \frac{\partial \sum_{i \in C} \Pi_{ci}}{\partial m} + \frac{\partial \sum_{i \in C} \Pi_{ci}}{\partial s_c} \frac{ds_c^*}{dm} = \frac{\partial \sum_{i \in C} \Pi_{ci}}{\partial m} < 0,$$

when evaluated at $s_c^*(C)$.

[22] More intense competition plays a role analogous to congestion costs in standard club theory.

[23] An increase in the proportion η of consumers who do not value the credence good results in a lower standard $s_c^*(C)$.

[24] When $w_o = c_o$, the quantity $Q(s_c, 0)$ is constant in s_c.

The supply of credence attributes thus is

$$S = \frac{(\bar{w} - \gamma)^3 m N^2}{(m+1)^3 \bar{w}^2 \bar{b}(C)}.$$

This is increasing in the demand pull $\bar{w}$ and the size of the market, decreasing in the costs γ and $\bar{b}(C)$, and increasing in m since the price effect exceeds the credence effect of a lower standard chosen by a larger club. The supply S also depends on the size of the club. It is straightforward to show that S is decreasing in m provided that $\bar{b}(C)$ is nondecreasing in m. This means that the activist may prefer to target a smaller rather than a larger club, since a larger club has a lower standard.

The profit of a firm $i \in C$ is

$$\Pi^*_{ci}(s^*_c(C)) = \frac{(\bar{w} - \gamma)^4 N^2}{(m+1)^4 \bar{w}^2 \bar{b}(C)^2} \Big(\bar{b}(C) - \frac{1}{2} b_i \Big).$$

The profit of a firm is thus proportional to $\bar{b}(C) - \frac{1}{2} b_i$, which identifies the incentive of a firm to join the club. The size of the club thus depends only on the parameters of the fixed cost functions.

The incentive to join the club is proportional to $\bar{b}(C) - \frac{1}{2} b_i$, and this has implications for the composition of the clubs that can form. The condition applies to any club composition, and for inefficient clubs the average fixed cost parameter would be higher than for an efficient club of the same size. Moreover, with an inefficient club the firms outside the club include more efficient firms, so the b_i of some potential entrant must be lower. Consequently, the efficient firm would enter an inefficient club, which then should be (weakly) larger than an efficient club, provided that an inefficient firm does not exit the club. This indicates that a variety of clubs could form in equilibrium.

To determine the size of an efficient club, note that with a club of size m firm $m+1$ will join if and only if

$$\bar{b}(m+1) \geq \frac{1}{2} b_{m+1},$$

where with some abuse of notation $\bar{b}(m)$ is the average cost parameter of an efficient club of size m. This can be rewritten as

$$\frac{2m}{m-1} \bar{b}(m) \geq b_{m+1}. \tag{16}$$

The equilibrium club size m^* thus satisfies

$$\bar{b}(m^*) - \frac{1}{2} b_{m^*} \geq 0 > \frac{2m^*}{m^* - 1} \bar{b}(m^*) - b_{m^*+1}.$$

As a comparative statics exercise consider an increase Δb in all the cost parameters b_i. The entry condition in (16) then can be rewritten as

$$\frac{2m}{m-1}\bar{b}(m) + \Big(\frac{m+1}{m-1}\Big)\Delta b \geq b_{m+1}.$$

An increase in the cost of meeting the standard thus results in a (weakly) larger club. This results because the standard in (15) is lower, making entry more attractive to higher cost firms. The lower standard results in a lower price, but the two effects offset leaving the quantity of credence goods unaffected. Since the standard is lower and the quantity produced is unaffected, an increase in fixed costs reduces the supply of credence attributes. The profit of each firm producing the credence product is lower because of the higher costs and because competition is more intense due to the larger number of firms producing the credence good. Hence for the case in which the competitive fringe firms producing the basic product earn no profits, an increase in fixed credence costs results in a larger club with a lower standard, and the supply of credence attributes is decreased because of the lower standard even thought there are more firms producing the credence good.

When the firms producing the basic product earn profits, the analysis is more complex. To illustrate the choice of a standard in this case, a numerical example is presented. Consider the parameter values: $n = 5$, $w_o = 1$, $c_o = 0$, $\bar{w} = 7$, $N = 10$, $\gamma = 3$, and $b_i = 0.5 + 0.1(i-1), i = 1, \ldots, 5$. For an efficient club $C = \{123\}$ the fixed cost parameters and ideal standards $\hat{s}_{ci}$ of the individual firms satisfying the first- and second-order conditions in (13) and (14) with b_i replacing $\bar{b}(m)$ are given in the following table, along with the profits evaluated at the standard $s_c^*(C) = \hat{s}_{c2}$.

Table 1

Firm	b_i	$\hat{s}_{ci}$	$\Pi_{ci}(\hat{s}_{c2})$
1	0.5	2.83	2.729
2	0.6	2.35	2.453
3	0.7	2.01	2.177

Since the club maximizes the aggregate profit of its members and the mean parameter $\bar{b}(3)$ of the fixed cost functions is 0.6, and the club chooses the standard $s_c^*(3) = 2.35$. As Table 1 indicates, all club members have positive profits. Since the market share of the two firms producing the basic product increases, they are also better off than in the absence of a club and have profits $\pi_n = 2.629$. For a club of size 3 to be an equilibrium, firm 4 must prefer not to enter the club, and with $b_4 = 0.8$,

it prefers not to enter, since in addition to the fixed costs the more intense competition drives club profits down. In addition, firm 3 must prefer not to quit the club. If it quit, the club $C' = \{1, 2\}$ composed of the remaining firms 1 and 2 would choose $s_c^*(2) = 4.605$, and the profit of the 3 firms producing the basic product would be $\pi_n = 1.994$, so firm 3 will not quit the club. The equilibrium thus is $(m^*, s_c^*(m^*)) = (3, 2.35)$.[25] This efficient club equilibrium is unique. That is, there is no equilibrium efficient club with 4 members, since firm 4 would quit, and there is no efficient club with 2 members, since firm 3 would join the club.

This example shows that in the absence of social pressure firms can have an incentive to form a voluntary club when consumers sufficiently reward them for the credence attributes attached to their products.

V. Private Politics and Social Pressure

A. Social Pressure and the Activist

This section introduces the push from social pressure. The activist can direct social pressure to either the club firms or the firms producing the basic product. The choice depends on how likely a campaign is to be successful and what the gain in credence attributes would be from targeting each group. Campaign success depends on many factors, but in the simple model considered here it depends on public sentiment, the resources available to the activist, and the resistance of its target. The resources available to the activist could come from donations made by citizens as in Baron (2009a), but here the activist is assumed to be able to call on citizens for whatever resources it chooses to spend on the campaign. Baron and Diermeier (2007) provide a richer model and analysis of activist campaigns.

The instrument of the activist is a private politics campaign that consists of a demand s_A, a target, and the conduct of the campaign.[26] In implementing its campaign the activist could target one firm at a time. The firms, however, understand that they are in line to be targeted and hence have an incentive to act collectively in opposition to the activist. At the time of the campaign the firms in the club are already organized to contest the campaign. Although the firms producing the basic product are not organized, they are assumed to form an ad hoc coalition to contest the campaign if they are targeted.

[25] This is also the equilibrium if the charter of the club specifies that the standard is chosen by majority rule voting.

[26] The activist could demand that its target increase its supply of credence attributes by an increment Δs_A. This, however, would result in a moral hazard problem, since, if they anticipate being targeted, the club firms could then choose a standard $s_c - \Delta s_A$ and, when targeted, concede and achieve the standard optimal in the absence of social pressure.

B. Targeting the Club Firms

1. The Campaign Equilibrium

The standard s_A resulting from a successful campaign has two effects on the club firms. First, at the optimal club standard operating profit is increasing in s_A. Second, fixed costs are higher. Not all firms in the club need be worse off if the campaign succeeds, since some, those with low fixed costs, preferred a higher standard than chosen by the club, as illustrated in Table 1. Moreover, the club that would form in the absence of social pressure may differ from the club that forms in the presence of social pressure. Once firms have made their participation decisions and the club has chosen its standard, the club is assumed to be fixed with no subsequent exit from or entry into it.

This section characterizes the campaign equilibrium when the activist targets the club firms. This could represent the environmental NGOs that back the FSC demanding that the club firms adopt the more stringent FSC standard (s_A) rather than the standard (s_c) of the SFI. It also could represent an activist that chooses the softer target. Efficient clubs are softer in the sense that their incremental fixed costs $K_i(s_A) - K_i(s_c), i \in C$, are smaller than the incremental fixed cost $K_j(s_A)$ that would be incurred by the firms $j \in \mathcal{N}$ producing the basic product if they were targeted.[27]

The gain to the activist from a successful campaign against the club firms is $s_A Q(s_A, 0) - s_c Q(s_c, 0)$, where $Q(s, 0) = \sum_{i \in C} q_{ci}(s)$. The gain is proportional to the difference in the credence standards, i.e.,

$$s_A Q(s_A, 0) - s_c Q(s_c, 0) = \frac{(\bar{w} - \gamma) mN}{(m+1)\bar{w}} (s_A - s_c),$$

which is increasing in the demand and decreasing in the club standard. The gain to the activist is increasing in $\bar{w}$, so the stronger is the demand pull the stronger is the incentive to contest the club firms.

The club firms have an aggregate incentive to contest the campaign, and the stake of firm i is $\Delta\Pi_{ci}(s_c, s_A) = \Pi_{ci}(s_c) - \Pi_{ci}(s_A)$. The stake can be evaluated as

$$\Delta\Pi_{ci}(s_c, s_A) = \frac{N(s_A - s_c)}{(m+1)^2 \bar{w} s_c s_A} \left[(w_o - c_o)^2 - s_c s_A (\bar{w} - \gamma)^2 \right] + K_i(s_A) - K_i(s_c). \tag{17}$$

The first term in (19) is the difference in the operating profits $\pi_c(s_c)$ and $\pi_c(s_A)$ and is positive when evaluated at $s_c^*(C)$ satisfying (10). Consequently, if the "average" reward $(\bar{w} - \gamma)(s_c s_A)^{\frac{1}{2}}$ from consumers is small relative to the margin $w_o - c_o$ on the basic product, the difference in the operating profit is positive. If the average net reward is large relative to the margin on the basic

[27] This follows because the lowest cost firms join the club, so $K_i(s_A) < K_j(s_A), \forall i \in C, j \notin C$.

product, the difference is negative; e.g., if $w_o = c_o$. The difference $K_i(s_A) - K_i(s_c)$ in the fixed costs is, however, positive, and it is the fixed costs that limited the club's standard in the absence of social pressure.

The Nash equilibrium (A^*, r^*) in the contest game based on (4) and (5) when both the activist and the club firms contest the campaign is

$$A^* = \frac{\beta(s_A Q(s_A, 0) - s_c Q(s_c, 0))^2 \sum_{i \in C} \Delta\Pi_{ci}(s_c, s_A)}{(\beta(s_A Q(s_A, 0) - s_c Q(s_c, 0)) + \sum_{i \in C} \Delta\Pi_{ci}(s_c, s_A))^2} \tag{18}$$

$$r^*(m) = \frac{\beta(s_A Q(s_A, 0) - s_c Q(s_c, 0))(\sum_{i \in C} \Delta\Pi_{ci}(s_c, s_A))^2}{(\beta(s_A Q(s_A, 0) - s_c Q(s_c, 0)) + \sum_{i \in C} \Delta\Pi_{ci}(s_c, s_A))^2}. \tag{19}$$

The activist expends A^* only if $s_A Q(s_A, 0) \geq s_c Q(s_c, 0)$, since it would not launch a campaign if $s_c Q(s_c, 0) > s_A Q(s_A, 0)$. The club expends resources on the contest only when the aggregate club stake is positive. Otherwise, the club concedes to the activist's demand.

The probability ρ_c^* that the campaign succeeds against the club firms using (3), (18), and (19) is

$$\rho_c^* = \frac{\beta(s_A Q(s_A, 0) - s_c Q(s_c, 0))}{\beta(s_A Q(s_A, 0) - s_c Q(s_c, 0)) + \sum_{i \in C} \Delta\Pi_{ci}(s_c, s_A)}. \tag{20}$$

The probability of a successful campaign depends on the contest incentives of the activist and the club firms. The stake of the club firms is decreasing in $\bar{w}$, so the demand pull from consumers reduces the incentive to contest the campaign. The activist's incentive is increasing in $\bar{w}$, so the probability of campaign success is decreasing in $\bar{w}$. Consequently, holding the club size and standard fixed, an increase in demand pull increases the probability that the campaign succeeds.

The probability ρ_c^* also depends on the standard s_c chosen by the club. The activist's incentive is decreasing in the standard, and the club's incentive depends on the effect of the standard on its stake. The derivative of the probability of a successful campaign is

$$\begin{aligned}
\frac{d\rho_c^*}{ds_c} &= -\frac{\beta\Big((-Q(s_c, 0) - s_c \frac{dQ(s_c, 0)}{ds_c}) \sum_{i \in C} \Delta\Pi_{ci}(s_c, s_A) + (s_A Q(s_A, 0) - s_c Q(s_c, 0)) \sum_{i \in C} \frac{d\Delta\Pi_{ci}(s_c, s_A)}{ds_c}\Big)}{(\beta(s_A Q(s_A, 0) - s_c Q(s_c, 0)) + \sum_{i \in C} \Delta\Pi_{ci}(s_c, s_A))^2} \\
&= \frac{\beta}{(\beta(s_A Q(s_A, 0) - s_c Q(s_c, 0)) + \sum_{i \in C} \Delta\Pi_{ci}(s_c, s_A))^2} \Big(\frac{mN(\bar{w} - \gamma)}{(m+1)\bar{w}}\Big) \Big[\frac{(s_A - s_c)^2 (w_o - c_o)^2 mN}{(m+1)^2 \bar{w} s_A s_c^2} \\
&\quad - \sum_{i \in C} \big(K_i(s_A) - K_i(s_c) - (s_A - s_c) K_i'(s_c)\big)\Big],
\end{aligned}$$

where the first term in brackets is the marginal effect on the operating profits of a club firm, the second term is the effect on the average fixed cost of the club firms, and $\sum_{i \in C} \frac{d\Delta\Pi_{ci}(s_c, s_A)}{ds_c} = \sum_{i \in C} \frac{d\Pi_{ci}(s_c)}{ds_c}$. The effect on operating profits is nonnegative, since consumers reward the firms for

a higher standard. The second term is positive from the strict convexity of the fixed cost function. The results are summarized in the following proposition.

Proposition 4: An increase in the standard of a club strictly decreases (increases) the probability of a successful campaign as

$$\frac{(s_A - s_c)^2(w_o - c_o)^2 mN}{(m+1)^2 \bar{w} s_A s_c^2} < (>) \sum_{i \in C} \big(K_i(s_A) - K_i(s_c) - (s_A - s_c)K_i'(s_c)\big). \tag{21}$$

If $w_o = c_o$, an increase in the club standard decreases the probability of a successful campaign.

That is, the fixed costs must be sufficiently convex or the margin on the basic product sufficiently small for an increase in the club standard to decrease the probability of a successful campaign. The following corollary incorporates the specification of the fixed costs used in the example.

Corollary 1: Let $K_i(s) = \frac{1}{2} b_i s^2,\ b_i > 0, \forall i$. For an efficient club the probability ρ_c^* is decreasing (increasing) if and only if

$$\frac{2(w_o - c_o)^2 mN}{(m+1)^2 \bar{w} s_A s_c^2} < (>) \sum_{i \in C} b_i. \tag{22}$$

When the $b_i, i \in C$, are high, the stakes of the firms are high and their incentives to contest the campaign are strong. The probability of a successful campaign is then decreasing in the club standard.

Lenox and Eesley found that the probability of a target acquiescing to an activist's demand was decreasing in a firm's cash holdings. If acquiescing corresponds to the activist campaign succeeding and if a firm's cash holdings are proportional to its stake in a contest, this is consistent with ρ_c^* decreasing in the stake. Lenox and Eesley also found that the probability of acquiescence is decreasing in the emissions of pollutants by the target relative to the emissions of other firms. If higher relative emissions of the club firms correspond to a lower standard, the prediction of the model is consistent with the finding if the margin $w_o - c_o$ is high or the fixed costs are low.[28]

A higher demand s_A by the activist increases the stake of the club firms and strengthens the contest incentives of the activist. The former effect increases the incentive of the club firms to contest the campaign, whereas the latter effect increases the incentive of the activist. The following corollary identifies which effect is greater.

[28] Lenox and Eesley also found that the level of the harm delivered by the activist is increasing in the emissions of the target, which is consistent with A^* decreasing in s_c, holding constant the stake in (19). The specifications they estimated, however, do not fit well the theory presented here, since A^* and ρ_c^* are jointly determined with the latter a direct function of the former. Moreover, the stake depends on the emissions of the firm. Whether the same results would obtain with an econometric specification corresponding to the model presented here is unclear.

Corollary 2: The probability ρ_c^* is decreasing (increasing) in s_A as

$$\frac{2(w_o - c_o)^2 mN}{(m+1)^2 \bar{w} s_A^2 s_c} < (>) \sum_{i \in C} b_i, \tag{23}$$

If ρ_c^* is decreasing in s_c, then ρ_c^* is decreasing in s_A.

An increase in the club standard decreases the incentives of both the activist and the club firms to contest the campaign, whereas an increase in the demand s_A increases the incentives of both the activist and the club firms to contest the campaign. If the probability that the campaign succeeds decreases in the first case, it also decreases in the second case (since $s_A > s_c$).

Holding s_c and m fixed, the probability of a successful campaign is strictly increasing in β, so higher quality activists are more successful than lower quality activists. Similarly, if the product is branded so it is easier (higher β) for the activist to harm the firm, a successful campaign is more likely. If a higher β corresponds to a greater trust gap between the activist and the firms, the greater the public's trust in the activist relative to that in the firms the more likely is the campaign to succeed. For example, a 2005 survey based on interviews with over 20,000 people in 20 countries found that for 14 tracking countries the average level of trust in NGOs was 29, compared to 2 for large domestic companies and -15 for global companies, whereas trust in national governments was -9.[29] The meaning of trust was left to the interviewee, but in the context of the model it might be interpreted as the extent to which the public finds credible the advocacy of the activist and the advocacy of the firms during the campaign.

2. The Club Standard under Social Pressure

To identify the effects of social pressure on the club's choice of a credence standard, suppose that only the club firms can be targeted. Taking into account the campaign expenditures, the expected profit $E\Pi_c^C$ of the club firms, where the superscript C denotes that the club is targeted, can be expressed as

$$E\Pi_c^C = \sum_{i \in C} \Pi_{ci}(s_A) + (1 - \rho_c^*)^2 \sum_{i \in C} \Delta\Pi_{ci}(s_c, s_A). \tag{24}$$

It is immediate from (24) that the club firms always contest the campaign rather than concede. That is, $E\Pi_c^C > \sum_{i \in C} \Pi_{ci}(s_A)$ for $\rho_c^* < 1$, and from (20) $\rho_c^* < 1$ provided the stake of the club firms is positive. In choosing its standard, the club firms have two considerations. The first is that an increase in the standard decreases the incentive of the activist to contest the campaign. The second is that a lower standard strengthens its own incentives to contest the campaign.

[29] See http:www.globescan.com/news_archives/WEF_trust2005.html.

The profit $\Pi_{ci}(s_A)$ is independent of s_c, so the first-order condition for the standard $s_c^{c*}(C)$ that maximizes expected profits in (24) is

$$\frac{dE\Pi_c^C}{ds_c} = -2(1-\rho_c^*)\frac{d\rho_c^*}{ds_c}\sum_{i\in C}\Delta\Pi_{ci}(s_c^{c*}(C), s_A) + (1-\rho_c^*)^2\frac{d\sum_{i\in C}\Pi_{ci}(s_c^{c*}(C))}{ds_c} = 0, \tag{25}$$

and the second-order condition is assumed to be satisfied. The first term in the derivative in (25) is the *contest effect* of a higher standard and is positive if a higher standard reduces the probability of a successful campaign. This provides an incentive to increase the club standard in the face of social pressure. The second term is proportional to the *market effect* given in (10), which reflects the response of the profit of the club firms to a higher standard.

To compare the preferences of a club under social pressure with its preferences in the absence of social pressure, evaluate (25) at the standard $s_c^*(C)$ from (13), which yields

$$\frac{dE\Pi_c^C}{ds_c} \mid_{s_c=s_c^*(C)} = -\Big(2(1-\rho_c^*)\frac{d\rho_c^*}{ds_c}\sum_{i\in C}\Delta\Pi_{ci}\Big) \mid_{s_c=s_c^*(C)} . \tag{26}$$

This is positive if the probability of a successful campaign is decreasing in the standard and the club stake $\sum_{i\in C}\Delta\Pi_{ci}$ is positive. The club firms then prefer a higher standard than in the absence of social pressure. Thus, at the optimal standard $s_c^{c*}(C)$ the second term in (25) is then negative, reflecting the effect of a standard that exceeds the optimal standard in the absence of social pressure.

In this case a higher standard is chosen because of social pressure. The higher standard decreases the probability of a successful campaign and does so because it weakens the incentive of the activist to expend resources on the campaign. This is due to the smaller gain $s_A Q(s_A, 0) - s_c Q(s_c, 0)$ for the activist in the event the campaign succeeds. The following proposition states this result.[30]

Proposition 5: If EU_c^C is strictly concave and $K_i(s), i \in C$, is sufficiently convex; i.e., ρ_c^* is decreasing in s_c, the club firms choose a higher standard when they anticipate being targeted by social pressure than in the absence of social pressure.

For the remainder of the paper the probability ρ_c^* is assumed to be strictly decreasing in s_c, which will be the case in the example with $w_o = c_o$.

The above analysis has held the club's size constant, but in the presence of social pressure club size can be affected. An efficient club C^* of size m^* is an equilibrium if the expected profit

[30] The effect of an increase in the demand s_A on the standard $s_c^{c*}(C)$ is ambiguous in sign.

$\Pi_{ci}(s_A) + (1-\rho_c^*)^2\Delta\Pi_{ci}(s_c, s_A)$ from (24) is nonnegative for all $i \in C^*$ and is negative for all $j \notin C^*$ if j entered. For the case in which $w_o = c_o$ these two conditions are:

$$\frac{N(\bar{w}-\gamma)^2}{(m^*+1)^2\bar{w}}s_A - \frac{1}{2}b_i s_A^2 + (1-\rho_c^*(C^*))^2(s_A - s_c^*(C^*))\Big(\frac{1}{2}b_j(s_A + s_c^*(C^*)) - \frac{N(\bar{w}-\gamma)^2}{(m^*+1)^2\bar{w}}\Big) \geq 0, \forall i \in C^*$$

and

$$\frac{N(\bar{w}-\gamma)^2}{(m^*+2)^2\bar{w}}s_A - \frac{1}{2}b_j s_A^2 + (1-\rho_c^*(C^*_{+j})^2(s_A - s_c^*(C^*_{+j}))\Big(\frac{1}{2}b_j(s_A + s_c^*(C^*_{+j}) - \frac{N(\bar{w}-\gamma)^2}{(m^*+2)^2\bar{w}}\Big) < 0, \forall j \notin C^*,$$

where $\rho_c^*(C)$ is given in (20).

The equilibrium expected utility $EU_A^c(s_c^{c*}(C))$ of the activist, where the superscript c denotes that the club is the target, is

$$\begin{aligned} EU_A^c(s_c^{c*}(C)) &= s_c^{c*}(C)Q(s_c^{c*}(C), 0) + \rho_c^*(s_A Q(s_A, 0) - s_c^{c*}(C)Q(s_c^{c*}(C), 0)) - A^* \\ &= s_c^{c*}(C)Q(s_c^{c*}(C), 0) + \rho_c^{*2}(s_A Q(s_A, 0) - s_c^{c*}(C)Q(s_c^{c*}(C), 0)), \end{aligned} \tag{27}$$

so the activist gains from a campaign.

3. The Example

Consider the case in which the competitive fringe producing the basic product earns no profits; i.e., $w_o = c_o$. The stake of firm $i \in C$ then is

$$\Delta\Pi_{ci}(s_c, s_A) = (s_A - s_c)\Big(\frac{1}{2}b_i(s_A + s_c) - \frac{N(\bar{w}-\gamma)^2}{(m+1)^2\bar{w}}\Big),$$

which can be positive or negative. The aggregate stake $\sum_{i\in C}\Delta\Pi_{ci}$, however, is positive at the standard in (15). The probability that the contest succeeds is given by

$$\rho_c^* = \frac{\beta m}{\beta m + \frac{1}{2}\sum_{i\in C} b_i(s_A + s_c) - \frac{mN(\bar{w}-\gamma)^2}{(m+1)^2\bar{w}}},$$

which is decreasing in s_A because the club fights relatively harder and decreasing in s_c because the activists contests the campaign relatively less hard. The probability ρ_c^* is increasing in β, N, and $\bar{w}$ and is decreasing in b_i and γ.

For this example, the first-order condition can be written as

$$\big(s_A - s_c^{c*}(C)\big)\sum_{i\in C} b_i + \Big(-\sum_{i\in C} b_i s_c^{c*}(C) + \frac{mN(\bar{w}-\gamma)^2}{(m+1)^2\bar{w}}\Big)\Big(\beta m + \frac{1}{2}\sum_{i\in C} b_i(s_A + s_c^{c*}(C)) - \frac{mN(\bar{w}-\gamma)^2}{(m+1)^2\bar{w}}\Big) = 0,$$

and the second-order condition is assumed to be satisfied. The effect of the demand by the activist on the club's credence standard, holding C fixed, is given by

$$\frac{ds_c^{c*}(C)}{ds_A} = -\frac{\sum_{i\in C} b_i}{\frac{d^2 E\Pi_c^C}{ds_c^2}}\left(\frac{\beta m + \sum_{i\in C} b_i s_c^{c*}(C) - \frac{mN(\bar{w}-\gamma)^2}{(m+1)^2\bar{w}}}{\left(\beta m + \frac{1}{2}\sum_{i\in C} b_i(s_A + s_c^{c*}(C)) - \frac{mN(\bar{w}-\gamma)^2}{(m+1)^2\bar{w}}\right)^2}\right). \tag{28}$$

The club chooses a higher standard when the activist makes a higher demand if the numerator of the second term is positive. More formally, the standard is increasing in the demand if

$$s_c^{c*}(C) > \frac{1}{\sum_{i\in C} b_i}\Big(\frac{mN(\bar{w}-\gamma)^2}{(m+1)^2\bar{w}} - \beta m\Big).$$

For $\rho_c^*<1$ the denominator in (28) is positive, and the numerator differs only by $s_c^{c*}(C)$ replacing $\frac{1}{2}(s_A + s_c^{c*}(C))$. The numerator thus could be positive. This analysis suggests that an activist may be able to increase the club's credence standard by making a higher demand.

The outcome of the campaign depends on β which can reflect the trust of the public in the activist relative to the firms, the susceptibility of the firms to a private politics campaign, or the quality of the activist. This then affects the club's choice of a standard. To determine the effect of an increase in β on the standard, first note that

$$\frac{\partial \rho_c^*}{\partial \beta} = \frac{1}{\beta}\rho_c^*(1-\rho_c^*)>0,$$

and

$$\frac{\partial^2 \rho_c^*}{\partial s_c \partial \beta} = \frac{1}{\beta}(1-2\rho_c^*)\frac{\partial \rho_c^*}{\partial s_c}.$$

If the activist is the underdog ($\rho_c^* \leq \frac{1}{2}$) in the campaign, then $\frac{\partial^2 \rho_c^*}{\partial s_c \partial \beta} \leq 0$. This is a sufficient but not necessary condition for the club standard to be increasing in β.[31]

C. Targeting the Non-Club Firms

Targeting the non-club firms rather than the club firms raises three new issues. First, if the campaign is successful, the market is not covered; i.e., some consumers with a low willingness to pay for credence attributes are priced out of the market in equilibrium. Second, if the contest is

[31] The comparative statics condition using (25) is

$$\frac{ds_c^{c*}(C)}{d\beta} = -\frac{1}{\frac{d^2 E\Pi_c^C}{ds_c^2}}\Big(-2\frac{\partial^2 \rho_c^*}{\partial s_c \partial \beta}\sum_{i\in C}\Delta\Pi_i - \frac{\partial \rho_c^*}{\partial \beta}\frac{d\sum_{i\in C}\Pi_{ci}(s_c^{c*}(C))}{ds_c}\Big).$$

successful, some firms may exit the industry. Third, the nature of the credence attributes matters. If the credence attributes of concern to consumers and the activist are a bad such as pollution, the activist counts it as a gain when some consumers are priced out of the market. If instead the credence attributes are a good from the perspective of consumers and the activist, there is no gain when consumers are priced out of the market. An example of such a good might be paying a living wage, providing higher safety levels than customary in a host country, and providing workers with education that does not provide productivity gains. The case considered here is that the credence attributes represent a social good to provide comparability to targeting the club firms.

Some activists target the "worst offenders," which here are the firms producing the basic product. Compared to targeting the club firms, targeting the firms producing the basic product is attractive to the activist because the gain s_A in the standard from a successful campaign is greater than the gain $s_A - s_c$ from targeting the club firms. Targeting the firms producing the basic product would also be attractive if the firms did not act collectively in contesting the campaign, since then given the contest function analogous to (3) the firm with the highest fixed cost would contest the campaign and all the others would free-ride on its efforts. Resistance to the campaign would then be undersupplied, and the campaign expenditures A would still constitute a public bad for the non-club firms. This provides an incentive to act collectively in contesting the private politics campaign, and the non-club firms will be assumed to do so.

If the campaign succeeds resulting in the non-club firms producing a product with standard s_A, the club firms have the product with the lower standard and thus have the lower price. If they anticipate that the activist will target the non-club firms, the club firms have an incentive to choose a low standard so that if the campaign succeeds there will be greater product differentiation and less intense price competition.

The equilibrium in the product market is presented in the Appendix along with the equilibrium profits. When the club is efficient, the non-club firms have higher fixed costs and some may drop out of the market rather than bear those costs. In that event the remaining non-club firms are assumed to meet the standard s_A. If $\ell \leq n - m$ firms remain in the market, the expressions in Appendix are valid by substituting $m + \ell$ for n. The number ℓ of firms remaining then satisfies $n - m > \ell \geq 1$ if all the ℓ firms have nonnegative profits when meeting the standard s_A. This will be satisfied, for example, with $\ell = 1$ (i.e., firm $m + 1$ remains) if

$$\frac{s_A N}{\bar{w}} \Big(\frac{w_o - c_o + (\bar{w} - \gamma)((m+1)s_A - m s_c)}{2(m+1)s_A - m s_c)} \Big)^2 - K_{m+1}(s_A) \geq 0.$$

The following analysis assumes that this condition is satisfied.

The expected utility EU_A^n of the activist if it targets the set $\mathcal{N}$ of firms remaining that produce the basic product is

$$EU_A^n(s_c) = s_c Q(s_c, 0) + \frac{\beta A}{\beta A + \sum_{j\in\mathcal{N}} r_j}(s_A Q_A(s_c, s_A) + s_c Q_c(s_c, s_A) - s_c Q(s_c, 0)) - A,$$

where $\mid \mathcal{N} \mid = \ell$, r_j is the contribution to the contest by firm j, and the quantities produced by the club and non-club firms are $Q_c(s_c, s_A) = mq_{ci}^n$ and $Q_A(s_c, s_A) = \ell q_{ni}^n$, respectively, where q_{ci}^n and q_{ni}^n are given in (A1) and (A2), respectively, in the Appendix. If the activist's incentive $s_A Q_A(s_c, s_A) - s_c Q_c(s_c, s_A)$ is positive, the activist contests the non-club firms, and if it is negative the activist cannot gain from targeting the firms producing the basic product. In that case it targets the non-club firms. If the activist contests the club firms, its incentive is increasing in the demand pull as indexed by $\bar{w}$.

The aggregate expected profit $E\Pi_n$ of the firms producing the basic product is

$$E\Pi_n^n = \frac{\beta A}{\beta A + \sum_{j\in\mathcal{N}} r_j} \sum_{j\in\mathcal{N}} \Pi_{nj}^n(s_c, s_A) + \frac{\sum_{j\in\mathcal{N}} r_j}{\beta A + \sum_{j\in\mathcal{N}} r_j} \sum_{j\in\mathcal{N}} \pi_n(s_c, 0) - \sum_{j\in\mathcal{N}} r_j,$$

where the profit $\pi_n(s_c, 0)$ of the non-club firms when the campaign fails is given in (2) and the profit if the campaign succeeds is $\Pi_{nj}^n(s_c, s_A) = \pi_n^n(s_c, s_A) - K_j(s_A)$, where the operating profit $\pi_n^n(s_c, s_A)$ is given in (A4). The stake of firm j is $\Delta\Pi_{nj}^n = \pi_n(s_c, 0) - \Pi_{nj}^n(s_c, s_A)$, and $\Pi_{nj}^n(s_c, s_A)$ is given in (A6). If the aggregate stake is negative, the firms concede to the campaign without contesting it. This stake should be positive if the club is effieicnt, since the firms producing the basic product did not join the club because they have high fixed costs. The stake is decreasing in $\bar{w}$, so the stronger is the demand pull from consumers the weaker is the incentive of the non-club firms to contest the campaign.

Acting collectively, the firms choose $\sum_{j\in\mathcal{N}} r_j$ to maximize $E\Pi_n^n$. The allocation of the collective expenditures $\sum_{j\in\mathcal{N}} r_j$ is indeterminant but could be made in proportion to the expected profits of the firms. When the firms contest the campaign, the equilibrium campaign expenditures are

$$A_n^* = \frac{\beta(s_A Q_A(s_c, s_A) - s_c Q_c(s_c, s_A))^2 \sum_{j\in\mathcal{N}} \Delta\Pi_{nj}^n}{(\beta(s_A Q_A(s_c, s_A)) - s_c Q_c(s_c, s_A)) + \sum_{j\in\mathcal{N}} \Delta\Pi_{nj}^n)^2}$$

$$\sum_{j\in\mathcal{N}} r_j^* = \frac{\beta(s_A Q_A(s_c, s_A) - s_c Q_c(s_c, s_A))(\sum_{j\in\mathcal{N}} \Delta\Pi_{nj}^n)^2}{(\beta(s_A Q_A(s_c, s_A)) - s_c Q_c(s_c, s_A)) + \sum_{j\in\mathcal{N}} \Delta\Pi_{nj}^n)^2}.$$

The probability ρ_n^* that the campaign succeeds when it is contested is

$$\rho_n^* = \frac{\beta(s_A Q_A(s_c, s_A) - s_c Q_c(s_c, s_A))}{\beta(s_A Q_A(s_c, s_A) - s_c Q_c(s_c, s_A)) + \sum_{j\in\mathcal{N}} \Delta\Pi_{nj}^n}.$$

The probability ρ_n^* is decreasing in the stake of the firms. The effect of the club standard on the stake is indeterminant, since an increase in s_c increases $\pi_n(s_c, 0)$ but may increase or decrease $\Pi_{nj}^n(s_c, s_A)$.

The expected utility of the activist is

$$\begin{aligned} EU_A^n(s_c) &= s_c Q(s_c, 0) + (s_A Q_A(s_c, s_A) - s_c Q_c(s_c, s_A))\rho_n^* - A_n^* \\ &= s_c Q(s_c, 0) + (s_A Q_A(s_c, s_A) - s_c Q_c(s_c, s_A))\rho_n^{*2}. \end{aligned}$$

The activist gains from conducting a campaign against the firms producing the basic product. The aggregate expected profit $E\Pi_n^n$ of the firms producing the basic product when they are the target is

$$E\Pi_n^n = \sum_{j \in \mathcal{N}} \Pi_{nj}^n(s_c, s_A) + (1 - \rho_n^*)^2 \sum_{j \in \mathcal{N}} \Delta\Pi_{nj}^n.$$

The club's choice of a standard is affected when the firms producing the basic product are anticipated to be targeted, since the probability ρ_n^* governs how likely the club firms are to face the basic product with a standard 0 or firms with a standard s_A. Since the club firms prefer greater product differentiation if the campaign is expected to succeed, the club firms have an incentive to choose a lower standard the higher is ρ_n^*. In addition to the effect on the standard, the equilibrium size of the club can be affected by how likely a campaign is to be successful.

If the club correctly anticipates that the activist will target the firms producing the basic product, it chooses a standard $s_c^{n*}(C)$ defined by

$$s_c^{n*}(C) \in \arg\max_{s_c} \sum_{i \in C} E\Pi_{ci}^n,$$

where the expected profit $E\Pi_{ci}^n$ of a club firm when the non-club firms are targeted is

$$E\Pi_{ci}^n = \rho_n^* \Pi_{ci}^n(s_c, s_A) + (1 - \rho_n^*)\Pi_{ci}(s_c, 0),$$

where $\Pi_{ci}^n(s_c, s_A)$ is given in (A5) in the Appendix.Targeting the firms producing the basic product provides an incentive for the club firms to choose a lower standard. Choosing too low a standard, however, could lead the activist to target the club firms. The choice of a standard is illustrated in the example in the next section.

VI. Choosing a Target

In this model the activist chooses its target based on which yields the higher expected utility from an equilibrium campaign, and this choice must be consistent with the expectations of the

club firms about which target will be chosen.[32] The activist bases its choice on two factors. The first is the relative gain, $s_A Q_A(s_c, s_A) + s_c Q_c(s_c, s_A) - s_c Q(s_c, 0)$ versus $(s_A Q(s_A, 0) - s_c Q(s_c, 0))$, from targeting the non-club firms rather than the club firms. The second is the probabilities of a successful campaign against the two sets of firms, where those probabilities depend on the gains as well as the stakes of the firms.

Let the best response of the activist to the choice of a standard by a club be denoted by $t^*(C, s_c) \in \{\mathcal{C}, \mathcal{N}\}$, where $\mathcal{C}$ indicates that the club firms are targeted and $\mathcal{N}$ denotes that the firms producing the basic product are targeted. Firms decide whether to join the club, and the club chooses its standard taking into account $t^*(C, s_c)$. If the best response to $(C^{\mathcal{C}}, s_c^*(C^{\mathcal{C}\rfloor}))$ is $t^*(C^{\mathcal{C}}, s_c^*(C^{\mathcal{C}}))$ and the best response to $(C^{\mathcal{N}}, s_c^{n*}(C^{\mathcal{N}}))$ is $t(C^{\mathcal{N}}, s_c^{n*}(C^{\mathcal{N}}))$, where $C^{\mathcal{N}}$ is the club that forms when the firms anticipate that the activist will target the non-club firms, there are two equilibria. If only one of the two is satisfied, it is the equilibrium. Neither may be satisfied, in which case an ϵ-equilibrium is that a club forms and chooses a standard slightly above or below the standard at which the activist is indifferent between targeting the club firms and the firms producing the basic product. If the club firms prefer not to be targeted, the equilibrium club $(C^o, s_c^o(C^o))$ then is such that the activist just prefers to target the non-club firms, $|C^o| = m^o$ firms are in the club, the club firms choose $s_c^o(C^o)$, firms producing the basic product prefer not to join the club, and no club firm prefers to leave the club and produce the basic product. Alternatively, if the club firms prefer to self-sacrifice to avoid the risk that a campaign against the non-club firms would succeed and decrease product differentiation, the club firms choose a standard slightly below the standard that just induces the activist to target the non-club firms.

The pure strategy equilibria are quite sensitive to the parameter values, as illustrated in the following numerical example.

A Numerical Example

When the activist can choose its target conditional on the club that forms and the standard it chooses, the equilibria are difficult to characterize analytically. Moreover, the equilibria are sensitive to the parameters of the model, and comparative statics are not smooth. To illustrate the class of equilibria that can result, numerical examples are presented. The base case has the following parameter values: $n = 7$, $N = 10$, $s_A = 5$, $\bar{w} = 7$, $\gamma = 4$, $c_o = 0$, $\beta = 1$, and $b_i = 0.5 + 0.2(i - 1)$. Table 2, Panel A identifies the number of equilibrium clubs, the number

[32] Hendry (2006) evaluated propositions relating to target selection based on case studies of five NGOs. Baron and Diermeier provide an analysis of target selection by an activist and identify conditions under which a soft target is selected.

of efficient equilibrium clubs, the standard chosen by the efficient club or clubs, which target is chosen by the activist, and the probability the campaign succeeds.

Panel A indicates that for low demands there are multiple equilibrium clubs, only one of which is efficient. It is composed of firms 1 and 2. The standard chosen by the club is increasing in the demand, and the club firms are targeted and the probability of a successful campaign decreases. At a demand of $s_A = 5$ there are 7 equilibrium clubs two of which are efficient. One is composed only of the firm with the lowest fixed cost, and it chooses a high standard and is the target. It concedes the campaign. The other efficient equilibrium is a large club that includes all but the highest cost firm. The large club chooses a low standard, and the activist targets the non-club firm with a low probability of success. For higher demand there are many equ8ilibrium clubs, but one one efficient one composed of firm 1. It chooses a standard that is increasing in s_A, and the probability the campaign succeeds decreases. As is evident from Panel A, general comparative statics properties are difficult to identify, although two properties of the equilibria considered above are corroborated. The club standard is increasing in the demand of the activist, and the probability of success is weakly decreasing in the demand.

Panel B illustrates the effects of demand pull. For low willingness to pay ($\bar{w} = 5$, all firms are in the club and they concede the campaign resulting in a standard equal to the demand $s_A = 5$. For higher $\bar{w}$ firm 1 is an equilibrium club, and as $\bar{w}$ increases, the firm chooses a higher standard, and the probability of success increases. At $\bar{w} = 8$ firm 2 joins the (efficient) club, the standard chosen is lower, and the campaign succeeds with probability 0.75. For $\bar{w} = 9$ the same club is an equilibrium, and chooses a higher standard and the concedes the campaign. At $\bar{w} = 10$ firm 3 joins the equilibrium club, and chooses a low standard than did the efficient club for $\bar{w} = 9$. For a higher willingness to pay the same club is efficient, chooses a higher standard, and contests the campaign with a probability of success of 0.76. This example suggest that demand pull can result in larger clubs, but those clubs choose lower standards.

Panel C illustrates the effects of the push from social pressure as indexed by β. For each of the values of β in the panel there are two efficient clubs, one composed of the lowest cost firm 1 and the other composed of all but the highest cost firm. The small club chooses a high standard, is targeted, and concedes the campaign. The large club chooses a low standard, the non-club firms are targeted, and the probability of success is less than one. The club standard chosen by each of these clubs is decreasing in β. The stronger the push from social pressure the lower are the standards chosen, but the small club concedes so the supply of credence goods is constant.

How robust these effects are is not clear. More examples will be run.

Lenox and Eesley found that the probability that a firm was targeted by an activist was increasing in the level of its emissions of toxic pollutants and in its emissions relative to those of other firms in the same 4-digit Standard Industry Classification (SIC) code. This is consistent with firms having an incentive to choose a higher standard to shift the activist to a different target. In the numerical example, the activist can prefer targeting the non-club firms because the club firms have chosen a sufficiently high standard to reduce the expected gain from targeting them.

VII. Conclusions

The objectives of this paper have been to explain the formation of industry programs pertaining to credence attributes of products, explain the choice of a credence standard by the firms participating in a program, explain how social pressure and private politics affect both which firms participate and the standard they choose, and identify the locus of social pressure. The paper combines a model of product differentiation through the provision of credence attributes with a contest function model representing the outcome of the private politics campaign. The resulting model is complex, and many predictions are not sharp. For example, with a finite number of firms there may be no club equilibrium in pure strategies. There can also be multiple pure strategy equilibrium clubs, some of which are efficient and some of which are inefficient. The properties of the equilibrium credence standard also depend on the functional forms and the parameter values. For example, the product market has both a credence effect as consumers reward the firms for the credence attributes of their products, but the credence standard also affects costs, competition, and prices and hence the incentives of both the activist and the firms. If the costs of meeting the credence standard are sufficiently convex, social pressure induces the club firms to choose a higher standard when they anticipate being targeted. The club firms do so because a higher standard decreases social pressure by reducing the incentive of the activist to contest the private politics campaign. If the activist is anticipated to target the firms producing the basic product, the club firms have an incentive to lower their standard to increase product differentiation in the event the campaign is successful. The pure strategy equilibria are also sensitive to the values of the parameters of the model, as illustrated in the example presented in Table 2. This means that variety should be expected in both the composition of clubs and their standards and in the pattern of activist targeting. Moreover, changes in parameter values can cause substantial changes in the set of equilibrium clubs.

A number of aspects of the collective choice of credence standards warrant additional research,

and four are mentioned here. The first is to identify in which industries and in which circumstances firms would be expected to form a club to assure credence attributes. In some industries consumers may not reward the firm nor support social pressure. In other industries firms may face high costs of collective action that prevent the formation of a club. In such industries the supply of credence attributes might be assured through government regulation and enforcement rather than social pressure. The second is the choice rule used by the club firms. The model assumed that the club firms maximize their aggregate profits, but the preferences of the member firms for the credence standard difer. A variety of choice rules could be used, and the rule chosen can affect both the standard and participation in the club. In the model a high cost firm has only one alternative to a high standard, and that is to quit the club. A choice rule that gave each firm an opportunity to influence the choice could better serve some firms and result in a different standard. The third is the interaction with public politics. NGOs and firms may be able to turn to government for regulation or for protection against regulation. Even if the NGOs and firms do not formally engage in public politics, private politics is conducted in the shadow of the law and regulation and hence of possible government action. Allowing NGOs and firms to engage in both private and public politics would enrich the theory of the collective choice of credence standards. Fourth, in the presence of potential private and public politics, firms could proactively partner with an NGO to establish credence standards with the NGO certifying compliance and potentially deflecting social pressure.

Appendix

Two Products with Credence Standards

If the activist targets the firms producing the basic product and its private politics campaign is successful, the products of the club firms meet the standard s_c whereas the products of the other firms meet the standard s_A. The activist's standard is higher than that of the club, in which case the prices of the products are ordered by $p_A > p_c$, where p_A is the price of a product with standard s_A. To be able to invert the demand functions, some consumers with low w must be priced out of the market.[33] Let $\hat{w} \equiv \frac{p_c - w_o}{s_c}$ denote the consumer who is indifferent between purchasing the product with standard s_c and purchasing no product. The consumer indifferent between purchasing the product with s_A and the product with s_c is $w^*(s_c, s_A) = \frac{p_A - p_c}{s_A - s_c}$. The demands q_c and q_A for the two products then are

$$q_c = \frac{N}{\bar{w}}\Big(\frac{p_A - p_c}{s_A - s_c} - \frac{p_c - w_o}{s_c}\Big)$$

$$q_A = \frac{N}{\bar{w}}\Big(\bar{w} - \frac{p_A - p_c}{s_A - s_c}\Big),$$

and the prices are[34]

$$p_c = w_o + \bar{w}s_c - \frac{\bar{w}s_c}{N}(q_A + q_c)$$

$$p_A = w_o + \bar{w}s_A - \frac{\bar{w}}{N}(s_c q_c + s_A q_A).$$

The equilibrium quantities q^n_{ci} and q^n_{Ai} produced by a firm in a club of size m and one of the $n - m$ firms producing the basic product, respectively, are

$$q^n_{ci} = \frac{N\Big[(w_o + \bar{w}s_c - c(s_c))\frac{n-m+1}{n-m}s_A - s_c(w_o + \bar{w}s_A - c(s_A))\Big]}{(m+1)\bar{w}s_c\Big(-\frac{m}{m+1}s_c + \frac{n-m+1}{n-m}s_A\Big)} \qquad (A1)$$

$$q^n_{Ai} = \frac{N\Big[w_o + \bar{w}s_A - c(s_A) - \frac{m}{m+1}(w_o + \bar{w}s_c - c(s_c))\Big]}{(n-m)\bar{w}\Big(-\frac{m}{m+1}s_c + \frac{n-m+1}{n-m}s_A\Big)}. \qquad (A2)$$

[33] See Motta (1993).

[34] The difference in the prices is

$$p_A - p_c = \frac{\bar{w}(s_A - s_c)}{N}(N - q_A),$$

which is positive since $N > q_A$.

The prices then are

$$p_c = c(s_c) + \frac{(w_o + \bar{w}s_c - c(s_c))\frac{n-m+1}{n-m}s_A - s_c(w_o + \bar{w}s_A - c(s_A))}{(m+1)\Big(-\frac{m}{m+1}s_c + \frac{n-m+1}{n-m}s_A\Big)} \tag{A3}$$

$$p_A = c(s_A) + \frac{s_A[(w_o + \bar{w}s_A - c(s_A)) - \frac{m}{m+1}(w_o + \bar{w}s_c - c(s_c))]}{(n-m)\Big(-\frac{m}{m+1}s_c + \frac{n-m+1}{n-m}s_A\Big)},$$

where $p_A{>}p_c$ is required to be satisfied.[35]

The operating profits $\pi_c^n(s_c, s_A)$ and $\pi_n^n(s_c, s_A)$ are

$$\pi_c^n(s_c, s_A) = \frac{\bar{w}s_c}{N}(q_{ci}^n)^2$$

$$\pi_n^n(s_c, s_A) = \frac{\bar{w}s_A}{N}(q_{Ai}^n)^2, \tag{A4}$$

and the profits are

$$\Pi_{ci}^n(s_c, s_A) = \frac{\bar{w}s_c}{N}(q_{ci}^n)^2 - K_i(s_c),\ i \in C \tag{A5}$$

$$\Pi_{nj}^n(s_c, s_A) = \frac{\bar{w}s_A}{N}(q_{Aj}^n)^2 - K_j(s_A),\ j \in \mathcal{N}. \tag{A6}$$

The quantity q_{ci}^n of $i \in C$ can be written as

$$q_{ci}^n = q_{ci} - \hat{q},$$

where

$$\hat{q} = \frac{Ns_c\Big[w_o + \bar{w}s_A - c(s_A) - \frac{m}{m+1}(w_o + \bar{w}s_c - c(s_c))\Big]}{(m+1)\bar{w}s_c\Big(-\frac{m}{m+1}s_c + \frac{n-m+1}{n-m}s_A\Big)}.$$

For $c_c(s) = c_o + \gamma s$ and $\gamma{\leq}\bar{w}$, the term $\hat{q}$ is positive.

[35] For example, if $c(s) = c_o + \gamma s$ and $w_o = c_o$, then $p_A{>}p_c$ for all parameter values:

$$p_A{>}p_c \iff \gamma + \frac{(\bar{w} - \gamma)s_A}{n-m}\Big(-\frac{m}{m+1}s_c + \Big(\frac{n-m+1}{n-m}\Big)s_A\Big)^{-1} > 0.$$

Table 2

Numerical Example

Panel A

For the Most Efficient Club

Parameter s_A	Number of Equilibrium Clubs	Number of Efficient Equil. Clubs	Efficient Club	Club Standard	Target	Probability of Campaign Success
2	2	1	12	1.98	*C*	1.00
3	4	1	12	2.66	*C*	0.84
4	2	1	12	3.03	*C*	0.68
5	7	2	1	4.97	*C*	1.00
			123456	0.14	*N*	0.16
6	12	1	1	5.97	*C*	1.00
7	10	1	1	6.70	*C*	0.91
8	8	1	1	7.12	*C*	0.79
9	6	1	1	7.49	*C*	0.72
			Panel B			
Parameter $\bar{w}$	Number of Equilibrium Clubs	Number of Efficient Equil. Clubs	Efficient Club	Club Standard	Target	Probability of Campaign Success
5	1	1	1234567	5.0	*C*	1.00
6	7	1	1	4.04	*C*	0.74
7	7	2	1	4.97	*C*	1.00
			123456	0.14	*N*	0.16
8	3	1	12	4.26	*C*	0.75
9	4	1	12	4.99	*C*	1.00
10	2	1	123	3.91	*C*	0.63
11	5	1	123	4.42	*C*	0.76
			Panel C			
Parameter β	Number of Equilibrium Clubs	Number of Efficient Equil. Clubs	Efficient Club	Club Standard	Target	Probability of Campaign Success
1	7	2	1	4.97	*C*	1.00
			123456	0.14	*N*	0.16
2	5	2	1	4.89	*C*	1.00
			123456	0.11	*N*	0.97
3	4	2	1	4.78	*C*	1.00
			123456	0.10	*N*	0.85
4	4	2	1	4.64	*C*	1.00
			123456	0.09	*N*	0.89

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