# Enforcement of private food standards: A role for self-reporting of non-compliance?

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Revised October 2024

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## Abstract

Private standards have emerged as an important means of food system governance. In the context of regulation and standards, they are set by a private body, adopted by, and implemented by private firms, evaluated for compliance by a private auditor, and enforced through private certification. This leads to a key question: are there cost-effective mechanisms ensuring compliance with such standards? To answer this question, the approach taken in this paper is to adapt the literature addressing optimal law enforcement to certification of private food standards, focusing on deterrence of non-compliance and incentives for self-reporting. The results indicate that allowing for self-reporting lowers the costs associated with enforcement, encourages processor remediation if the standards are not met, and reduces costly effort associated with processor avoidance of auditing.



**Keywords:** Private food standards, compliance, self-reporting

**JEL Codes:** Q13, Q18, K19

## Introduction

In his 2012 Presidential Address to the Agricultural and Applied Economics Association (AAEA), Sexton (2013) noted that there has been a significant increase in demand over recent decades for provision of a range of attributes in food products, many of which cannot be verified either *ex ante* or *ex post* by consumers. These attributes, which are typically interpreted as representing higher-quality products, reflect a range of consumer preferences for food and related products that, for example, meet dietary requirements (low sodium), cover food safety (pesticide residues) and ethical production concerns (animal welfare), satisfy the right-to-know about (genetic modification), and location of (geographic indicators) food production methods, contribute to resolving known externalities associated with food production (shade-grown coffee), and marketing arrangements that promote better trading conditions for marginalized producers in developing countries (fair trade). Food products containing these types of attribute, and which create a severe asymmetric information problem, are part of a broader class of goods known as credence goods.

In the economics literature, the term credence good refers to a good where consumers are never able to discover how much of the good they actually need and they are also unable to establish the quality of the good even after consumption (Emons, 2001). Importantly, sellers not only provide the good to consumers, but they also act as "experts" determining the needs of consumers. As pointed out originally by Darby and Karni (1973), and discussed at length in Dulleck and Kerschbamer (2006), there is considerable potential for fraud where experts have an incentive to exploit informational asymmetries at both "diagnosis" and "treatment" stages in markets for credence goods. The canonical example of this is an expert, a doctor (car mechanic), diagnosing a medical (mechanical) problem and providing treatment (repairs). The problem facing

the consumer is that they have insufficient information to judge whether the diagnosis is actually correct and also whether they have actually received the appropriate level of treatment. In other words, experts know more about the type of good that a consumer needs (diagnosis), and may exploit that informational asymmetry by defrauding the consumer in terms of the quality of the good actually provided (treatment). Dulleck and Kerschbamer (2006) argue that if treatment is verifiable *ex post* and/or liability rules exist to protect consumers from receiving simple treatment when complex treatment is required, experts will be disciplined from acting fraudulently.

With increased presence of credence goods in the food sector, a body of literature has evolved focusing on analyzing their market and welfare-economic impact, including, *inter alia*, Caswell and Mojduszka (1996), Marette, Crespi and Schiavina (1999), Segerson (1999), McCluskey (2000), Zago and Pick (2004), Roe and Sheldon (2007), Sheldon and Roe (2009a; 2009b), and Bonroy and Lemarié (2012).[1] The analysis presented has focused almost exclusively on the treatment stage of credence goods and how setting of either public or private standards, third-party-certification, and product labeling may be used to ensure consumers are not cheated on claimed food product quality. In other words, consumers are assumed to have full knowledge in forming their preferences about product quality (the diagnosis is correct), e.g., they understand shade-grown coffee has ecological and sustainability benefits, but they are unable to verify product quality both before and after consumption (they may get the wrong treatment), e.g., the coffee they purchase is not shade-grown as claimed.

The combination of either public or private standards, third-party certification, and product labeling is now very common in the food sector. The canonical example of labeling of a credence attribute is that of "dolphin-safe" on cans of tuna fish sold in the United States, introduced in the

[1] See Sheldon (2017) for a review of the literature on credence goods in the context of food.

early-1990s in response to too many dolphins being killed incidentally in the process of commercial tuna fishing (Körber, 1998). Under the Dolphin Protection Consumer Information Act of 1990, a US federal agency, the National Oceanic and Atmospheric Administration (NOAA), is responsible for monitoring and certifying compliance with the rules for dolphin-safe labeling. Other examples of credence good labeling include: (i) organic food products where many countries, including the United States, the European Union (EU), Canada, and Japan only allow the term "organic" to be used by certified producers; (ii) ecolabeling of fish products managed by the Marine Stewardship Council (MSC), an international organization, certifying fish and seafood products meet sustainable fishery standards; (iii) certification and labeling by the Non-GMO Project of food produced in North America without use of genetically-modified (GM) ingredients; and (iv) Fair Trade coffee audited, certified and labeled as meeting certain sustainability and labor standards, and administered by organizations such as Fair Trade USA and Fair Trade International.

From these examples, it is clear that private standards have emerged as an important means of food system governance in both developed and developing regions (Hatanaka, Bain, and Busch, 2005; Berdegué *et al*., 2005; Henson and Humphrey, 2010; Fagotto, 2014; Rao, Bast, and de Boer, 2021; Hu *et al*., 2022; Rincon-Ballesteros *et al*., 2019). Along with the development of private standards, there has been a shift in monitoring of compliance with food standards to third-party certifiers who are responsible for accessing, evaluating, and certifying food product safety and quality claims in terms of a set of standards and compliance methods (Hatanaka, Bain, and Busch, 2005). For example, Rincon-Ballesteros *et al*. (2019), report on a sample of 223 food processing plants in 14 Latin American countries that are certified by the food safety and quality scheme Brand Reputation through Compliance Global Standards (BRCGS). While the majority of the

sample are exporters, according to BRCGS, increasing numbers of Latin American firms are getting certification for their domestic markets (Food Navigator, November 11, 2019).

Certifiers contribute to resolution of the asymmetric information problem associated with credence goods by signaling information about food product characteristics and processing methods (Deaton, 2004), their capacity to do so also depending on their ability to be independent (Tanner, 2000).[2] Getting third-party certification typically involves four steps: first a food processor applies for certification; second, the certifier undertakes an evaluation of the food processor's operations; third, the certifier conducts an audit; and fourth, certification is issued, the food processor being allowed to label its products accordingly (Hatanaka, Bain, and Busch, 2005).

Multiple reasons have been put forward for the proliferation of private standards, including *inter alia*: increased consumer and government concerns about food safety, demands by consumers for a wide range of food attributes, globalization of the food marketing system, and a shift in legal liability for food safety from the public to the private sector (Henson and Humphrey, 2010).[3] It is also argued that the aim of private standards is to go beyond public regulations in terms of stringency and application, thereby providing "…additional assurances that rules and regulations will be adhered to…" (Henson and Humphrey, 2010, p.1634).

Placing private standards in the broader context of regulation and standards, they can be characterized as set by a private body, adopted by, and implemented by private firms, evaluated for compliance by a private auditor, and enforced through private certification (Henson and Humphrey, 2010). By contrast in a regulatory setting, public standards are set and adopted by the legislature, implemented by private firms, evaluated for compliance by an official inspectorate,

[2] See Hatanaka, Bain, and Busch (2005) for a critical assessment of the growth in third-party certification.
[3] Other reasons include, food processors minimizing losses/maintaining reputations due to food safety recalls, and limitations to public regulation (Fagotto, 2014).

and enforced through the courts (Henson and Humphrey, 2010). This stark distinction might lead one to feel that enforcement of food standards can only work in a regulatory setting due to availability of public (criminal law) sanctions.

However, both political scientists and legal scholars have argued that while there is, *de jure* no obligation to apply a private standard, in practice there is a *de facto* obligation (Blowfield, 2005; van der Meulen, 2011). For example, if an upstream firm signs a contract with a downstream firm to supply a food product certified to meet a specific private standard, in principle, that private contract creates an obligation for the upstream firm to comply with the terms of the contract, and failure to do so may be subject to litigation under private (civil law).[4] In other words, growth of private food standards can be thought of in terms of "private food law" (van der Meulen, 2011).[5] Naturally this leads to an important question: are there mechanisms that can be applied by third-party certifiers that will ensure compliance with private food standards?[6]

To answer this question, the approach taken in this paper is to adapt the literature addressing optimal law enforcement and self-reporting, and its subsequent application to environmental regulation. The economics of law enforcement has a long pedigree, with initial contributions by Becker (1968) and Stigler (1970). In his classic article, Becker (1968) argued that due to enforcement costs, it is not optimal to identify violators all the time. Instead, application of a maximal sanction allows for a given average sanction with a lower probability of violators being caught, but with less enforcement effort. While Becker's (1968) argument has been accepted by many (Polinsky and Shavell, 1979), subsequent analysis by Malik (1990) indicates that due to the

[4] This possibility already exists with respect to public regulation of food safety. For example, under the UK's 1990 Food Safety Act, food businesses are held strictly liable for food safety (Henson and Humphrey, 2010).
[5] Private food law and governance have been critically assessed by, *inter alia*, Fuchs and Kalfagianni (2010). See also the broader discussion of the rise of private regulation in the world economy, e.g., Büthe (2010), Büthe and Mattli (2011), and Verbruggen (2013)
[6] There is only modest discussion in the literature on the effectiveness or otherwise of third-party certifiers in enforcing compliance with private standards, e.g., Fagotto (2014).

possibility of receiving the maximal sanction, violators expend resources to avoid being apprehended. Therefore, the optimal sanction should be reduced, in order that the marginal benefit of the sanction in reducing enforcement costs is equal to the marginal cost of avoidance. Follow-up analysis by Kaplow and Shavell (1994) shows that when self-reporting of violations is added to models of optimal enforcement, enforcement costs are saved, and risk is reduced as those who report violations bear certain rather than uncertain sanctions.[7]

There are multiple examples of US administrative agencies establishing self-reporting programs that mitigate penalties for non-compliance with legally mandated regulations (Toffel and Short, 2011). For example, in its Contractor Disclosure Program, the US Department of Defense will reduce penalties for firms that self-report procurement fraud, while the Leniency Program of the US Department of Justice relaxes sanctions against firms that self-report antitrust violations. Analysis of self-reporting has been extended in the environmental economics literature, due to various US environmental laws, including the US Clean Air Act, requiring firms to self-report violations to the Environmental Protection Agency (EPA), with the potential for sanction relief.

For example, extending the arguments of Malik (1993), Innes (1999a; 2001a; 2001b) shows that self-reporting generates pollution remediation benefits and reduces both avoidance and enforcement costs. There is also a parallel legal and economic analysis of firm-level self-policing and its potential contribution to deterrence. Arlen and Kraakman (1997) argue the magnitude and use of sanctions for non-compliance should be designed to encourage self-policing, while Innes (1999b) outlines how firms can be prompted to self-police/voluntarily remediate environmental damage through the promise of reduced sanctions. Pfaff and Sanchirico (2000) argue that self-auditing, whereby firms engage in costly efforts to discover their own violations, can be more

[7] Self-reporting generates risk-sharing benefits, given that risk-averse violators are faced with a non-stochastic sanction rather than one that is stochastic, i.e., a zero sanction if not caught versus a high penalty if they are caught.

extensive and efficient than periodic inspections, although firms will not necessarily self-report violations. While empirical analysis of the impact of voluntary regulation on environmental quality finds evidence for effects that are both positive (Innes and Sam, 2008; Sam, Khanna, and Innes, 2009), and negative (Alberini and Segerson, 2002; Lyon and Maxwell, 2007), subsequent empirical research finds that US regulators do shift enforcement resources away from firms that self-report violations, and that self-reporting firms improved both their regulatory compliance and environmental performance (Toffel and Short, 2011).

In this paper, the approach presented in, Kaplow and Shavell (1994) is adapted and applied to enforcement of private food standards, with a focus on self-reporting of non-compliance by food processors. Specifically, risk-neutral food processors are assumed to choose whether to meet a private food standard, which if ignored, generates benefits to a firm(s) and a cost to society. The remainder of the paper is structured as follows: first, a model of private food standards is outlined; second, analysis of the incentives for compliance by food processors with and without the possibility of self-reporting is conducted; finally, a summary of the paper and conclusions are presented.

## A model of private food standards

### Private food standards and certification

It is assumed that, in the absence of a private standard, the market setting is one of incomplete vertical contracts, i.e., downstream food retailers and upstream food processors cannot sign enforceable contracts specifying the supply of a customized food product, the precise nature of the latter only being realized *ex post* (Hart and Moore, 1999).[8] The possibility of a tort case is also ruled out by assumption, i.e., a food retailer is unable to determine that a tort (harm) has occurred,

[8] See Kaplow and Shavell (2002) for a discussion of the incompleteness of contracts and their less than rigorous enforcement.

they cannot identify the tort-feasor (the food processor causing the harm), and as a result they do not sue in court for sanctions against a non-complying food processor.[9,10] This compares to the standard literature on suit settlement and trial where the existence of a tort and the identity of the tort-feasor are known, such that compensatory and possibly punitive damages can be assessed (see Kaplow and Shavell, 2002; Polinsky and Shavell, 1998).[11]

To minimize post-contractual transactions costs, a private standard $f_i$ in industry $i$ is established where a third-party certifier evaluates the product *ex ante*. Following Henson and Humphrey (2009), $f_i$ includes the following: (a) description of the production process firms in $i$ must follow in order to comply with the standard; (b) verification of compliance with the standard through internal documentation by firms in $i$; (c) mechanisms of internal audit so that firms in $i$ can self-monitor their compliance; and (d) external audit of any firm in $i$ by a certifier. It is also assumed that third-party certifiers are not subject to capture by the food processors they audit, and that their audits are random.

The private standard $f_i$ describes the product attribute $q_i$ food processors must comply with to satisfy the requirements of downstream food retailers, where $q_i = q(f_i)$, and $q_i' > 0$, i.e., product quality increases in the level of the standard. A food retailer's reputation, indexed by the value of their brand equity $B$, is a function of upstream food processor(s) compliance with $f_i$, where $B = k(q_i)$, and $B' > 0$. Based on the earlier discussion of credence attributes, $q_i$ is drawn from a

[9] Compared to common law systems such as that applied in the United States, the Mexican and Latin American legal systems do not consider "tort law" as an autonomous body of law. Instead, based on the civil law tradition, relief for individuals harmed by the actions of others comes under the category of "extra-contractual liability" (see Vargas, 2004; Muñoz and Vázquez-Cabello, 2019; Morpurgo, 2015).

[10] The potential for class action lawsuits based on food product liability is also ruled out - see Polinsky and Shavell (2010) for a discussion of product liability.

[11] See Innes (2001b) for an interesting discussion of the implications of self-reporting by a defendant if a suit were filed, i.e., the promise of lower court sanctions could elicit self-reporting, with punitive damages only being filed against those who fail to report a harmful act.

spectrum of final food consumer preferences for product characteristics, including food safety (pesticide residues/organic production), ethical production (animal welfare), right-to-know (GM ingredients), and sustainability (environmental/eco-system impact). While consumers may suffer a loss of utility when food standards are not being met, the assumption here is that food retailers bear the aggregate cost of consumers boycotting their products/stores, along with the associated damage to their reputation.

### Food processors

Food processors in *i*, who are assumed risk-neutral, can choose whether to comply with the standard $f_i$ or not. If they fail to comply, economic damage *d* is incurred by food retailers in terms of the reduction in their brand equity *B*. By not complying with the standard, a food processor obtains a benefit $b \in [0, \infty]$ in terms of reduced processing and other costs, where *b* differs among firms in *i*, and has a positive continuous density *g*(.) with a cumulative distribution *G*(.). For simplicity, the population of food processors in *i* is normalized to one.

## Analysis

### Enforcement of private food standards – No self-reporting by food processors

Without self-reporting by food processors of their failure(s) to comply with $f_i$, a certifier audits food processors with probability *p*, where the audit accurately establishes the private standard is or is not being met, each audit costing *c*. If found in non-compliance, the food processor is subject to a sanction *s*, i.e., it is not certified as meeting the private standard for a specific period, where the maximum level of the sanction $\bar{s} \geq d$. $\bar{s}$ is equal to the financial loss to the food processor of temporarily not being certified and being denied retail shelf space, plus any re-certification costs.

The certifier chooses the probability it will audit and the level of the sanction to maximize welfare, i.e., the sum of food processors' benefits *b* minus the damage incurred by food retailers *d*

due to non-compliance with the standard $f_i$, plus the auditing costs $c$. A food processor will not comply with the standard if $b \geq ps$, welfare being defined as:

$$W = \int_{ps}^{\infty} (b - d) g(b) db - pc, \tag{1}$$

where the first term are benefits of upstream non-compliance less the damage incurred by downstream retailer(s), and the second term is the auditing cost, the population of food processors (normalized to one) being examined with probability $p$, each audit costing $c$.

As in Becker (1968), the optimal sanction applied against any non-compliant food processor firm is $\bar{s}$. In other words, if $s^* < \bar{s}$, the sanction imposed by the certifier could be increased and the probability of audit $p$ lowered, such that the expected sanction $ps$ remains constant, i.e., the level of deterrence is preserved, the first term in (1) being unchanged, while auditing costs, the second term in (1), are reduced, thereby increasing $W$.

Differentiating (1) with respect to $p$, and assuming $s^* = \bar{s}$:

$$\frac{dW}{dp} = \bar{s}(d - p\bar{s}) g(p\bar{s}) - c, \tag{2}$$

the optimal probability of audit $p^*$ being given by:

$$p^* = \frac{d - c / [\bar{s} g(p^* \bar{s})]}{\bar{s}}, \tag{3}$$

with the optimal expected sanction $p^* \bar{s}$ determined as:

$$p^* \bar{s} = d - \frac{c}{\bar{s} g(p^* \bar{s})}. \tag{4}$$

Interpretating equation (4): the left-hand side is the economic loss due to deterring the marginal food processor, i.e., the firm would have gained $b = p^* \bar{s}$ if they had not complied. The right-hand

side of (4) is the net gain from deterring the marginal food processor, i.e., the damage *d* less the costs of deterrence.

There is already an extensive literature on reasons why Becker's (1968) result might not hold, including imperfect information about the probability of apprehension (Bebchuk and Kaplow, 1992).[12] However, it is worth noting here that the optimal sanction $s^*$ imposed by the certifier may be dependent on the extent of any remediation efforts by the food processor. For example, if a food processor fails to comply with a food safety standard, the damage *d* to a downstream retailer(s) could be mitigated by "clean-up" efforts on the part of the food processor *e*, e.g., shutting down a food production line in order to identify and remove hazards associated with food safety. For example, the US deli meat firm Boar's Head recently shut down a plant in Virginia following a listeria outbreak that had resulted in nine deaths and consumers getting sick in 18 states (Jewett and Rosenbluth, New York Times, September 13, 2024).

Necessarily, remediation efforts come at a cost $c^e$, any remaining damages being $d^a$, i.e., if there is no remediation, $d > d^a + c^e$. Following Innes (1999a), if there are large enough net benefits from remediation by food processors, $d - (d^a - c^e) > 0$, the probability of auditing *p* should be raised, and the sanction reduced such that $s < \bar{s}$, to secure the benefits of remediation. In other words, a higher probability of auditing increases the likelihood of remediation, generating benefits beyond those due to imposition of sanctions and deterrence of non-compliance.[13]

Malik (1990) and Innes (2001b) have also shown that when sanctions against non-compliance are increased, firms have an incentive to engage in costly activities to avoid being caught. For

[12] Drawing on Bebchuk and Kaplow (1992, footnote 2), other explanations for non-maximal sanctions include: risk aversion (Polinsky and Shavell, 1979), non-monetary sanctions (Kaplow, 1990), marginal deterrence (Stigler, 1970), and differences in wealth (Polinsky and Shavell, 1991).
[13] See Innes (1999a) for a discussion of the full set of conditions under which this result will hold.

example, firms could lobby/bribe the auditor to turn a blind eye to their failing to meet the required standard. Specifically, when the sanction *s* rises, food processors not meeting the standard have a greater incentive to avoid being audited and caught. In this case, the optimal sanction should also be set below its maximum level, $s < \bar{s}$ and the probability of audit increased. The upper bound to the sanction *s* is one that equates the marginal benefit of increased deterrence with the marginal cost of increasing avoidance.[14]

Enforcement of private food standards – Self-reporting by food processors

If self-reporting of non-compliance by food processors is allowed, and no administrative costs are incurred by food processors through self-reporting, the sanction *r* imposed by the certifier should be no greater than the expected sanction applied to food processors that do not self-report, $r \leq ps$. Therefore, food processors will report a breach to the certifier if and only if $b \geq \min(r, ps)$, in which case, welfare becomes:

$$W = \int_r^{\infty} (b - d) g(b) db - pcG(r), \qquad (5)$$

the difference to equation (1) being twofold: first, the lower limit of integration is *r* rather than the expected sanction of *ps*; and second, the auditing cost is $pcG(r)$ as opposed to *pc*, as only those food processors that do not self-report are audited, i.e., when $r > ps$. With a positive probability of auditing, $p > 0$, a sanction of *s*, and *r*=*ps*, the same set of food processors fail to comply with the standard with or without the option of self-reporting, i.e., the integrals in equations (1) and (5) are the same. Importantly, with self-reporting by food processors, certifier auditing costs will be lower by the amount $[1 - pG(ps)]pc$. In this case the optimal auditing scheme is one where $r = ps$ and $s = \bar{s}$. If $r > ps$, there would be no incentive for food processors to self-report; and if $r < ps$,

[14] See Innes (2001b) for a discussion of the full set of conditions under which this result will hold.

the probability of being audited could be lowered, resulting in individuals still self-reporting and paying *r*, but the cost of auditing would be reduced, thereby increasing *W*.

Substituting $p\bar{s}$ for $r$ in (5), and differentiating with respect to $p$ :

$$\frac{dW}{dp} = \bar{s}(d - p\bar{s})g(p\bar{s}) - pc\bar{s}g(p\bar{s}) - cG(p\bar{s}), \tag{6}$$

the optimal probability of audit $p^*$ being given by:

$$p^* = \frac{d - cG(p^*\bar{s})/[\bar{s}g(p^*\bar{s})]}{\bar{s} + c}, \tag{7}$$

with the optimal expected sanction $p^*\bar{s}$ determined as:

$$p^*\bar{s} = d - p^*c - \frac{cG(p^*\bar{s})}{\bar{s}g(p^*\bar{s})}. \tag{8}$$

Like equation (4): the left-hand side of (8) is the economic loss due to deterring the marginal food processor, i.e., the firm would have gained $b = p^*\bar{s} = r^*$ if they had not complied. The right-hand side of (8) is the net gain from deterring the marginal food processor, i.e., the damage *d* less the costs of deterrence which now has two components: first, the expected cost $p^*c$ of examining the marginal food processor who has been deterred from non-compliance, but is in the pool of food processors that could be audited; and second, the infra-marginal cost $cG(p^*\bar{s})/\bar{s}g(p^*\bar{s})$ of examining food processors who do comply with a higher probability.

Again, drawing on Innes (1999a), if there are net benefits, $d - (d^a - c^e) > 0,$ , to be gained from food processors remediating the damage resulting from their non-compliance, the sanction for self-reporting should be equal to the expected sanction from not self-reporting, *r=ps*, whereas for non-reporting food processors, the sanction for non-compliance should be set maximally at $\bar{s}$. The argument for this is straightforward: first, if $r < ps$, the probability of audit can be lowered

without affecting the incentive to self-report, and undertake remediation efforts; and second, the Becker (1968) result holds, i.e., the sanction for non-reporting food processors is raised to $\bar{s}$, while the probability of audit *p* is lowered, preserving the expected sanction for not reporting $p\bar{s}$. As a result, the incentive for food processors to self-report is maintained, the benefits of damage remediation are realized, and certifier auditing costs are lower.

A similar result holds if food processing firms seek to avoid being apprehended for non-compliance with the private standard, i.e., the sanction for self-reporting should be equal to the expected sanction from not self-reporting, $r = ps$ (Innes, 2001b). Essentially, self-reporting occurs before a food processor takes any avoidance action, ensuring that the costs incurred due to non-compliance, deterrence, and avoidance are all lowered. Importantly, compared to Malik's (1990) earlier finding, with self-reporting, the sanction against non-reporting firms can be raised to its maximal level, without avoidance costs being incurred.

### Enforcement of private food standards – Self-reporting and threat of food processor boycott

In the case of private food standards, certifiers typically apply a gradual system of sanctions against non-complying firms, starting with a warning, through removal of certification, to exclusion from the standard (Fuchs and Kalfagianni, 2010). In keeping with the literature on the economics on law enforcement, an additional sanction equivalent to "imprisonment" is also considered here.

Specifically, it is argued that a certifier can threaten to publicly expose a food processor for failing to comply with a private standard, which could then result in a campaign by a non-governmental organization (NGO)/activist(s). Such a campaign would be designed to encourage consumers to boycott altogether the offending firm's uncertified product(s), including where available through retailers who do not value compliance with the standard (Hatanaka, Bain, and Busch, 2005). In addition, NGOs/activist groups are on record as advocating the use of third-

party certifiers as a means of ensuring private standards are "…objective, transparent, and accessible to interested parties…" (Hatanaka, Bain, and Busch, 2005).[15]

While there is an argument that firms in pursuing corporate social responsibility will seek to produce products that meet a higher standard, for which consumers are willing to pay a premium, firms are frequently pushed into taking such action by NGOs/activists.[16] For example, Starbucks, despite having established a reputation for corporate social responsibility in the 1990s, were threatened with a boycott in 2000 by the NGO Global Exchange if they did not sell and promote fair trade coffee (Argenti, 2004). There are other well-known examples of food processors and retailers responding to the threat of boycott over genetically modified (GM) content in their products and humane treatment of animals, including Heinz, Gerber, McDonalds and Burger King (Hudson and Lusk, 2004; Innes, 2006). Both Heinz and Gerber were targeted by Greenpeace in the late-1990s for their use of GM soy and corn products in their food/baby-food. In the case of MacDonalds and Burger King, the People for Ethical Treatment of Animals (PETA) targeted both in 2001 for purchasing eggs from producers operating with insufficiently large animal pens. Currently, 15 boycotts of food processing and retailing firms, including Coca-Cola and Kellogg's are listed online (ethical consumer, 2024).

The role of NGOs/activists in promoting boycotts of firms has been subject to analysis by economists. Fedderson and Gilligan (2001) examine the impact of an information-supplying activist on outcomes in a credence good market where consumers care about the operating practices of firms operating in a duopoly. Their model assumes that activists randomly monitor the specific operating characteristics of one firm, where these are either good or bad, neither being

[15] See also Gereffi, Garcia-Johnson, and Sasser (2001), and Joseph (2002), and Ruggie (2003).
[16] See Baron (2001; 2003) for discussion of the concept of corporate social responsibility in the context of "private politics".

observable to consumers. Through monitoring, activists learn the quality-choice of that firm and then signal that knowledge to consumers who then make their purchasing decision. Activists can support an equilibrium where at least one firm supplies the high-quality good, even though consumers cannot observe quality even after consumption. In addition, depending on the degree of substitutability between goods, activists can support equilibria where either both firms supply high-quality, or low and high-quality goods are supplied. Therefore, activists may improve the workings of a credence goods market.

NGOs may also operate in a setting where government is involved in standard-setting. Heyes and Maxwell (2004) examine the impact of an NGO in a competitive market where government sets a mandatory minimum standard and the NGO can confer a label on firms that voluntarily conform to their standard. Without third-party certification, only the low-quality good is supplied, the latter surviving in equilibrium if an NGO sets a voluntary standard. By comparison, a mandatory minimum standard ensures only a single quality can survive in equilibrium. It is shown that the voluntary label is more attractive to firms than the minimum standard, average quality being higher under the minimum standard. Given this result, Heyes and Maxwell (2004) show that a minimum standard is optimal when combined with a voluntary standard set by the NGO.

Alternatively, if the industry initially sets a standard and the NGO then pushes to increase the standard, Baron (2011) shows that the industry standard will be higher than in the absence of pressure from the NGO. In this model, firms can produce either a low-quality good, or a high-quality good with credence attributes, the standard being set by an industry credence organization and credibly certified by a third-party. The level of the standard is a function of the number of firms in the organization, and once collectively set, these firms compete in the high-quality segment of the market, while firms outside the organization sell the low-quality good. Preferences

for the credence attribute are drawn from a uniform distribution of consumers. Baron (2011) models the problem as a four-stage game: first, the NGO demands the industry set a standard, after which the credence organization sets a standard; second, the NGO directs social pressure on the organization; third, the NGO and its target organization contest a campaign; fourth, given the outcome of the campaign, there is Cournot-Nash competition in the product market.

Suppose, therefore, that it is possible to stage a boycott of the product(s) sold by a food processor failing to comply with a private food standard, but such a sanction is costly to implement. The monetary sanction for damage inflicted on a food retailer is $s_1 \leq \bar{s}_1$, and the sanction due to a boycott of the offending food processor is the monetary value of a permanent loss of retail shelf space for its product $s_2 \leq \bar{s}_2$. The total cost of sanctions to a food processor is $s = s_1 + s_2$, the cost of imposing a boycott being $\gamma s_2$, where $\gamma = [\eta + \pi] > 0$. The NGO/activists organizing a boycott of a specific food product incurs a cost $\eta$ in terms of the lost opportunities for other boycott activities (Innes, 2006), and the food processor incurs costs $\pi$ from contesting the boycott (Baron, 2011).

Following Baron (2011), the probability that a boycott campaign is successful is given by $\rho = \beta\eta / (\beta\eta + \pi)$, where $\beta > 0$ reflects the public reputation of the food processor, the latter being more vulnerable to a boycott the higher is $\beta$. The NGO/activist *A* maximizes their expected utility $EU^A$ less their campaign costs:

$$EU^A = \rho q(f_i) + (1-\rho) q(< f_i) - \eta, \tag{9}$$

where $\rho q(f_i)$ is the probability that food product meets the private standard, and $\rho q(< f_i)$ is the probability it only meets some publicly set minimum standard. In the case of the food processor,

they choose the amount of resources $\pi$ they expend on contesting the boycott in order to maximize their expected profits $E\Pi$:

$$E\Pi = \rho\Pi q(f_i) + (1-\rho)\Pi q(< f_i) - \pi. \quad (10)$$

The probability that an NGO/activist campaign succeeds is increasing in $\beta$, and decreasing in the costs $c^e$ of restoring food product quality to meet the private standard. In other words, the impact of a permanent loss of retail shelf space is a function of the value of the food processor's reputation $\beta$, and how costly it is restore that reputation.

Many food and drinks firms have learned from the Perrier water case how important it is to react promptly to safety and other issues relating to their products in order to preserve brand reputation. Following the discovery of traces of benzene in its mineral water, Perrier withdrew 160 million bottles of water from the market in 1990 at a cost of $150 million, their share price falling by 37 percent, the firm eventually being acquired by Nestlé, and taking more than five years to regain public trust in the brand (Caesar-Gordon, PRWeek, October 28, 2015). Perrier's significant loss of market share and damaged reputation suggests that failure to manage a safety or other problem with either a branded food or drink product can have significant economic consequences (Kurzbard and Siomkos, 1992). Not surprisingly, Coca-Cola promptly and voluntarily recalled several Minute Maid drink products in late-2021 due to the potential presence of foreign matter with the potential for adverse health consequences (Shen, USA Today, December 13, 2021).

Therefore, if a boycott is credible in the absence of self-reporting, then $s = \bar{s}_1 + s_2$, where $s_2 > 0,\ 0 < p < 1,$ and with self-reporting $r = ps$. In addition to the reduction of auditing costs, food processors voluntarily reporting their non-compliance, the social costs of initiating boycotts can also be reduced. With self-reporting, the total sanction $r = r_1 + r_2 = ps = p(\bar{s}_1 + s_2)$, where $r_1$

and $r_2$ are the monetary and boycott sanctions respectively. If $r \leq \overline{s}_1$, the certifier should set $r_1 = r$, and $r_2 = 0$, i.e., no boycott(s) will be implemented, generating social cost savings of $p\gamma s_2$. If instead $r > \overline{s}_1$, the certifier should set $r_1 = \overline{s}_1$, and set $r_2 = p(\overline{s}_1 + s_2) - \overline{s}_1$, the savings in social costs being $(1-p)\gamma s_2$. In other words, the monetary costs of non-compliance, $\overline{s}_1$ are applied with certainty rather than with probability of $p$, and the threat of boycott is reduced by $(1-p)\overline{s}_1$.

Essentially, a given level of deterrence due to the sanction $r$, can be achieved at lower cost, with a lower probability of audit, because food processors who do not self-report non-compliance face a greater sanction through boycott of their product(s). If there are benefits from remediation by food processors, the certain sanction applied to food processors that self-report should be set at $r_1 < \overline{s}_1$, while the maximal sanction should be applied to firms that do not self-report, i.e., they are subject to a boycott.

## Summary and conclusions

Use of private food standards in combination with third-party certification of those standards has expanded significantly in the past few decades. Despite the proliferation of private standards, there has been little formal economic analysis of the incentives for food processors to comply with standards, how the system of third-party certification might operate to ensure such compliance, and what the costs of auditing and enforcement might be. To provide some initial thoughts, this paper draws from the extensive literature on the economics of crime and law enforcement originally pioneered by Becker (1968).

Specifically, the analysis presented is an adaptation of the optimal law enforcement and self-reporting results due to Kaplow and Shavell (1994), and subsequent application to environmental regulation by Innes (1991a, 1991b, 2001b). The key results of the paper are summarized in the following schemata and related discussion:

**Self-Reporting of Non-Compliance with Private Food Standards**

| Reporting Status | Optimal Sanction by Private Certifier | Benefits | Remediation/Avoidance Activities |
|---|---|---|---|
| **Without self-reporting** | Maximal with lower probability of audit | Lower auditing and enforcement costs, maintained level of deterrence | Reduce sanction with increased probability of audit |
| **With self-reporting** | Lower sanction for self-reporting, otherwise maximal sanction | Lower auditing and enforcement costs, maintained level of deterrence | Reduce sanction for those that self-report, otherwise maximal sanction |
| **With self-reporting and boycott threat** | Certain sanction for self-reporting, otherwise greater sanction for non-compliance | Lower auditing and enforcement costs, maintained level of deterrence | Reduce sanction for those that self-report, otherwise maximal sanction via boycott |

- first, without self-reporting, a third-party certifier audits food processors with some probability, incurring an auditing cost. If a food processor is in non-compliance, they are penalized with a sanction. In this case, the certifying agency chooses the probability of audit and level of the sanction to maximize the sum of food processors' benefits, minus the harm caused from not meeting the standard, and the costs of audit. With a positive probability of auditing, the optimal sanction the certifying agency imposes is a temporary suspension of the offending food processor from the right to label their product as meeting the private food standard. In the presence of either remediation or avoidance efforts by the food processor, the optimal sanction should be reduced.

- second, with self-reporting, if a food processor voluntarily admits to the certifier that they have not complied with the private food standard, they incur the cost of remediation, and are "put on probation" in the sense that they are automatically audited to ensure the standard is being met. In other words, self-reporting elicits a sanction equal to the temporary suspension of the right to label a product as meeting the private standard. At the same time, there is still a positive probability that non-reporting food processors are audited and penalized with the maximal sanction, although

the costs of enforcement are now lower with self-reporting. With either remediation or avoidance efforts by food processors, the optimal sanction should be reduced for those that self-report, but for those that do not, the maximal sanction should be applied.

- third, a second sanction can also be introduced into the analysis, equivalent to "imprisonment" in a criminal law setting. Specifically, the certifying agency with some positive probability can reveal to an NGO/activist group(s) that a food processor has not complied with a private standard and has been permanently de-certified from producing the labeled product. The activist group then expends resources on pushing for boycott altogether of the offending food processor's product(s). The threat of "imprisonment" against those food processors who do not self-report, adds to the efficiency benefits of a self-reporting scheme, i.e., it is less costly for the certifying agency to achieve a given level of deterrence, with self-reporting firms incurring a sanction with certainty, the amount depending on whether there is engagement in remediation efforts.

Necessarily, this is a stylized model of private food standards and third-party certification of those standards, but its usefulness lies in identifying key issues relating to economic incentives for compliance, sanctions for non-compliance, deterrence, and the costs associated with auditing and enforcement. Importantly, while the discussion has been entirely in the context of food products with credence characteristics, private certification is actually quite widespread, Lytton (2014) noting that in 2001 there were at least 180 private organizations in the United States certifying over 350 types of product. In principle, therefore, the analysis of self-reporting has wider application, especially eco-labeling of non-food products such as energy supply, textiles, paper, and forest products (Youssef and Abderrazak, 2009). For example, the Forest Stewardship Council (FSC), an international non-profit organization established in 1993, promotes responsible

management of the world's forests via timber certification, their FSC logo certifying a forest product comes from an environmentally, socially, and economically responsible source.

It should be noted though that the results reported here also depend on there being no administrative costs associated with self-reporting (Malik, 1993; Kaplow and Shavell, 1994). If they matter, a self-reporting food processor incurs such costs with certainty compared to only a probability with no self-reporting. Therefore, self-reporting only makes sense if the expected damage, and hence the sanction, is large enough relative to the administrative costs (Innes, 2001b). Nevertheless, the analysis does highlight the reputational risks to both food processors and retailers of non-compliance with private food standards, i.e., the threat of a product boycott, and the potential damage to retailer brand equity if standards are not met. The Perrier water case, along with previously threatened boycotts of firms such as Heinz, Gerber, MacDonalds and Starbucks, suggest that minimizing such reputational risks is critical.

To this point, the focus has been on self-reporting of non-compliance with private standards by food processors, but in describing private standards Henson and Humphrey (2009) and van der Meulen (2011) state that they can include mechanisms of internal audit so that firms can self-monitor their compliance. Therefore, an extension of the current analysis might focus on an enforcement mechanism that encourages self-policing along with remediation. The empirical results presented in Toffel and Short (2011) suggest that in the case of environmental regulation, self-reporting signals effective self-policing, and that regulators use the fact of self-reporting to identify firms that are substantively monitoring themselves, who then receive audit relief.

In Innes (1999a), it is assumed there is no self-policing, with sanctions not being conditioned on a firm's level of "cleanup" prior to their being found non-compliant. However, Innes (1999b) has explored the possibility formally, showing that in an optimal regime, firms that pollute are

prompted to self-police through the promise of a reduced sanction, the benefits being increased frequency of early remediation and reduced costs of auditing to reach a given level of deterrence. Necessarily it is an open empirical question whether self-monitoring by food processors in relation to private food standards operate in this fashion, although recent voluntary responses to food safety scares suggests that it probably does take place.

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