

# Governmental Regulation and Self-Regulation\*

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## Abstract

Why may government regulation be a useful complement to business self-regulation in the financial services industry, while largely unneeded or even detrimental for e-commerce? We develop a game-theoretic model wherein a government establishes a mandate for product quality without possessing effective enforcement abilities, and a firm chooses whether to ignore, comply with, or exceed the government quality standard. After bringing a product to market, the firm faces the possibility of political or interest group reactions, such as being the focus of a lawsuit or activist campaign. Equilibrium results show how the threat of lawsuits or interest group activism can complement governmental regulations to discipline the choices of businesses. The model establishes conditions under which certain types of firms in certain environments react favorably or unfavorably to government regulations.

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## Governmental Regulation and Self-Regulation

The simple act of buying a product or service follows from a wide range of strategic interactions among multiple actors. First, for any industry, a government may establish rules for firms conducting business in that market. Second, firms may respond to these mandates by providing goods of various qualities and prices, which consumers may then choose to purchase. This interaction among firms, governments, and consumers does not take place in a vacuum, however. A long-standing body of political science scholarship has demonstrated the ways in which government is responsive to organized and unorganized stakeholders (e.g., Schattschneider 1960, Miller and Stokes 1963, Lowi 1979). Furthermore, firm and consumer responses to government mandates (or lack thereof) are not conclusive. Various *nonmarket* reactions, such as lawsuits, consumer boycotts, and interest group protests, may occur after firms bring their products to market; and these nonmarket reactions might induce governments, as well as firms, to reconsider their initial decisions.<sup>1</sup>

Given that firms are likely to be responsive to government mandates, as well as to potential *ex post* nonmarket reactions, a fundamental question regarding the efficacy of government regulation is: under what conditions might governments choose to engage in *de jure* regulation, instead of outsourcing *de facto* regulation and industry oversight to other nonmarket actors, to ensure favorable public policy outcomes? While scholars have explored similar questions in analyzing how legislatures might seek to engage in active rather than passive oversight of the bureaucracy (e.g., Banks and Weingast 1992, McCubbins and Schwartz 1984), the respective virtues of active versus passive regulatory policy have received less attention. These questions are not solely academic points of inquiry, as events over the past decade have raised new concerns regarding the virtues of government regulation versus private market solutions that facilitate industry “self-regulation.”

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<sup>1</sup>The term “nonmarket” is meant to denote the wide range of political, social, and legal arrangements that firms might have to engage outside of their market environment (i.e., Baron 2010). These interactions fall within the category that Diermeier (2007) refers to as “private politics.”

In the late 1990s, for example, lawmakers and consumer activists began to voice concerns that online firms were inadequately protecting their consumers' privacy, and misusing consumers' personally identifiable information. Many online companies claimed they were meeting high standards of privacy protection, yet in practically all circumstances such claims were impossible to verify. At the same time, different branches of the U.S. government were struggling with whether or not to establish a federally-mandated baseline for online privacy protection, given the uncertainty regarding the technical feasibility of enforcement.

In July 1998, the United States Federal Trade Commission (FTC) issued a report to Congress wherein it claimed that industry self-regulation was potentially adequate to ensure that online firms would adopt socially desirable online privacy protections. A subsequent report in 1999 favored self-regulation; but, in a final report to Congress on internet privacy in May of 2000, the Commission deviated from its earlier position in arguing that industry "self-regulation alone, without some legislation, is unlikely to provide online consumers with the level of protection they seek and deserve," and recommending that Congress create such legislation.<sup>2</sup>

In stark contrast to the majority recommendation, the lone dissenter, Commissioner Orson Swindle, lambasted the majority's report with a 27-page critique. According to Swindle, the Commission had failed to demonstrate how industry self-regulation was insufficient to achieve socially desirable ends, and that the majority had failed to account for any of the likely costs of such sweeping regulatory actions, valuing the "asserted benefits of enhancing consumer confidence" over "alternative approaches that rely on market forces, industry efforts, and enforcement of existing laws."<sup>3</sup> Even if the federal government had desired to proactively regulate Internet privacy, concerns existed (as noted by Commissioner Swindle) as to whether the regulators at the FTC were sufficiently technically adept (regarding

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<sup>2</sup>"Statement of Chairman Pitofsky" in *Privacy Online: Fair Information Practices in the Electronic Marketplace*. May 22, 2000.

<sup>3</sup>"Dissenting Statement of Commissioner Orson Swindle" in *Privacy Online: Fair Information Practices in the Electronic Marketplace—A Report to Congress*. May 22, 2000 (pp. 1-2).

knowledge about computers, the Internet, data management, and the like) to engage the technological issues that would come with fully enforcing such a regulatory mandate.

Central to these differing perspectives was the question of whether existing market and nonmarket arrangements were sufficient to induce companies to make socially desirable choices, even when those choices might not be easily observable. The Clinton Administration ultimately rejected the FTC’s recommendation in favor of a self-regulatory approach to address online consumer protections. More than ten years after this decision, one sees that while cases of identity theft do occur, the private market has responded with various personal-information protections, such that tens of millions of American consumers feel comfortable enough to engage actively in electronic commerce. Industry self-regulation appears to have worked well in this case.

A quite different picture emerges, however, regarding the efficacy of industry self-regulation in the realm of financial services. Beginning in the 1970s, the “asset-backed security” was developed, which was effectively a collection of loans made by banks, then sold into a secondary market and divided into shares, which were, in turn, sold to private and institutional investors. As the market for these structured asset-backed securities rapidly expanded throughout the 1980s and 1990s, their integrity became questionable. During this period of rapid expansion, however, several prominent members of the federal government strongly advocated against government regulation of these markets. Instead, it was argued that the private marketplace had the necessary and appropriate incentives to ensure that the market for asset-backed securities functioned in an efficient manner; and any attempt to regulate this market would simply limit (and possibly destroy) the benefits that would naturally follow from these financial innovations.<sup>4</sup>

A clear example of this sentiment was reflected in a rule that was jointly issued by the Federal Reserve, the FDIC, the Office of the Comptroller of the Currency, and the Office of

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<sup>4</sup>Johnson and Kwak (2010) document how self-regulation advocates dominated much of the public debate over these topics in the late 1990s and early 2000s.

Thrift Supervision in late 2001 that effectively outsourced supervision of these markets to the private credit-rating agencies. Under the new rules, the grades that credit-rating agencies bestowed on different securities would influence the capital requirements that banks had to satisfy given the value of their underlying debt.<sup>5</sup> Given the complexity of these securities, pressure on rating agencies to bestow good ratings on banks, and the potential ability of banks to shop around for attractive ratings, banks found themselves holding relatively little capital reserves given the status of their assets.<sup>6</sup>

As a large number of loans started to fail in the mid-2000s, many of these assets plummeted in value; and with banks having insufficient capital to cover the debt that they were holding, they began failing (damaging much of Wall Street as well). While it might be unfair to argue that active government intervention would have prevented the 2008 financial crisis, a consensus has emerged regarding the inability of self-regulation to efficiently manage these types of products.<sup>7</sup> As noted by Timothy Howard, the former CFO of Fannie Mae: “I think the regulators—and most policy makers—truly thought the market would properly regulate itself, and they continued to think so even as the excesses built to extraordinary levels.”<sup>8</sup> History suggests otherwise.

Why did industry self-regulation seem to be relatively effective in the case of Internet privacy but not financial services? More broadly speaking, under what conditions might we expect firms to meet government mandates, or establish standards outside of government (i.e., to engage in self-regulation), particularly when government has limited enforcement

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<sup>5</sup>Federal Register, 66 (230): 59614-59667.

<sup>6</sup>Smith (2008) provides a parsimonious commentary on the ways in which the private ratings agencies effectively engaged in a race-to-the-bottom when evaluating bond packages, which greatly contributed to the financial crisis of 2008.

<sup>7</sup>While government intervention might possibly have helped to ameliorate some of the consequences of the financial disaster, the complexities associated with the subprime debt market (as colorfully described in Lewis 2010) suggests that endowing the federal government with such authority might not have ensured favorable outcomes.

<sup>8</sup>“Why it Collapsed.” Corine Hegland. *National Journal*. April 11, 2009. p. 18.

capabilities? To address these types of questions, we develop a model of industry self-regulation given the implicit threat of nonmarket reactions. We consider limited government regulation, in which the government chooses a high or low quality standard for products, yet lacks full enforcement power (consistent with complex marketplaces like those surrounding Internet privacy or mortgage-backed securities). Upon observing the government mandate, a firm makes its own quality choice, with direct implications for the prices that it charges (and its subsequent profits). Finally, after the product is brought to market, various nonmarket actors (in the form of courts or consumer activists) potentially intervene in the marketplace, providing information and/or penalizing firms that produce harmful products. We identify conditions of the activist environment and the scope of judicial penalties that can induce a firm to produce a high-quality product or service, both with and without explicit government mandates. Our model is relevant for a wide array of markets in which product quality is not clearly observable by consumers or government regulators (e.g., the types of “credence goods” explored by Feddersen and Gilligan 2001), as well as where the government is ill-equipped to fully enforce its chosen standards.

In what follows, we begin by exploring the relevant literature, and describe our baseline model of government regulation and industry self-regulation. We then identify how judicial institutions and consumer activists can influence firms’ production decisions, absent direct enforcement of government mandates. Regarding litigation, we find that when the size of a potential judicial penalty is large, when the firm cares significantly about future transactions, and when low quality goods are likely to lead to disasters, a firm will have an incentive to produce high quality products. With regard to activists, we find that when interest groups receive substantial benefits from revealing a firm’s production choices, they will exert sufficient effort to inform consumers, which will induce the firm to self-regulate. We also reveal an interesting complementarity between activist strategies and government choices, in that the government mandate, despite being unenforceable, can make it easier, or more difficult, for the activist to induce the firm to self-regulate. Put simply, we identify

conditions under which firms are sufficiently disciplined by threats of activism or lawsuits, such that additional government regulation is either of little use or actually detrimental. We conclude with a discussion of our results, returning to our consideration of Internet privacy and financial services, and suggest ideas for future work to advance this research program.

## **Existing Literature and Research**

Our theory adds to the scholarly work on governmental regulation and self-regulation, as well as to research on corporate social responsibility, and on private politics. While a voluminous literature has focused on the ways government might regulate industry through inspections and investigations (e.g., Gordon and Hafer 2005, Moe 1985, Shipan 2004, Shotts and Wiseman 2010, Wood and Anderson 1993) and the rulemaking process (e.g., Balla and Wright 2001, Yackee 2006), a less-developed literature explicitly engages the concept of industry self-regulation. In studying regulatory processes and policies, it is commonly assumed that, regardless of why the policies were initially devised, government has the capacity (and political will) to fully enforce those regulations that it creates (e.g., Peltzman 1976, Stigler 1971). In contrast to this perspective, we advance a different view of government, in which it might possess more limited enforcement capacity in complex environments, relying in full or in part on nonmarket actors such as litigants or activists, and on self-regulation.

The term “self-regulation” has come to mean several things ranging from the ways in which trade associations facilitate the establishment of industry-wide standards (e.g., Abo-lafia 1985) and engage in industry monitoring (e.g., DeMarzo, Fishman, and Hagerty 2005), to the manner in which individual firms voluntarily provide environmentally “clean” products in the absence of (or anticipation of) government standards (e.g., Lyon and Maxwell 2002, 2004). Embracing a broad view of self-regulation, our approach speaks to several strands of the literature involving the voluntary provision of socially desirable goods and standard setting.

The substantive focus of much of the self-regulation literature, thus far, has been on environmental policy (e.g., Borck and Coglianese 2011, Coglianese and Nash 2009).<sup>9</sup> In this area, scholars have developed theories analyzing how the voluntary adoption of environmental standards can influence both the prospects of subsequent government regulation (e.g., Lutz, Lyon, and Maxwell 2000; Maxwell, Lyon, and Hackett 2000), as well as inducing market segmentation among firms based on their propensity to engage in environmentally sound practices (e.g., Arora and Gangopadhyay 1995). This notion of market segmentation is relevant to a rapidly developing literature analyzing the market forces that influence corporate social responsibility (e.g., Babnoli and Watts 2003; Baron 2007, 2008; Besley and Ghatak 2007). Our model differs notably from these approaches in that we incorporate a government standard that is effectively not fully enforceable; and thus, we expand the definition of self-regulation to include meeting a government regulation, even without a penalty imposed for violating that regulation. We also assume that consumers are not entirely aware of a firm’s product quality choices. Hence, we tackle the hard case of when self-regulation might ensue even when firm choices are relatively unobservable.

We therefore are also contributing to the literature that explores differences between the perceptions and reality of socially responsible management practices. On this point, several scholars have demonstrated how firms that participate in self-regulatory organizations often fail to achieve the organizations’ objectives (e.g., King and Lenox 2000; Rivera, de Leon, and Koerber 2006), and that viable sanction programs are crucial if self-regulatory trade associations hope to attract *good* performers and avoid otherwise pervasive adverse selection problems (e.g., Lenox and Nash 2003).<sup>10</sup> Similar to these studies, we seek to explain when firms will voluntarily produce *high-quality* goods, and how such behavior is influenced by government regulations, by threats of lawsuits, and by activist intervention.

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<sup>9</sup>King and Toffel (2009) provide an outstanding recent review of the various conceptions of self-regulation in the context of environmental policy.

<sup>10</sup>Short and Toffel (2008) demonstrate how firms are more likely to engage in voluntary audits of their environmental compliance efforts if they have been recently subjected to government enforcement measures.



Finally, our incorporation of the nonmarket forces of courts and activists speaks to an emerging literature on “private politics” (e.g., Baron 2001, 2003, 2011; Diermeier 2007; Werner 2012) that analyzes situations in which private interests attempt to influence collective actions by firms without relying on public modes of order, such as legislatures. Such theories, for example, have addressed how boycott threats from interest groups can influence firm production choices in the absence of government regulation (e.g., Innes 2006), as well as how consumer activists can influence firms by strategically providing information about their choices to a (relatively) uninformed market (e.g., Feddersen and Gilligan 2001).<sup>11</sup> While adding to these literatures, our work differs from previous models in several ways. First, government is prominent in our model, as we seek to identify the effects of government regulation of businesses within the context of industry self-regulation and nonmarket threats. Second, we assume that activist engagement is a costly activity, which allows us to identify how activists can influence market conditions based on their potential benefit from intervention. More broadly speaking, by accounting for the possibility of lawsuits, of watchdog groups, and of a government with limited enforcement capacity, we extend the existing literature in a way that we think more fully captures the market and nonmarket dynamics that underpin what industries thrive and which fail in the face of limited government regulations.

## The Baseline Model

Our baseline model analyzes a scenario in which a government can either set a “high” or “low” standard for product quality; and after receiving this mandate, a firm chooses whether to produce a high- or low-quality product. Because the government lacks enforcement power in our model, one might interpret the government mandate to be analogous to a guidance document that is issued by a regulatory agency, that suggests best practices but does not have the force of law, or as standards offered where the government has no jurisdiction (e.g.,

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<sup>11</sup>These topics are advanced further by Baron and Diermeier (2007) who analyze ways in which firms might undermine their potential attractiveness as targets of activist non-governmental organizations.

U.S. labor practices have no direct influence over labor policies of U.S. firms that are sourcing in Asia). The model may also apply to the broad class of settings in which the government is *limited* in its enforcement ability, in contrast to earlier works in which regulatory enforcement is assumed to be absolute.<sup>12</sup>

Assuming that consumers value high-quality products, particularly if the government has mandated a high-quality standard, a firm in our model will choose whatever quality standard maximizes its expected profit, given the government mandate. When firm production choices are known with certainty, we find that firms will always produce high-quality goods whenever producing a high-quality good is not prohibitively expensive. That said, the range of marginal costs for which a high-quality good is produced is strictly larger when the government mandates a high, rather than low, quality standard. This is because consumers value high-quality goods more when the government sets a high-quality standard, and hence, firms are willing to incur greater costs to produce high-quality goods under these circumstances. When firm choices are not publicly observable, however, we find that the firm will only produce low-quality goods, regardless of the government mandate.

### *Formalization*

Our baseline model involves a representative firm choosing a quality level ( $s_f \in \{0, 1\}$ ) after the establishment of a government standard ( $s_g \in \{0, 1\}$ ), which then accrues profits based on its quantity choice ( $q$ ) in response to market demand. We leave to future work the explicit strategic decisions of the government, focusing here instead on how low ( $s_g = 0$ ) and high ( $s_g = 1$ ) government standards influence subsequent market and nonmarket reactions. We assume that the representative firm produces its product in a market where it faces the following inverse demand function:

$$p = \alpha - \beta q \tag{1}$$

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<sup>12</sup>Our model would also be consistent with situations in which bureaucracies issue regulations but they are ill-equipped, by design (e.g., Moe 1989), to enforce them effectively.

where  $p$  is the price the firm charges for its product, and  $q$  is the quantity that the firm produces.

We assume that  $\alpha$  captures the impact of a firm's quality choice on price, both in how it relates to the government standard, and in how it is valued by society on its own merits. More formally, we assume that:

$$\alpha = \alpha(s) = d + s_{fm}(1 + s_g) \quad (2)$$

where  $d > 0$  captures the baseline price that a given firm can charge,<sup>13</sup>  $s_g \in \{0, 1\}$  is the quality standard chosen by the government, and  $s_{fm} \in [0, 1]$  is the quality standard of the firm as perceived in the marketplace.<sup>14</sup> All else equal, products that are perceived to be high quality ( $s_{fm} = 1$ ), and correspond to a high government standard ( $s_g = 1$ ) command the highest price, whereas the lowest price occurs when the marketplace perceives the firm as producing low-quality goods, regardless of the government standard. In some ways then, the government mandate serves as a recommendation or endorsement of the importance of product attributes that consumers value. Such an assumption is entirely plausible given that most consumers are not particularly well-informed about the relative virtues of different product qualities. For example, while all consumers value safe cars, it is less clear how the average consumer would value particular safety features (e.g., airbags) without some sort of authoritative endorsement that might come from the government.<sup>15</sup> Likewise, and speaking to our examples above, while consumers might place some innate value on privacy, the underlying virtues of a particular level of privacy protection might be

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<sup>13</sup>One could consider  $d$  to be the value of a firm's brand name in the marketplace, in that more well-regarded firms can charge higher prices for their goods (i.e., Klein and Leffler 1981; Shapiro 1983).

<sup>14</sup>Note that  $s_{fm}$  does not necessarily equal  $s_f$  and (by assumption) can take all values in between (and including) 0 and 1.

<sup>15</sup>While consumers place value on the government's high mandate in our model, such a mandate should not be equated with a statement of actual product quality. Such an assumption is consistent with the Supreme Court's recent ruling in *Wyeth v. Levine* (2008) where the Court held that FDA approval of a pharmaceutical did not provide the producer with safe harbor from tort litigation. That is, FDA approval of a drug should not be interpreted as stating that the drug is without fault.

unclear, absent government endorsement.<sup>16</sup>

We assume that the firm faces a constant marginal cost of production for its products,  $m$ , which is a function of the per-unit cost of production and the quality level chosen. More specifically, we assume that:

$$m = c + \eta s_f \quad (3)$$

where  $s_f \in \{0, 1\}$  is the actual quality standard chosen by the firm,  $\eta \in [0, 2]$  is the marginal cost of producing a high-quality good, and  $(d - c) > 1$ .<sup>17</sup>

Combining the above expressions, the firm's profit can be expressed as:

$$\Pi = pq - mq = (d + s_{fm}(1 + s_g) - \beta q - (c + \eta s_f))q \quad (4)$$

#### *Market Behavior with Observable and Unobservable Choices*

We begin with our analysis by establishing the baseline outcome that emerges when government standards and firm production choices are perfectly observable, meaning that  $s_{fm} = s_f$ . In such a model, if the government mandates a high-quality standard ( $s_g = 1$ ), the firm could choose either to comply ( $s_f = 1$ ) or to defy the mandate and produce low-quality goods ( $s_f = 0$ ). Hence, the profit function described above in Equation 4 corresponds to  $\Pi|_{s_g=1, s_{fm}=s_f=1} = (d + 2 - \beta q - c - \eta)q$  when  $s_f = 1$ , and  $\Pi|_{s_g=1, s_{fm}=s_f=0} = (d - \beta q - c)q$  when  $s_f = 0$ ; and the firm chooses its quantity of production to maximize these profits. Specifically, the equilibrium quantities  $q^*|_{s_g=1, s_{fm}=s_f=1} = \frac{d-c+2-\eta}{2\beta}$  and  $q^*|_{s_g=1, s_{fm}=s_f=0} = \frac{d-c}{2\beta}$  are produced when the firm chooses a high- and low-quality standard, respectively, given  $s_g = 1$ . These quantities, in turn, yield equilibrium profits of:  $\Pi^*|_{s_g=1, s_{fm}=s_f=1} = \frac{(d-c+2-\eta)^2}{4\beta} \geq \frac{(d-c)^2}{4\beta} =$

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<sup>16</sup>Of course, it would be interesting to explore the implications of a model where the government mandate did not so starkly improve the value of a product to a consumer. One natural way to investigate these questions in the context of our analysis would be to alter the specification of  $\alpha$  as follows:  $\alpha = d + s_{fm}(1 + \kappa s_g)$  where  $\kappa \in [0, 1]$ , and analyze how our results might change for values of  $\kappa \neq 1$ .

<sup>17</sup>The restrictions on  $d$ ,  $c$ , and  $\eta$  were made to ensure that it is always in the firm's interest to produce some type of good, and thus to allow us to focus on the more substantively interesting cases and results.

$\Pi^*|_{s_g=1, s_{fm}=s_f=0}$ . Hence, the firm accrues at least as high profits when producing a high-quality good when the government has mandated a high-quality standard as if it produces a low-quality good.

Alternatively, suppose the government sets a low standard for quality ( $s_g = 0$ ). Engaging in similar analysis reveals that profits from the high-quality product could be greater than, or less than, the profits from choosing a low-quality standard, depending on the marginal cost of producing high-quality goods,  $\eta$ . For  $\eta \in [0, 1)$ , the cost of producing high-quality goods is sufficiently low that firms will exceed the government standard so as to generate greater profits than if they complied with a low-quality standard. In contrast, for  $\eta > 1$ , firms will not find it in their interest to produce high-quality products and will rather meet the government's low-quality standard. Taken together, these findings motivate the following proposition.

**Observable Production Proposition** *When government and firm choices are publicly observable, firms will always meet a government mandate for high-quality goods, and will exceed a government mandate for low-quality goods if the marginal cost of production is sufficiently low.*

**Proof:** Proofs of all propositions are given in the Appendix.

Hence, for  $\eta \in [1, 2]$ , the firm chooses a quality standard that matches the government mandate. When  $\eta < 1$ , however, the marginal cost of producing high-quality goods is sufficiently low that, regardless of what standard the government chooses, high-quality goods will always be produced. In either case, firms make efficient production choices, in that they only produce those goods with the qualities that are demanded by the marketplace. The high government standard here serves to expand the marketplace, by inducing consumers to value high-quality products at a greater level, yielding a sufficiently high price to make their production profitable.

While this result is both relatively straightforward and normatively attractive, in that we can point to how firms will sometimes voluntarily exceed government mandates ensuring the

production of high-quality goods, it relies on perfect information about the firm’s choices. In reality, there are many products for which quality standards cannot be easily deduced, even after they have been purchased or consumed. For example, if one equates the quality levels modeled here with labor or product sourcing practices, it is unlikely that the average consumer can ascertain whether certain coffee beans are truly “fair trade,” or certain athletic shoes were produced without relying on child labor. Given this inherent unobservability, it is worthwhile to explore how firms might produce their products if their choices were unknown.

To analyze this scenario, we consider the same model as above, but now suppose the firm’s quality decision is unobservable. As before, the government publicly announces a standard  $s_g \in \{0, 1\}$ , yet now the firm chooses a quality level ( $s_f \in \{0, 1\}$ ), which is unknown to the market. Rather than  $s_{fm} = s_f$ , we now assume that consumers have an expectation about product quality, parameterized as  $s_c \in [0, 1]$ , which they maintain in the absence of further information. For the purposes of our baseline analysis, we assume that no further information is received by consumers, and as a result, the market reacts as if  $s_{fm} = s_c$ . Consumers do not, for example, glean knowledge about quality from the firm’s quantity choice, nor do they believe that all firms lie to them. Hence, we are setting aside some market-undermining behaviors (i.e., Akerlof 1970) in that we are explicitly assuming that consumers are not fully rational; but we believe that a fairly unsophisticated, or naive, public is plausible for most market transactions, given the baseline level of knowledge that most consumers possess about manufacturing and sourcing practices.<sup>18</sup> An alternative interpretation of this assumption is that consumers are rational and could become informed, but the costs of doing so are prohibitively high.

Given this formalization, if the government sets a high standard ( $s_g = 1$ ) and the firm

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<sup>18</sup>Spence (1977) and Polinsky and Rogerson (1983) also provide examples of models wherein consumers are not fully rational.

chooses  $s_f = 1$ , then the firm's profit is defined by:

$$\Pi|_{s_g=1, s_f=1} = (d + 2s_c - \beta q - c - \eta)q \quad (5)$$

In the market stage, the firm chooses its quantity to maximize profits, which yields  $q^*|_{s_g=1, s_f=1} = \frac{d-c+2s_c-\eta}{2\beta}$  and profit equal to  $\frac{(d-c+2s_c-\eta)^2}{4\beta}$ .<sup>19</sup> In contrast, if the firm chooses  $s_f = 0$ , then  $\Pi^*|_{s_g=1, s_f=0} = \frac{(d-c+2s_c)^2}{4\beta}$ , which clearly exceeds the profit that follows from producing a high-quality good. Similar analysis reveals that if the government were to set a low-quality standard initially ( $s_g = 0$ ), then the firm would have a strict incentive to produce low-quality goods ( $s_f = 0$ ). In other words, when the production processes of the firm are not observable, the firm will always choose a low-quality standard, regardless of the government mandate. This analysis motivates the following proposition.<sup>20</sup>

**Unobservable Production Proposition** *When firm choices are not observable, firms never voluntarily exceed government mandates, and only meet government mandates when the government advocates a low-quality standard.*

Taken together, the above propositions suggest that firms will effectively *never* produce high-quality products unless their choices are observable. Building on these results, we analyze how different *nonmarket* actors might facilitate observability (or partial observability) of firms' choices, that could induce self-regulation. One could focus on a variety of potential nonmarket influences—ranging from consumer boycotts, to lawsuits, to public demonstrations intended to influence shareholder and consumer sentiment, and so forth. In the extensions that follow, we focus on two particular nonmarket reactions: the possibility of lawsuits and

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<sup>19</sup>Here, and throughout the paper, we make the implicit assumption that firms will not enter the market if they cannot obtain weakly positive profits. (Moreover, we assume that firms cannot produce negative quantities.) As such, we make the necessary assumptions regarding the relative values of  $s_c$  and  $\eta$  to allow such conditions to be obtained.

<sup>20</sup>This finding is consistent with several other models that analyze production choices under incomplete information, and most notably Feddersen and Gilligan's Proposition 3 (2001, p. 158), in their model of information-providing activists.

the role of information-providing activists.

## Lawsuits and Regulation

In many situations, a firm's quality choice directly affects the benefits that consumers experience. In other cases, the effects of such choices are revealed with less certainty. For example, by opting to produce a low-quality good, firms might implicitly be choosing to manufacture a relatively unsafe product with a higher probability of consumer harm than if a high-quality standard were chosen. In the event of a product-induced calamity (e.g., deaths from unsafe cribs, adverse reactions to pharmaceuticals, fires from poorly designed space heaters), a firm might be sued by private parties for the damages caused by its product. The potential to be a defendant in such lawsuits should influence the firm's initial product design decision, particularly if the likelihood of a disaster is affected by the firm's quality choice.

To capture such a possibility, we extend our baseline model to account for lawsuits that may be brought as a consequence of product quality choices. We assume that, after firms make their product choices as described in the above game with unobservable production, a product-induced disaster occurs with a certain probability, which is influenced by whether the firm initially chose a high-quality standard. In the event of a disaster, a lawsuit ensues wherein the firm's quality choice is revealed (presumably through the discovery and testimony process), which influences the future profits that accrue to the firm in a second period. Furthermore, a firm held liable for a disaster is subject to a court mandated penalty. Alternatively, if a disaster does *not* occur, the firm simply experiences another period of profits identical to those it obtained after the first period of market activity. In either case, the firm's second-period profits are assumed to be subject to discounting.<sup>21</sup>

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<sup>21</sup>In many ways, our model of lawsuits and self-regulation is related to a wide body of law and economics



Consistent with the intuition above, we find that in equilibrium the firm will have a strong incentive to produce low-quality goods because consumers will be unaware of the firm's actual production choices in the first period.<sup>22</sup> Under certain conditions, however, the potential of a lawsuit can induce a firm to meet or exceed government mandates and produce high-quality goods. This is true when the size of the judicial penalty is large, when the firm cares significantly about the future, and when the probability of a disaster is large absent high-quality production (particularly when consumers expect that the firm will produce high-quality goods).

The firm's decision to produce high-quality products depends crucially on the government standard, despite its lack of direct enforcement. Put simply, when low-quality products exhibit a high probability of disaster, government standard setting can induce a firm to produce high-quality goods, even by those firms that have little incentive to produce high-quality goods absent the high government standard. Similar to our baseline analysis, this result follows because consumers value the standard setting role of the government, and thus reward firms that are subsequently revealed to have met the government's standard, while punishing those who have not.

Formally, as presented in Figure 1, we now assume that after the firm has made its quality choice  $s_f$ , the market ensues, subject to the specifications described in the baseline model. We assume that, after the first period of market behavior, a disaster occurs ( $D = 1$ ) with probability  $\rho > 0$ , and with probability  $1 - \rho$  no disaster occurs ( $D = 0$ ). For the purposes of analysis, we assume that  $\rho = \rho_0 - \rho_1 s_f$ , where  $0 \leq \rho_1 \leq \rho_0 \leq 1$ . Hence, if the firm chooses

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scholarship (e.g., Daughety and Reinganum 1995, 2005; Diamond 1974; Glaeser and Shleifer 2003; Polinsky and Rogerson 1983; Polinsky and Rubinfeld 1988; Simon 1981) that studies the impact of liability standards and legal regimes on safety provision. While ours is not the first model of these phenomenon, one attractive feature of our approach is that it facilitates comparisons between the relative impacts of judicial institutions and potential activist interventions on firms' product selection (in comparison to a baseline, where neither of these institutions exist).

<sup>22</sup>We assume the firm can only make a production choice once—namely, in the first period.

$s_f = 0$ , the probability of disaster equals a baseline probability of an adverse event,  $\rho_0$ ; and high-quality products ( $s_f = 1$ ) reduce this probability by  $\rho_1$ .

[Insert Figure 1 about here]

If no disaster ensues, another iteration of market activity occurs (with the firm setting its quantity and consumers buying products as per the demand function). The firm experiences profits as derived above, which are subject to some discount factor  $0 \leq \delta \leq 1$ . If a disaster does occur, we assume that a trial takes place, wherein the firm's quality choice is revealed with certainty, a fixed judgment is handed down, and another iteration of the market ensues.<sup>23</sup> Following a trial, firm profits in the second period are a function of the information that has been revealed about its quality choice ( $s_{fm} = s_f$ ), its new quantity choice in light of this revelation, and the scope of the judgment, discounted by  $\delta$ . More formally, discounted second-period profits in the case of an incident are defined as:

$$\Pi(Period2)|_{D=1} = \delta[(d + s_f(1 + s_g) - \beta q - (c + \eta s_f))q - J] \quad (6)$$

where  $J \geq 0$  is the penalty that is handed down by the court as the result of its judgment. Hence, we are implicitly assuming that a firm is subject to strict liability in the case of a disaster, such that it will have to pay some penalty,  $J$ , if its product were involved in the disaster, regardless of the product's quality.<sup>24</sup>

As in the baseline model, regardless of the government's mandate, firms face a choice of whether to produce high- or low-quality products, but the possibility of a lawsuit affects this choice in two ways. First, the product quality choice affects the likelihood of a disaster,

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<sup>23</sup>The court here acts automatically, rather than playing a more strategic role.

<sup>24</sup>A natural extension to this model would be to assume that the size of the judicial penalty is correlated with whether the firm had complied with the government mandate. Preliminary analysis suggests that such an extension would change the size of the equilibrium judicial penalty (described below) while retaining many of the properties of the results from the current (more simple) model.

leading to an adverse judgment; and second, given the lawsuit, a firm's true product quality is revealed to the market. Hence, firms base their quality decisions on the relative value of their first-period profits (when the market clears based on consumers' expectations about product quality,  $s_c$ ) in comparison to their expected second-period profits given that the market may become fully-informed.

The model therefore features both the incentives to produce low-quality goods in light of consumer ignorance evident in the Unobservable Production Proposition and the incentives for high quality under certain circumstances as in the Observable Production Proposition. Solving for the firm choices involves expected utility calculations for each of the four possibilities: (a)  $s_g = 1, s_f = 1$ ; (b)  $s_g = 1, s_f = 0$ ; (c)  $s_g = 0, s_f = 1$ ; and (d)  $s_g = 0, s_f = 0$ . In comparing across these different cases, the interesting question to consider is under what conditions might the possibility of a lawsuit induce a firm to meet, and possibly, exceed a government standard, which would not occur in the absence of potential litigation? More specifically, what are the conditions that would induce a firm to produce high-quality goods with or without a government mandate? In comparing the firm's expected utilities across these cases, one sees that these conditions can be expressed in terms of a variety of parameters in the model. For our purposes, it is most straightforward to express these conditions in terms of the cutpoint  $J^*$ , above which the firm produces high-quality goods, in order to reduce the probability of having to pay such a large negative judgment. The exact cutpoints  $J^*|_{s_g=0}$  and  $J^*|_{s_g=1}$  are given in the Appendix, and are analyzed using comparative statics techniques, yielding the following proposition.

**Lawsuit Threat Proposition** *For both high and low government mandates for industry quality, there exists some crucial judicial penalty,  $J^*$  such that for  $J \geq J^*$ , firms will produce high-quality goods, whereas for  $J < J^*$ , firms will produce low-quality products.  $J^*$  is decreasing in  $\rho_0$  when  $s_g = 1$ , and when  $s_g = 0$  for sufficiently large  $s_c$ . Moreover, regardless of the government mandate,  $J^*$  is:*

- a) decreasing in  $\delta$ ,*
- b) increasing in  $\rho_1$  and  $\eta$  iff  $\rho_0$  is sufficiently large, and*

*c) decreasing in  $d$  and  $s_c$  iff  $\rho_0$  is sufficiently large.*

To understand the conditional nature of some key aspects of this proposition, it is helpful to contrast the model presented here with other models in which bad behavior can be detected and punished. In a typical model of probabilistic punishment, to induce good behavior the punishment has to be substantial, and increasingly substantial for lower probabilities of detection. The present model, however, is complicated by several features: first, a disaster can occur (albeit with a lower probability) even if the firm produces a high-quality good; second, in addition to the punishment ( $J$ ), the judicial process reveals the firm's type; thus, third, a disaster's impact on profits may vary substantially between a firm producing a low-quality good and one producing a high-quality good. The effect of these differences is two-fold. First, as in the typical model, focusing on firms that would generally like to get away with low-quality good production, a higher value of  $J$  is needed to induce good behavior. However, second, for firms that would be inclined to produce a high-quality good based on the revelatory nature of the judicial activity alone, a higher judicial penalty is less necessary to persuade the firm to behave well. In essence, for this part of the parameter space, a low judicial penalty allows the revelatory mechanism to do most of the work of sorting firms into those with good and bad behavior.

Given the above differences between the current model and the typical model of probabilistic punishment, the results of the Lawsuit Threat Proposition become more intuitive. Consistent with the typical model, for all values of our parameters of interest, the firm will choose to produce high-quality goods when the judgment following a disaster is sufficiently large (greater than  $J^*$ ). Comparative statics over this  $J^*$  cutpoint, as presented in the proposition thus characterize when the range of high-quality good production increases (when  $J^*$  decreases) or when it decreases (for larger values of  $J^*$ ). Interpreting the proposition, then, if the government mandates a high standard, firms are more likely to meet the mandate and

produce high-quality goods when the probability of a disaster occurring with a low-quality good is high ( $\rho_0$  large). If the government mandates a low standard, however, this same relationship only holds so long as the market perception of the firm's product quality is sufficiently high.

This result matches intuition in that if the government mandates a high standard, the firm has a relatively strong incentive to produce high-quality goods given the market premium that follows from the government mandate. This incentive is enhanced in markets where low-quality goods are likely disastrous. High-quality production not only limits the likelihood of disaster but also allows for substantial second-period profits were a disaster to still occur. When  $s_g = 0$ , however, this relationship only holds when  $s_c$  is high enough such that the firm's first-period profits from producing high-quality goods make up for the higher costs of producing high-quality goods. The relationship is reversed for low  $s_c$  because of the wrinkle in our model noted above: when  $s_c$  is low, high-quality firms become substantially rewarded through the judicial revelatory mechanism in a way that would be undermined by a high judicial penalty  $J$ .

The proposition also states that, regardless of the government mandate, when firms have a larger stake in the future ( $\delta$  high) they will be more likely to produce high-quality goods. This result is sensible in that a fly-by-night firm that does not expect to be around for the fallout from its product failures will be more likely to produce low-quality goods, whereas those with long-term views will be more likely to produce the high-quality goods that avoid disaster and potentially costly lawsuits.

The effects of the other main parameters of the model depend on the baseline probability of disaster, which influences whether the model's logic follows the traditional pattern or whether it is also dependent on the more subtle aspects of revelation and punishment included here. When a disaster is relatively unlikely ( $\rho_0$  low) it is difficult to induce a firm with an already valuable brand name ( $d$  large) or one that benefits from favorable consumer

perceptions ( $s_c$  large) to produce high-quality goods without a large judicial penalty. These firms capitalize on their reputations to gain substantial first-period profits, hoping to avoid detection.<sup>25</sup> In contrast, when the baseline probability of disaster is relatively high, judicial action is likely and the revelatory nature of the lawsuit does most of the work of inducing good behavior on the part of firms. Here, a lower judicial penalty allows the differential effect on firms producing high- versus low-quality goods to be as substantial as possible. A similar logic underlies the results regarding the reduction in the probability of disaster upon producing high-quality goods ( $\rho_1$ ) and the marginal costs of high-quality goods ( $\eta$ ).

Besides identifying whether or not firms can be induced to meet or exceed government standards for low- or high-quality goods, a more central question to our inquiry is how this self-regulation-inducing judgment varies as a result of the government's mandate. In other words, for example, are there conditions under which the high government standard, despite lack of enforcement, induces high-quality good production, which would not have occurred absent the government regulation? And, if so, what do those conditions look like? To isolate such conditions, we compare the equilibrium cutpoint for a low government standard ( $J^*|_{s_g=0}$ ) to that for a high standard ( $J^*|_{s_g=1}$ ). The results are given in the Appendix and are characterized in the following proposition.

**Regulatory-Judicial Complements Proposition** *When the baseline probability of disaster ( $\rho_0$ ) is sufficiently large, high-quality good production can be sustained with a lower judicial fine when the government has chosen a high quality mandate than when the government has chosen a low quality mandate. The opposite is true when the probability of disaster is low.*

The intuition behind this proposition is aided by consideration of Figure 2. Crucial to understanding this finding is seeing the difficult choice that a high government standard presents to the firm. On the one hand, the firm knows that it can command a higher price

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<sup>25</sup>Such a description may be reminiscent of the actions of banks that were considered “too big to fail” during the housing and financial crises of 2008.

for producing high-quality goods, because they are more valued by consumers due to the government mandate. As noted above, however, this premium will only be realized if a disaster occurs and the firm's production choice is revealed through the discovery process—and investing in high-quality goods makes such a disaster less likely to occur.

[Insert Figure 2 about here]

In light of such considerations, the leftmost and rightmost sections of the figure are as expected. For a sufficiently low judgment, a firm has no incentive to produce high-quality goods; and for a sufficiently high judgment, the firm works to avoid the judgment by producing a high-quality good, which minimizes the likelihood of disaster. The other two regions, however, exhibit an interesting combination of the incentives that exist in more traditional models of probabilistic punishment and in our model with a revelatory role of the judicial process. More specifically, in the upper-middle portion of the figure, the firm produces a product quality exactly in line with government standards, such that if the government sets a low standard, the firm produces a low-quality good; and if the government sets a high standard, the firm responds in kind. A higher judgment is essential to induce the firm to exceed the government mandate when government sets a low standard because the revelation of low-quality good production harms the firm less if a disaster occurs than in the case when government mandates a high-quality standard (given the market premium consumers attach to a high-quality mandate).

In the lower-middle portion of the figure, however, the firm is induced to do the *opposite* of what the government advises. In other words, when the chance of disaster is relatively low and judgment sizes are moderate, the firm produces a low-quality product when the government standard is high, and a high-quality product when the government standard is low. The logic here is consistent with that of conventional punishment models. With a low probability of disaster, the firm is tempted to produce the low-quality good, in hopes of

never being detected. This temptation is greater given the higher prices available under the high government standard. Thus the punishing judgment must be even greater to induce high-quality good production given such a higher government standard.

## Activists and Regulation

Having identified how the possibility of lawsuits might induce self-regulation in conjunction with governmental regulation, we now consider how similar outcomes could possibly be obtained even absent any type of governmental forum, such as a judicial arena. To address this possibility, we return to our baseline model and assume that after the firm brings its product to market, a concerned activist can choose to exert a level of effort to engage in investigatory activities that can influence the public's perception of the firm's choices. We assume that the more effort the activist exerts the more likely she is to accurately inform the public about the firm's production choices, with the goal of inducing the market to reward high-quality firms and to punish those with low-quality goods.

This extension regarding activist behavior is relevant to many private sector activities. For example, a firm's quality choices might have little impact on whether a product-related disaster occurs, yet they could be of clear interest to consumers and to private activists (e.g., Environmental Defense Fund, Fair Trade Federation, Rainforest Action Network) who hold certain goals. Choosing to source from non-fair-trade coffee providers will likely not result in some cataclysmic coffee incident, but the decision to source from certain providers is clearly salient to labor and human rights activists who might seek to influence dominant market practices.<sup>26</sup> As such, these interested parties have an incentive to invest effort in uncovering the true nature of the production processes undertaken by firms, and to try to reveal this

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<sup>26</sup>Recent work by Hainmueller et al. (2011), Hiscox et al. (2011), and Hiscox and Smyth (forthcoming) provides empirical evidence to suggest that consumers will, indeed, pay a premium to purchase good from firms that they believe are engaging in socially responsible sourcing practices.



information to the marketplace for the purposes of rewarding firms with good practices and punishing others.

Consistent with our earlier results, we find that a firm has a strong incentive to produce low-quality goods given that its first-period (and possibly second-period) profits are based on its unobservable quality choices. Despite this incentive, a firm will produce high-quality goods depending on how important consumer perceptions are to the activist. When the truthful revelation of the firm's choice is very important, the activist (unsurprisingly) will exert significant effort to inform the public. As a result, the firm will choose to produce a high-quality product in the first period. When the potential rewards from correctly informing the public are small, however, the activist will not exert sufficient effort to reveal the firm's true production choice to the public; and hence, the firm will always choose to produce low-quality products. Finally, when the activist's potential rewards are moderate, we find that a firm will sometimes produce a high-quality good and sometimes produce a low-quality good, and the activist will exert just enough effort to ensure that the firm is indifferent between these options. Hence, our results identify how self-regulation can be obtained as the result of private politics, and how the possibility for viable self-regulation depends on the nature of the interest group environment. Moreover, we find complementarities between the interest group and government regulatory environments, in that activists are able to encourage high-quality firm choices with a lower level of effort when the government mandates a high, rather than low, standard.

We formalize the actions of such an activist in our analytical framework by building upon our baseline model in the following way. As illustrated in Figure 3, following the first-period market behavior, an activist ( $A$ ) chooses a level of effort ( $e$ ) with which to investigate and report the firm's quality choice, which can influence the firm's second-period profits. We assume that more effort produces more credible evidence, turning consumers away from their naive expectations about the firm's product quality,  $s_c$ , and toward a belief based on

the activist's evidence. Moreover, higher activist effort is also more likely to reveal the true product quality.

[Insert Figure 3 about here]

Many functional forms are consistent with these assumptions. For simplicity, we assume that the following is true of consumers' second-period beliefs. With probability  $\frac{1}{e}$  consumers' beliefs don't deviate from their prior expectations ( $s_{fm} = s_c$ ); with probability  $\frac{1}{2e}$  the market believes what the activist reports, yet the activist is wrong (i.e.,  $s_{fm} = 1 - s_f$ ); and with the remaining probability ( $\frac{2e-3}{2e}$ ) the market believes what the activist reports, and the activist is correct (i.e.,  $s_{fm} = s_f$ ). We also assume  $e \geq 2$ ; at this lowest effort level, with probability  $\frac{1}{2}$  consumer beliefs are static across the two periods, with probability  $\frac{1}{4}$  the activist is believed but wrong, and  $\frac{1}{4}$  of the time the activist is believed and correct.

Regarding the activist's utility, we assume that the activist values rewarding high-quality firms and punishing low-quality firms.<sup>27</sup> Although the activist does not have the resources to punish and reward firms directly, the information revealed to consumers serves this role quite well.<sup>28</sup> However, it is costly to exert the effort needed to influence the market in this way, and we assume that the activist's utility can be represented by the following form:

$$U_A = -Z|s_{fm} - s_f| - e \tag{7}$$

In other words, the activist is happiest when the market learns the firm's actual quality choice after the first period, and is increasingly unhappy by a factor of  $Z > 0$  the further the market's perception of the firm's choice deviates from reality. One might interpret  $Z$  as the

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<sup>27</sup>Their motives for doing so may vary in reality. Expanding the market share of firms with similar values to their own may be sufficient; but uncovering egregious practices also may help with the fund-raising needed to continue their activities into the future, for example.

<sup>28</sup>A model of activist-led boycotts could be advanced in a similar manner to what we offer here.

salience that an activist attaches to truthfully informing the market about a firm's production practices. We assume that the activist is fully informed and rational. Specifically, the activist is fully informed about the firm's profit function, and hence understands the incentives that the firm faces in choosing a level of quality, and bringing a product to market. As such, the activist's choice of effort maximizes her expected utility by affecting the information uncovered and revealed to the marketplace, and possibly by influencing the firm's *ex ante* product-quality standards. For the purposes of our analysis below, we confine our attention to those cases where  $s_c \geq 0.5$ .<sup>29</sup>

The first step in deriving the equilibrium involves finding the optimal level of effort for each possible case of the firm's quality choice and the government's standards. First, if the firm chooses to produce high-quality goods ( $s_f = 1$ ), the activist wishes, in equilibrium, to exert effort equal to  $e^*|_{s_f=1} = \frac{\sqrt{2}\sqrt{Z(3-2s_c)}}{2}$ . Note that this effort level is nonzero because the public's perception of the firm's choice in the second period will be determined by  $s_c$  unless the activist sinks some minimal level of effort into investigating and publicizing the firm's true production choices. Matching this intuition,  $e^*|_{s_f=1}$  is decreasing in  $s_c$ . In other words, the more predisposed consumers are towards believing that the firm produces high-quality goods, the less effort the activist is willing to exert, in equilibrium, to convince consumers that their perceptions are accurate. In essence, the activist's role here is to offer a seal of approval, which is less necessary the closer consumer perceptions are to a firm's actual choice. This case holds for sufficiently large  $Z$  (for  $Z \geq Z_H^*$ ). For lower levels of  $Z$ , however, the activist's low effort level is insufficient to induce the firm to choose to produce a high-quality product.

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<sup>29</sup>When  $s_c < 0.5$  we find that the results of the model are quite similar to what we present here, the exception being for intermediate values of  $Z$ , where analysis reveals that there are multiple pure strategy equilibria—one involving the firm producing high-quality goods, and the other involving the firm producing low-quality goods. Moreover, as considered in footnote 15, confining our attention to cases wherein  $s_c \geq 0.5$  ensures that we are focusing on those cases in which the firm is guaranteed to secure weakly positive profits by entering the market.

In the case where the firm chooses to produce low-quality goods, the activist has an incentive to exert sufficient effort to produce convincing evidence that the firm has chosen  $s_f = 0$ . That equilibrium value is  $e^*|_{s_f=0} = \frac{\sqrt{2}\sqrt{Z(1+2s_c)}}{2}$ . While higher than  $e^*|_{s_f=1}$  (for  $s_c > 0.5$ ), this effort level is insufficient to bring about a high-quality choice by the firm. This is because this situation only arises (in equilibrium) for low values of  $Z$  (for  $Z \leq Z_L^*$ ). Note that unlike  $e^*|_{s_f=1}$ ,  $e^*|_{s_f=0}$  is *increasing* in  $s_c$ . In other words, an activist is more willing to exert effort to influence market perceptions when the firm has chosen to produce low-quality goods, while consumers are wrongly predisposed to believe that the firm has chosen a high-quality standard. That said, in this region the activist does not have a strong enough incentive to dedicate sufficient effort to alter the firm's quality choice, and the best that the activist can hope for is to expose the firm's choice to the market, which will influence its second-period quantity and profits.

[Insert Figure 4 about here]

In between  $Z_L^*$  and  $Z_H^*$ , as shown in Figure 4, the equilibrium involves mixed strategies, as is common in this sort of monitoring game. If the firm adopts a high standard, the activist wants to exert a low level of effort. But a low effort level gives the firm the incentive to actually select a low quality. This, in turn, induces a high level of activist effort, bringing about a high-quality product choice by the firm. And so on, without an equilibrium in pure strategies. In the mixed strategy equilibrium, the activist chooses a level of effort  $e_{mix}^*$  (as defined in the Appendix), which makes the firm indifferent between producing a low- or high-quality product. The firm adopts a high standard with probability  $x^*$ , such that  $e_{mix}^*$  is the activist's optimal level of effort; and the probability  $x^*$  increases monotonically in  $Z$  from  $Z_L^*$  to  $Z_H^*$ .

**Activist Monitoring Proposition** *The equilibrium to the activist nonmarket reaction game involves a partition of the activist salience space into three intervals defined by two*

cutpoints,  $Z_L^*$  and  $Z_H^*$ , such that:

- a) for  $Z \leq Z_L^*$ , the firm produces low-quality goods ( $s_f = 0$ ), and the activist exerts effort level  $e^*|_{s_f=0} = \frac{\sqrt{2}\sqrt{Z(1+2s_c)}}{2}$ ;
- b) for  $Z \geq Z_H^*$ , the firm produces high-quality goods ( $s_f = 1$ ) and the activist exerts effort level  $e^*|_{s_f=1} = \frac{\sqrt{2}\sqrt{Z(3-2s_c)}}{2}$ ; and
- c) for  $Z \in (Z_L^*, Z_H^*)$ , the firm produces high-quality goods with probability  $x^*$  and produces low-quality goods with probability  $1 - x^*$ , and the activist exerts effort level  $e_{mix}^*$ .

Note that because the activists value truthful revelation of firm quality, rather than whether or not the firm meets or exceeds the government standard, the equilibrium effort levels  $e^*|_{s_f=1}$  and  $e^*|_{s_f=0}$  do not depend on the government mandate. Nevertheless, as in the baseline case and the courts extension, the government standard may influence the firm's behavior when there is some probability of detection. Specifically, the cutpoints  $Z_L^*$  and  $Z_H^*$  differ depending on the government mandate.<sup>30</sup> And, in the mixed strategy part of the equilibrium,  $e_{mix}^*$  also differs across these two cases. The following proposition notes the relative value of  $e_{mix}^*$  between the high and low government standard cases.

**Regulatory-Activist Complements Proposition** *The level of effort that induces a firm to randomize between producing high- and low-quality goods,  $e_{mix}^*$ , is strictly lower when the government selects a high quality standard ( $s_g = 1$ ) than when the government selects a low quality standard ( $s_g = 0$ ).*

This proposition states that an activist is able to induce the firm's mixing behavior with a lower level of effort given a high government standard. Although the activist has no specific interest in the government standard, this finding shows the government and activist as serving complementary roles. The intuition behind this finding is that (similar to the judicial extension) the market value of producing high-quality goods is greater if the government has set a high standard than if the government has set a low standard. Hence, the revelation of not meeting the high standard is thus more costly to profits than revelation

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<sup>30</sup>The order of these cutpoints between the cases of high and low government mandates depends on values taken by key model parameters.

of only meeting (and not exceeding) the government's low standard. As such, the activist is able to make the firm indifferent between producing a high-quality product and producing a low-quality product with less effort when the government sets a high standard.

In addition to the ordering of these optimal effort levels across cases of high and low government standards, comparative statics over this level of effort differ somewhat depending on the government mandate, as characterized in the following proposition.

**Susceptibility to Activism Proposition** *The crucial level of effort that induces the firm to randomize between a high and a low-quality choice,  $e_{mix}^*$ , decreases as the future ( $\delta$ ) becomes more valuable to the firm. Moreover, when the government sets a high standard ( $s_g = 1$ ),  $e_{mix}^*$  is decreasing in the value of the firm's brand name ( $d$ ), and increasing in the value of the consumer's naive expectation of a firm's quality choice ( $s_c$ ). When the government sets a low standard ( $s_g = 0$ ),  $e_{mix}^*$  is decreasing in  $d$  and increasing in  $s_c$  iff  $\eta$  is sufficiently low.*

In other words, the greater the firm values the future, the more it is concerned about its low quality level being uncovered by the activist. Therefore, with even a modest level of effort, the activist can make the firm indifferent between a high- and a low-quality choice. Our result also suggests that firms with valuable brand names are particularly hurt by activist revelations of low-quality products, and therefore are induced to produce high-quality goods even with a lower level of activist effort. This relationship holds generally when government mandates a high quality standard; but it only holds when high-quality goods are relatively cheap to produce in the case of a low government mandate. Put simply, firms with more valuable brand names are more susceptible to activism than are firms with less valuable brand names, and are thus induced to produce higher quality goods with lower activist efforts. The exception to this regularity is when the benefits of producing the high-quality good are low ( $s_g = 0$ ) and costs ( $\eta$ ) are high. Here, firms with more valuable brand names see their greatest profit opportunity arising from the difference in perception ( $s_c > 0$ ) and reality ( $s_f = 0$ ) in the first period, and must therefore be disciplined by a high level of activist effort to produce the high-quality good. Finally, firms that benefit from favorable consumer

expectations regarding their product quality require greater levels of activist effort to produce high-quality goods, because as  $s_c$  increases, the firm is more tempted to exploit consumers' naivete regarding their quality choice. This relationship always holds when government chooses a high standard, but is again conditional on costs of production when the government chooses a low standard.

## **Implications for Electronic Commerce and Financial Services**

Why was self-regulation ostensibly successful in Internet privacy, but arguably disastrous in managing financial markets and mortgage-lending institutions? Our theory, the results of which are summarized in Table 1, provides insight into this question. In particular, the model's extensions show the conditions under which firms produce high quality goods in the presence or absence of high government regulatory standards.

[Insert Table 1 about here]

Regarding Internet privacy, while advocates of self-regulation favored the Clinton Administration's decision not to impose federal privacy regulations on electronic commerce, it is worth noting that the decision was made without a clear articulation of what institutions (if any) could effectively ensure that firms made desirable choices, absent government oversight and enforcement activity. Similar to the actors in our model, government was deciding between setting a high or low standard for Internet privacy protections, and firms were making unobservable production choices. While the Observable Production Proposition suggests that if these choices were perfectly observable, all firms would choose the socially appropriate level of privacy protections, the Unobservable Production Proposition points to the clear incentives that firms had to engage only in low-quality information management practices, which was the precise concern that was voiced by a majority of the FTC.

Despite this potential for pervasively bad online privacy protections, the Lawsuit Threat Proposition suggests that online firms would likely provide appropriate privacy protections if the potential judicial penalties following from misuse of consumers' information were sufficiently high. Consistent with this argument, Commissioner Swindle argued that existing consumer protection and anti-fraud laws would be sufficient to induce self-regulation, as consumers could file complaints against firms if incidents occurred as a result of misuse of their personally identifiable information (analogous to a product-induced disaster in the context of our model). On a more nuanced level, however, the Lawsuit Threat Proposition also implies that the potential judicial penalty necessary to induce self regulation would likely have to be higher for firms with more well-established brand names (i.e., higher  $d$ ) if the baseline probability of disaster was relatively low. As such, one would expect that if consumer complaints emerged, they would likely involve the more prominent firms in the industry (given that the latent judicial penalty,  $J^*$ , was likely sufficient to induce compliance among lower-profile firms). Consistent with this argument, history demonstrates that much of the earliest litigation regarding consumer online privacy did, indeed, involve the more prominent online firms, such as Microsoft, RealNetworks, and eBay.<sup>31</sup>

While disciplining high-profile firms via the judiciary might seem relatively difficult, the Susceptibility to Activism Proposition suggests how activists could possibly succeed where litigation fails. In the absence of explicit government regulation for online privacy, the level of effort that induces a firm to mix between providing high- and low-quality goods decreases in the value of the firm's brand name (assuming high-quality goods are not prohibitively costly to produce). As such, our results suggest that activists should be more easily able to induce high-profile firms to voluntarily adopt high-quality privacy protections than they

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<sup>31</sup>While the targeting of high-profile firms is consistent with other theories of judicial politics (e.g., to send a signal to the industry regarding tolerance for various practices), it clearly comports with our model as well, and is worthy of more systematic exploration.



could for low-profile firms. Consistent with this intuition, history demonstrates that over the past ten years, the major industry players (e.g., Microsoft, Amazon, eBay, etc.) have been very quick to respond to the concerns of privacy advocacy groups such as the Electronic Privacy Information Center (EPIC) and the Center for Democracy and Technology (CDT), to ensure that they are not branded as irresponsible players in the e-commerce marketplace.

Compared to the successful self-regulation in internet privacy, our results paint a much bleaker picture regarding regulation of financial services. In this area, there was effectively no existing legal backstop that could allow private interests to take investment and lending institutions to court for unfavorable outcomes. While fraud is (and was) clearly illegal, and a component of the market was being influenced by fraudulent activities, most of what was occurring in the packaging, valuing, and selling shares of unstable debt was completely legal. Simply put, profit-seeking institutions found themselves responding to short-term incentives completely within the confines of existing law. In the context of our model then,  $J$  was effectively zero (or possibly negative, if one interprets the government's eventual asset-relief payments to be the judgment that was rendered). Hence, this lack of an existing legal framework (and potential judicial penalty), made it unlikely that firms would produce high-quality goods and services out of fear of subsequent litigation.

Turning to our activist extension, we see that here, too, our model offers a grim picture. Unlike the internet privacy case, for which a wide range of vibrant interest groups existed, the interest group environment surrounding financial services is notably less dense. In terms of the model, it be reasonable to argue that the activist reward space in the case of financial services could be characterized by a low  $Z$  – that is, there was relatively little incentive for activists to reveal the true state of the world to the average consumer (particularly given that practically all interested parties were benefiting from market opacity). As such, it might be unsurprising that activists exerted relatively little effort to learn the true state of many of these assets, which corresponded to firms creating risky (i.e., low-quality) investment

instruments.

Finally, it is important to note that this situation would not have been improved by the government issuing a high (but unenforceable) standard for the financial services industry. As per the Unobservable Production Proposition above, doing so (setting  $s_g = 1$ ) would have merely expanded the market and allowed firms to charge higher prices (by alerting consumers to the importance and plausibility of high-quality products in this industry), without affecting the actual quality of the services that firms were offering. Without a robust nonmarket environment, or a direct means of government enforcement of the high standard, therefore, government pronouncements are ineffectual and potentially counter-productive.

## Conclusion and Future Directions

One of government's most significant roles in society is to establish and enforce rules that influence how firms and individual consumers conduct their interactions. If given perfect information and total control, a social welfare maximizing government would presumably establish industry rules that ensured that the products and services being brought to the marketplace were endowed with a socially optimal level of quality. When government is not all-knowing or all-powerful, questions arise regarding how socially beneficial goods and services can emerge in a marketplace where firms have a clear incentive to produce low-quality goods and foist them on an ignorant public.

We address these questions by analyzing conditions under which various nonmarket institutions induce firms to meet (or exceed) government mandates, even in the absence of strict government enforcement. When the potential judicial penalty that follows from a product-induced disaster is sufficiently high, or when activists have sufficient incentives to investigate and publicize company practices, firms either will voluntarily establish a higher standard than the government mandate, or alternatively will comply with a government

mandate for high-quality goods. As such, we have demonstrated how nonmarket institutions can facilitate industry self-regulation when government regulation is either lacking or toothless. Moreover, for industries over which the government is able to enforce its mandates more so than is modeled here, our results also provide guidance towards understanding the conditions under which government might seek to impose and enforce industry standards, rather than effectively outsourcing regulation to the private marketplace.

Building on this theoretical foundation, there are several extensions to this project that would enhance our understanding of the relationships among governments, firms, and non-market institutions in facilitating meaningful business regulation. First, and most notable, one might model the government as a strategic actor with its own preferences. Having explored what will occur if government establishes high industry standards in markets that are subject to the threat of lawsuits or activist interactions, the next step is to identify what actions government is most likely to take if it is motivated by broad social welfare considerations, by more parochial constituency concerns, and/or by factors such as interest group pressures. Building on this point, it is important to identify how various market and nonmarket actors can influence the government's regulatory standard decisions through lobbying, campaign contributions, or other nonmarket strategies, prior to the games that we have modeled here. Such analyses can help us assess how firms' lobbying efforts interact with their propensities for self-regulation.

In addition, our theory points to many directions for potential empirical exploration. While the case studies that we explore are consistent with the implications of our model, more systematic analyses are needed to move beyond these early foundations. A first step would be to analyze whether those industries that are subject to relatively high judicial penalties (i.e., through punitive damages) are more likely to engage in self-regulatory efforts. One could also analyze whether self-regulation is most common in industries that are characterized by high levels of interest group activity, as such an environment would likely ensure that activists are

readily able to provide valuable information to the market regarding firm production choices. Further empirical explorations would test whether the responses to such nonmarket pressures differ systematically across different types of firms and different government standards, as predicted here. Regardless of what directions are ultimately taken, this paper offers an initial glimpse into substantial research questions about the market and nonmarket impacts of government and self-regulation.

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## Appendix

### Proof of the Observable Production Proposition

Suppose government and firm choices are perfectly observable by the public, and the government sets a high-quality standard ( $s_g = 1$ ). As noted in the text, if  $s_f = 1$ ,  $\Pi|_{s_g=1, s_{fm}=s_f=1} = (d+2-\beta q-c-\eta)q$ . Differentiating this expression with respect to  $q$  yields:  $\frac{\partial \Pi|_{s_g=1, s_{fm}=s_f=1}}{\partial q} = -2\beta q + d+2-c-\eta \Rightarrow q^* = \frac{d+2-c-\eta}{2\beta}$ . Hence,  $\Pi^*|_{s_g=1, s_{fm}=s_f=1} = \frac{(d+2-c-\eta)^2}{4\beta}$ . Alternatively, if  $s_f = 0$ , as noted in the text,  $\Pi|_{s_g=1, s_{fm}=s_f=0} = (d-\beta q-c)q$ . Differentiating this expression with respect to  $q$  yields:  $\frac{\partial \Pi|_{s_g=1, s_{fm}=s_f=0}}{\partial q} = -2\beta q + d-c \Rightarrow q^* = \frac{d-c}{2\beta}$ . Hence,  $\Pi^*|_{s_g=1, s_{fm}=s_f=0} = \frac{(d-c)^2}{4\beta}$ . Given that  $(d-c) > 1$ , and  $\eta \leq 2$  by assumption, it must be true that  $\Pi^*|_{s_g=1, s_{fm}=s_f=1} = \frac{(d+2-c-\eta)^2}{4\beta} > \frac{(d-c)^2}{4\beta} = \Pi^*|_{s_g=1, s_{fm}=s_f=0}$ . Hence, the firm will always choose a high quality standard when it is mandated by the government. Suppose, however, that the government sets a low-quality standard ( $s_g = 0$ ). Consistent with Equation (4) in the text, if  $s_f = 1$ ,  $\Pi|_{s_g=0, s_{fm}=s_f=1} = (d+1-\beta q-c-\eta)q$ . Differentiating this expression with respect to  $q$  yields:  $\frac{\partial \Pi|_{s_g=0, s_{fm}=s_f=1}}{\partial q} = -2\beta q + d+1-c-\eta \Rightarrow q^* = \frac{d+1-c-\eta}{2\beta}$ . Hence,  $\Pi^*|_{s_g=0, s_{fm}=s_f=1} = \frac{(d+1-c-\eta)^2}{4\beta}$ . Alternatively, if  $s_f = 0$ ,  $\Pi|_{s_g=0, s_{fm}=s_f=0} = (d-\beta q-c)q$ . Differentiating this expression with respect to  $q$  yields:  $\frac{\partial \Pi|_{s_g=0, s_{fm}=s_f=0}}{\partial q} = -2\beta q + d-c \Rightarrow q^* = \frac{d-c}{2\beta}$ . Hence,  $\Pi^*|_{s_g=0, s_{fm}=s_f=0} = \frac{(d-c)^2}{4\beta}$ , and we see that  $\Pi^*|_{s_g=0, s_{fm}=s_f=0} < \Pi^*|_{s_g=0, s_{fm}=s_f=1}$  iff  $\eta \in [0, 1)$ .

### Proof of the Unobservable Production Proposition

Suppose government and firm choices are not perfectly observable by the public, and government mandates a high quality standard ( $s_g = 1$ ). If  $s_f = 1$ , then the firm's profit is defined by  $\Pi|_{s_g=1, s_f=1} = (d+2s_c-\beta q-c-\eta)q$ . Differentiating this expression with respect to  $q$  yields  $q^*|_{s_g=1, s_f=1} = \frac{d+2s_c-c-\eta}{2\beta}$  and profit equal to  $\Pi^*|_{s_g=1, s_f=1} = \frac{(d+2s_c-c-\eta)^2}{4\beta}$ . In contrast, if the firm chooses  $s_f = 0$ , then the firm's profit is defined by:  $\Pi|_{s_g=1, s_f=0} = (d+2s_c-\beta q-c)q$ . Differentiating this expression with respect to  $q$  yields:  $\frac{\partial \Pi|_{s_g=1, s_f=0}}{\partial q} = -2\beta q + d+2s_c-c \Rightarrow q^* = \frac{d+2s_c-c}{2\beta}$ . Hence,  $\Pi^*|_{s_g=1, s_f=0} = \frac{(d+2s_c-c)^2}{4\beta}$ , which is clearly greater than  $\Pi^*|_{s_g=1, s_f=1}$ , implying that whenever the government sets a high standard the firm will choose  $s_f = 0$ . In the event that the government sets a low standard ( $s_g = 0$ ), if  $s_f = 1$ , the firm's profit is defined by  $\Pi|_{s_g=0, s_f=1} = (d+s_c-\beta q-c-\eta)q$ . Differentiating this expression with respect to  $q$  yields:  $\frac{\partial \Pi|_{s_g=0, s_f=1}}{\partial q} = -2\beta q + d+s_c-c-\eta \Rightarrow q^* = \frac{d+s_c-c-\eta}{2\beta}$ . Hence,  $\Pi^*|_{s_g=0, s_f=1} = \frac{(d+s_c-c-\eta)^2}{4\beta}$ . In contrast, if  $s_f = 0$ , then the firm's profit is defined by  $\Pi|_{s_g=0, s_f=0} = (d+s_c-\beta q-c)q$ . Differentiating this expression with respect to  $q$  yields:  $\frac{\partial \Pi|_{s_g=0, s_f=0}}{\partial q} = -2\beta q + d+s_c-c \Rightarrow q^* = \frac{d+s_c-c}{2\beta}$ . Hence,  $\Pi^*|_{s_g=0, s_f=0} = \frac{(d+s_c-c)^2}{4\beta}$ , which is clearly greater than  $\Pi^*|_{s_g=0, s_f=1} \forall \eta \in (0, 2]$ . Hence, regardless of what government standard is chosen, the firm will always choose  $s_f = 0$ .

### Proof of the Lawsuit Threat Proposition

To prove the first part of the proposition, it is sufficient to compare the firm's expected utility that corresponds with each choice of  $s_f$  when  $s_g = 1$  and when  $s_g = 0$ , to identify the crucial judgment  $J^*$  such that the firm is indifferent between choosing a high standard ( $s_f = 1$ ) and choosing a low standard ( $s_f = 0$ ). To begin, suppose  $s_g = 1$ . If the firm chooses  $s_f = 1$ , then its expected profit given equilibrium quantity choices in each period equals:

$$E\Pi^*|_{s_g=1, s_f=1} = \frac{(d + 2s_c - c - \eta)^2}{4\beta} + \delta[(\rho_0 - \rho_1)\left(\frac{(d + 2 - c - \eta)^2}{4\beta} - J\right) + (1 - \rho_0 + \rho_1)\left(\frac{(d + 2s_c - c - \eta)^2}{4\beta}\right)],$$

where the first term reflects the firm's first-period profits, and the second term reflects the firm's second-period profits, where a disaster ensures with probability  $\rho = \rho_0 - \rho_1$  leading to costly judgment  $J$ , and with probability  $1 - \rho = (1 - \rho_0 + \rho_1)$  no disaster ensues, all discounted by  $\delta$ .<sup>32</sup> Likewise, the firm's expected profits if  $s_f = 0$  can be characterized as the following:

$$E\Pi^*|_{s_g=1, s_f=0} = \frac{(d + 2s_c - c)^2}{4\beta} + \delta[(\rho_0)\left(\frac{(d - c)^2}{4\beta} - J\right) + (1 - \rho_0)\left(\frac{(d + 2s_c - c)^2}{4\beta}\right)].$$

Inspection reveals  $E\Pi^*|_{s_g=1, s_f=1} \geq E\Pi^*|_{s_g=1, s_f=0}$  when

$$J \geq \frac{4\delta\rho_1 s_c(c - d - s_c) + 4\delta(\rho_1 - \rho_0)(d - c + 1 - \eta + \eta s_c) + (1 + \delta)\eta(2d - 2c + 4s_c - \eta)}{4\beta\delta\rho_1} = J^*|_{s_g=1},$$

and  $E\Pi^*|_{s_g=1, s_f=1} < E\Pi^*|_{s_g=1, s_f=0}$  when  $J < J^*|_{s_g=1}$ . Hence, when  $J \geq J^*|_{s_g=1}$  the firm will produce a high-quality good, but will produce low-quality goods otherwise. Likewise, when  $s_g = 0$ ,

$$E\Pi^*|_{s_g=0, s_f=1} = \frac{(d + s_c - c - \eta)^2}{4\beta} + \delta[(\rho_0 - \rho_1)\left(\frac{(d + 1 - c - \eta)^2}{4\beta} - J\right) + (1 - \rho_0 + \rho_1)\left(\frac{(d + s_c - c - \eta)^2}{4\beta}\right)],$$

$$E\Pi^*|_{s_g=0, s_f=0} = \frac{(d + s_c - c)^2}{4\beta} + \delta[(\rho_0)\left(\frac{(d - c)^2}{4\beta} - J\right) + (1 - \rho_0)\left(\frac{(d + s_c - c)^2}{4\beta}\right)].$$

---

<sup>32</sup>We assume that consumers continue to hold their prior beliefs about the firm's product quality in the absence of a disaster.

Similar to the analysis above, inspection reveals that  $E\Pi^*|_{s_g=0, s_f=1} \geq E\Pi^*|_{s_g=0, s_f=0}$  for

$$J \geq \frac{\delta\rho_1 s_c(2c - 2d - s_c) + \delta(\rho_1 - \rho_0)(2d - 2c + 1 - 2\eta + 2\eta s_c)}{4\beta\delta\rho_1} + \frac{(1 + \delta)\eta(2d - 2c + 2s_c - \eta)}{4\beta\delta\rho_1} = J^*|_{s_g=0}$$

and  $E\Pi^*|_{s_g=0, s_f=1} < E\Pi^*|_{s_g=0, s_f=0}$  when  $J < J^*|_{s_g=0}$ . Hence, when  $J \geq J^*|_{s_g=0}$  the firm will produce a high-quality good, but will produce low-quality goods ( $s_f = 0$ ) otherwise.

To prove the second part of the Lawsuit Threat Proposition, it is sufficient to take comparative statics over  $J^*|_{s_g=1}$  and  $J^*|_{s_g=0}$  with respect to our variables of interest and identify whether the first derivatives are positively or negatively valued. For the case where government sets a high standard ( $s_g = 1$ ), comparative statics analysis reveals that:

$$\begin{aligned} \frac{\partial J^*|_{s_g=1}}{\partial \rho_0} &= \frac{\eta(1 - s_c) + c - d - 1}{\beta\rho_1} < 0, \text{ and} \\ \frac{\partial J^*|_{s_g=1}}{\partial \delta} &= \frac{\eta(\eta - 2d + 2c - 4s_c)}{4\beta\delta^2\rho_1} < 0 \end{aligned}$$

given the underlying parametric assumptions of the model. Moreover, we also see that

$$\begin{aligned} \frac{\partial J^*|_{s_g=1}}{\partial \rho_1} &= \frac{4\delta\rho_0(\eta(s_c - 1) + d - c + 1) + (1 + \delta)\eta(\eta - 2d + 2c - 4s_c)}{4\beta\delta\rho_1^2} \geq 0 \\ &\text{iff } \rho_0 \geq \frac{\eta(1 + \delta)(2d - 2c - \eta + 4s_c)}{\delta(1 + \eta s_c - d - c - \eta)}, \\ \frac{\partial J^*|_{s_g=1}}{\partial d} &= \frac{2\delta\rho_1(1 - s_c) + \eta(1 + \delta) - 2\delta\rho_0}{2\beta\delta\rho_1} < 0 \\ &\text{iff } \rho_0 > \frac{2\delta\rho_1(1 - s_c) + (1 + \delta)\eta}{2\delta}, \\ \frac{\partial J^*|_{s_g=1}}{\partial s_c} &= \frac{\delta\rho_1(\eta + c - d - 2s_c) + \eta(1 + d) - \delta\rho_0\eta}{4\beta\delta\rho_1} < 0 \\ &\text{iff } \rho_0 > \frac{\eta(1 + \delta) + \delta\rho_1(c - d + \eta - 2s_c)}{\delta\eta}, \text{ and} \\ \frac{\partial J^*|_{s_g=1}}{\partial \eta} &= \frac{2\delta(\rho_0 - \rho_1)(1 - s_c) + (1 + \delta)(d - c - \eta + 2s_c)}{2\beta\delta\rho_1} \geq 0 \\ &\text{iff } \rho_0 \geq \frac{2\delta\rho_1(s_c - 1) + (1 + \delta)(d - c - \eta + 2s_c)}{\delta(s_c - 1)}. \end{aligned}$$

Alternatively, for the case where government sets a low standard ( $s_g = 0$ ), comparative

statics are:

$$\frac{\partial J^*|_{s_g=0}}{\partial \delta} = \frac{\eta(\eta - 2(d - c) - 2s_c)}{4\beta\delta^2\rho_1} < 0,$$

given the underlying parametric assumptions of the model. Moreover, we also see that:

$$\begin{aligned} \frac{\partial J^*|_{s_g=0}}{\partial \rho_0} &= \frac{2\eta(1 - s_c) - 2(d - c) - 1}{4\beta\rho_1} < 0, \text{ iff } s_c \geq \frac{2\eta - 2d + 2c - 1}{2\eta}, \\ \frac{\partial J^*|_{s_g=0}}{\partial \rho_1} &= \frac{\delta\rho_0(2\eta s_c - 2d - 2c - 1) + (1 + \delta)\eta(\eta - 2d + 2c - 2s_c)}{4\beta\delta^2\rho_1^2} \geq 0 \\ &\quad \text{iff } \rho_0 \geq \frac{\eta(1 + \delta)(2d - 2c + 2s_c - \eta)}{\delta(1 + 2d - 2c + 2\delta s_c - 2\eta)}, \\ \frac{\partial J^*|_{s_g=0}}{\partial d} &= \frac{\delta\rho_1(1 - s_c) + \eta(1 + \delta) - \delta\rho_0}{2\beta\delta\rho_1} < 0 \\ &\quad \text{iff } \rho_0 > \frac{\eta(1 + \delta) + \delta\rho_1(1 - s_c)}{\delta}, \\ \frac{\partial J^*|_{s_g=0}}{\partial s_c} &= \frac{\delta\rho_1(\eta - s_c - d + c) + \eta(1 + \delta) - \delta\rho_0\eta}{2\beta\delta\rho_1} < 0 \\ &\quad \text{iff } \rho_0 > \frac{\eta(1 + \delta) + \delta\rho_1(c - d + \eta - s_c)}{\delta\eta}, \text{ and} \\ \frac{\partial J^*|_{s_g=0}}{\partial \eta} &= \frac{\delta(\rho_0 - \rho_1)(1 - s_c) + (1 + \delta)(d - c - \eta + s_c)}{2\beta\delta\rho_1} \geq 0 \\ &\quad \text{iff } \rho_0 \geq \frac{(1 + \delta)(d - c + s_c - \eta) + \delta\rho_1(s_c - 1)}{\delta(s_c - 1)}. \end{aligned}$$

### Proof of the Regulatory-Judicial Complements Proposition

To prove this proposition, it is sufficient to identify the value of  $\rho_0$  such that  $J^*|_{s_g=1} = J^*|_{s_g=0}$ . To identify this value, note that  $J^*|_{s_g=1} - J^*|_{s_g=0} =$

$$\frac{\delta(\rho_1 - \rho_0)(2d - 2c - 2\eta + 2\eta s_c + 3) + \delta\rho_1 s_c(2c - 2d - 3s_c) + (1 + \delta)2\eta s_c}{4\beta\delta\rho_1},$$

and this expression is greater than zero when  $\rho_0 < \frac{2\delta\rho_1(1-s_c)(d-c-\eta)+3\delta\rho_1(1+s_c^2)+(1+\delta)2\eta s_c}{\delta(2(d-c-\eta-\eta s_c)+3)}$ . Hence, when  $\rho_0 \leq \frac{2\delta\rho_1(1-s_c)(d-c-\eta)+3\delta\rho_1(1+s_c^2)+(1+\delta)2\eta s_c}{\delta(2(d-c-\eta-\eta s_c)+3)}$ ,  $J^*|_{s_g=1} \geq J^*|_{s_g=0}$ ; and  $J^*|_{s_g=1} < J^*|_{s_g=0}$  otherwise.

### Proof of the Activist Monitoring Proposition

To prove this proposition, we begin by identifying the optimal effort level ( $e^*$ ) that the activist would exert if it knew the firm's quality choice with certainty. Suppose the government sets a high standard, and the firm chooses a high standard (i.e.,  $s_g = 1, s_f =$

1). In that scenario, the expected utility of the activist (based on Equation 7) can be characterized as follows:

$$EU_A|_{s_g=1, s_f=1} = -Z\left(\frac{3-2s_c}{2e}\right) - e,$$

where  $e$  is the effort level exerted by the activist, and  $Z$  is the weight that she places on the difference between the market's perception of the firm's production choice and its actual choice in the second period (where the market's perception does not deviate from its prior,  $s_c$ , with probability  $\frac{1}{e}$ , and the activist facilitates the correct realization of the firm's production choice with probability  $\frac{2e-3}{2e}$ ). Differentiating this expression with respect to  $e$  yields:

$$\frac{\partial EU_A|_{s_g=1, s_f=1}}{\partial e} = \frac{Z(3-2s_c)}{2e^2} - 1 \Rightarrow e^*|_{s_g=1, s_f=1} = \frac{\sqrt{2}\sqrt{Z(3-2s_c)}}{2}.$$

Alternatively, suppose that the firm chooses a low standard (i.e.,  $s_g = 1, s_f = 0$ ), the expected utility of the activist from exerting effort can be characterized as:

$$EU_A|_{s_g=1, s_f=0} = -Z\left(\frac{2s_c+1}{2e}\right) - e.$$

Engaging in similar analysis to above, we see that

$$\frac{\partial EU_A|_{s_g=1, s_f=0}}{\partial e} = \frac{Z(2s_c+1)}{2e^2} - 1 \Rightarrow e^*|_{s_g=1, s_f=0} = \frac{\sqrt{2}\sqrt{Z(2s_c+1)}}{2},$$

which implies that the activist would be willing to exert more effort if it knew that the firm were producing low-quality goods, and the public was predisposed towards expecting the firm to produce high-quality goods (i.e.,  $s_c > \frac{1}{2}$ ). Given these optimal activist effort levels, we can calculate the firm's expected utility for choosing  $s_f = 1$  as follows:

$$\begin{aligned} E\Pi^*|_{s_g=1, s_f=1} &= \frac{(d-c-\eta+2s_c)^2}{4\beta} + \delta \left[ \frac{1}{e^*|_{s_g=1, s_f=1}} \left( \frac{(d-c-\eta+2s_c)^2}{4\beta} \right) \right. \\ &\quad \left. + \frac{1}{2e^*|_{s_g=1, s_f=1}} \left( \frac{(d-c-\eta)^2}{4\beta} \right) + \left( \frac{2e^*|_{s_g=1, s_f=1} - 3}{2e^*|_{s_g=1, s_f=1}} \right) \left( \frac{(d-c-\eta+2)^2}{4\beta} \right) \right], \end{aligned}$$

where the first term represents the firm's first-period profit from choosing  $s_f = 1$ , given that consumers have expectations  $s_c$  about the firm's actual choice, and the second (discounted) term represents the firm's expected second-period profit, given that with probability  $\frac{1}{e^*|_{s_g=1, s_f=1}}$  the market's prior beliefs will not change; with probability  $\frac{1}{2e^*|_{s_g=1, s_f=1}}$  the activist will induce a misperception so that the market will think that  $s_f = 0$ , yielding firm profits equal to  $\Pi^*|_{s_g=1, s_f=1, s_{fm}=0}$ ; and with probability  $\frac{2e^*|_{s_g=1, s_f=1} - 3}{2e^*|_{s_g=1, s_f=1}}$  the activist will induce a correct revelation of the firm's choice, yielding firm profits equal to  $\Pi^*|_{s_g=1, s_f=1, s_{fm}=1}$ . By the

same logic, the firm's expected profits from choosing  $s_f = 0$  is as follows:

$$E\Pi^*|_{s_g=1,s_f=0} = \frac{(d-c+2s_c)^2}{4\beta} + \delta \left[ \frac{1}{e^*|_{s_g=1,s_f=0}} \left( \frac{(d-c+2s_c)^2}{4\beta} \right) \right. \\ \left. + \frac{1}{2e^*|_{s_g=1,s_f=0}} \left( \frac{(d-c+2)^2}{4\beta} \right) + \left( \frac{2e^*|_{s_g=1,s_f=0} - 3}{2e^*|_{s_g=1,s_f=0}} \right) \left( \frac{(d-c)^2}{4\beta} \right) \right].$$

In considering these quantities, the relevant question to ask is, for what value of  $Z$  (which supports an optimal  $e^*$ ) would the firm choose to deviate from the assumed strategy? The first point to establish is whether the firm is content to choose  $s_f = 0$  given that the activist is exerting effort level  $e^*|_{s_g=1,s_f=0} = \frac{\sqrt{2}\sqrt{Z(2s_c+1)}}{2}$ , or would it prefer to deviate to choosing  $s_f = 1$ . We characterize the firm's expected profit if it deviates to  $s_f = 1$  from  $s_f = 0$  as:

$$E\Pi^*|_{deviate(s_g=1,s_f=0)} = \frac{(d-c-\eta+2s_c)^2}{4\beta} + \delta \left[ \frac{1}{e^*|_{s_g=1,s_f=0}} \left( \frac{(d-c-\eta+2s_c)^2}{4\beta} \right) \right. \\ \left. + \frac{1}{2e^*|_{s_g=1,s_f=0}} \left( \frac{(d-c-\eta)^2}{4\beta} \right) + \left( \frac{2e^*|_{s_g=1,s_f=0} - 3}{2e^*|_{s_g=1,s_f=0}} \right) \left( \frac{(d-c-\eta+2)^2}{4\beta} \right) \right].$$

Setting  $E\Pi^*|_{s_g=1,s_f=0} = E\Pi^*|_{deviate(s_g=1,s_f=0)}$  allows us to obtain the  $Z_L^*|_{s_g=1}$  such that the firm is indifferent between these two options. Similarly, we also seek to identify for what value of  $Z$  (which supports an optimal  $e^*$ ) would the firm choose quality level  $s_f = 1$  rather than deviating to  $s_f = 0$ , given that the activist is exerting effort level  $e^*|_{s_g=1,s_f=1} = \frac{\sqrt{2}\sqrt{Z(3-2s_c)}}{2}$ . We characterize the firm's expected profit if it engages in such a deviation as:

$$E\Pi^*|_{deviate(s_g=1,s_f=1)} = \frac{(d-c+2s_c)^2}{4\beta} + \delta \left[ \frac{1}{e^*|_{s_g=1,s_f=1}} \left( \frac{(d-c+2s_c)^2}{4\beta} \right) \right. \\ \left. + \frac{1}{2e^*|_{s_g=1,s_f=1}} \left( \frac{(d-c+2)^2}{4\beta} \right) + \left( \frac{2e^*|_{s_g=1,s_f=1} - 3}{2e^*|_{s_g=1,s_f=1}} \right) \left( \frac{(d-c)^2}{4\beta} \right) \right].$$

Setting  $E\Pi^*|_{s_g=1,s_f=1} = E\Pi^*|_{deviate(s_g=1,s_f=1)}$  allows us to obtain the  $Z_H^*|_{s_g=1}$  such that the firm is indifferent between the two options. Hence, we establish the partitions in the activist salience space such that for  $Z \leq Z_L^*|_{s_g=1}$ , the firm chooses a low standard, for  $Z \geq Z_H^*|_{s_g=1}$  the firm chooses a high standard, and for  $Z \in (Z_L^*|_{s_g=1}, Z_H^*|_{s_g=1})$  the firm mixes between actually choosing a high standard and choosing a low standard.

To identify the probability distribution that supports this mixed strategy equilibrium when  $Z \in (Z_L^*|_{s_g=1}, Z_H^*|_{s_g=1})$ , we begin by identifying the crucial level of effort that the activist must exert to make the firm indifferent between playing  $s_f = 1$  and  $s_f = 0$ . That is, we are solving for  $e_{mix}|_{s_g=1}$  that satisfies the following equation:

$$E\Pi^*|_{s_g=1,s_f=1,e_{mix}} = E\Pi^*|_{s_g=1,s_f=0,e_{mix}}.$$

Upon identifying  $e_{mix}^*|_{s_g=1}$ , we then identify the probability that the firm plays  $s_f = 1$  (i.e.,  $x^*|_{s_g=1}$ ) that supports this effort level. To do this, we begin by identifying the optimal effort level that the activist would exert if the firm were mixing with any generic probability,  $x$ . We can characterize the expected utility of the activist in this scenario as:

$$EU_A|_{s_g=1, mix} = x\left(\frac{-Z(3 - 2s_c)}{2e} - e\right) + (1 - x)\left(\frac{-Z(2s_c + 1)}{2e} - e\right).$$

Differentiating this expression with respect to  $e$  and solving for  $e^*$  yields the optimal effort level that the activist would exert for any generic probability,  $x : e^*|_{s_g=1, x} = \frac{\sqrt{2Z(2x - 4xs_c + 2s_c + 1)}}{2}$ . Setting this quantity equal to the  $e_{mix}^*|_{s_g=1}$  that supports the firm's mixed strategy above yields the optimal probability distribution  $x^*|_{s_g=1}$  that supports the mixed strategy equilibrium when  $Z \in (Z_L^*|_{s_g=1}, Z_H^*|_{s_g=1})$ . Due to space considerations, these optimal closed-form  $e_{mix}^*|_{s_g=1}$  and  $x^*|_{s_g=1}$  equations are omitted. Similar analysis is conducted to derive the equilibrium for the case where  $s_g = 0$ , which we omit from the text for space considerations (but which are available from the authors upon request).

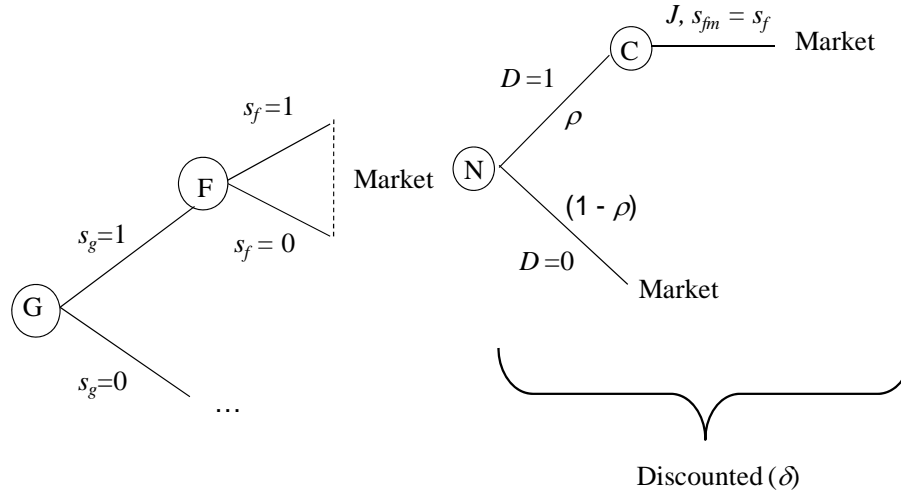
### Discussion of the Regulatory-Activist Complements Proposition and the Susceptibility to Activism Proposition

To prove the Regulatory-Activist Complements Proposition, one must compare the magnitudes of  $e_{mix}^*|_{s_g=1}$  and  $e_{mix}^*|_{s_g=0}$ . After taking the difference of these quantities, inspection reveals that  $e_{mix}^*|_{s_g=1} < e_{mix}^*|_{s_g=0}$ . We omit closed-form characterizations of these quantities due to space considerations, yet they are available from the authors upon request.

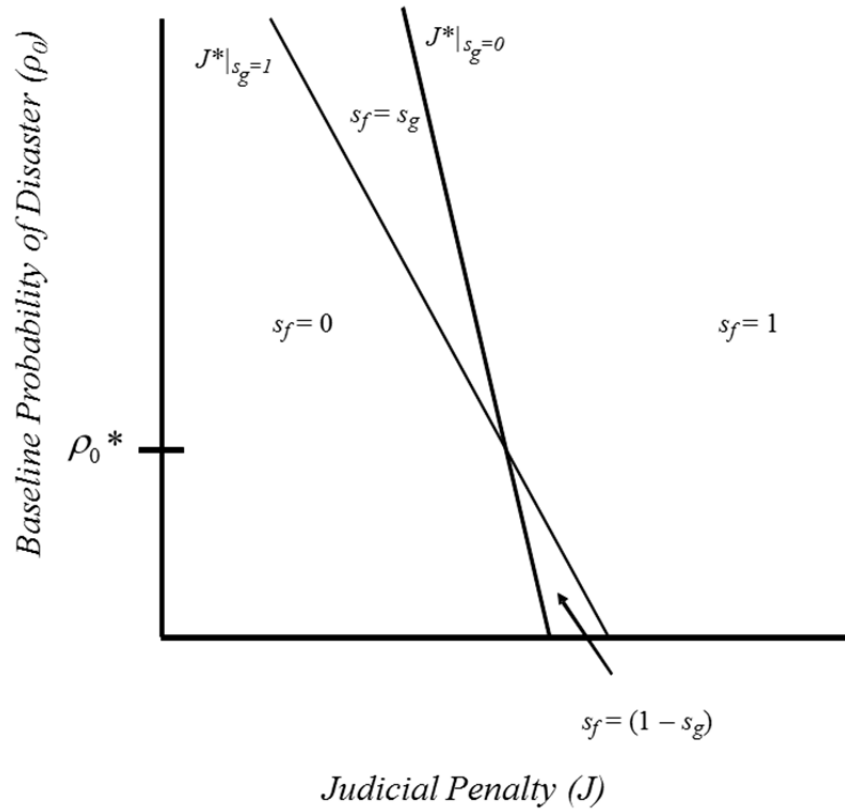
Similarly, to prove the Susceptibility to Activism Proposition, one must differentiate  $e_{mix}^*|_{s_g=1}$  and  $e_{mix}^*|_{s_g=0}$  with respect to  $\delta, d$ , and  $s_c$ , and identify whether the quantities are positively or negatively signed. While these calculations are straightforward, they are quite cumbersome to present, and hence, are omitted for space considerations, yet are available from the authors upon request.



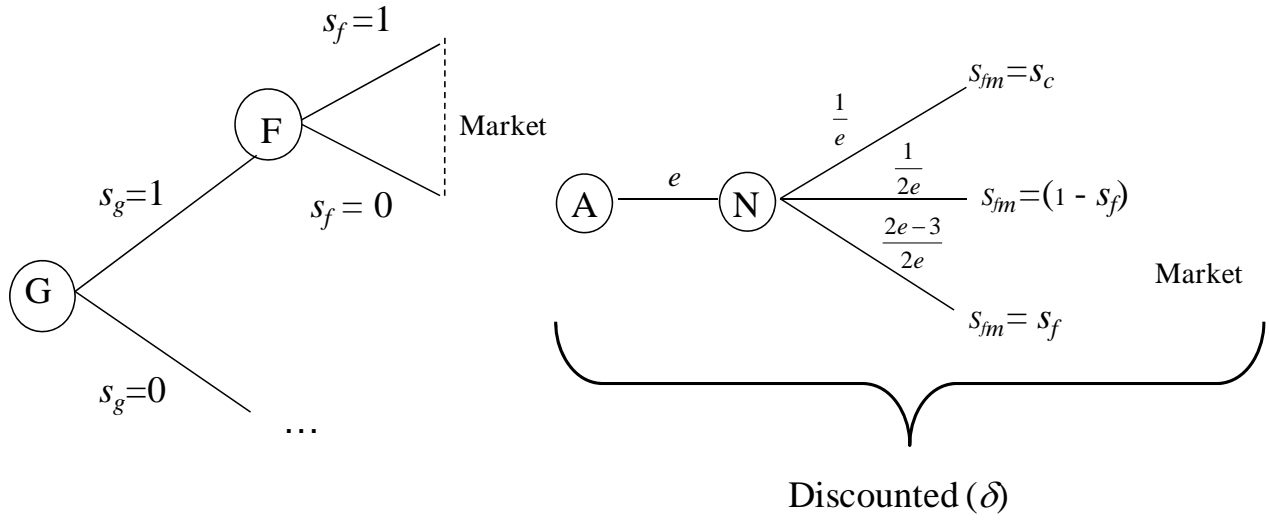
**Figure 1: Regulation and Market Interactions with Judicial Institutions**



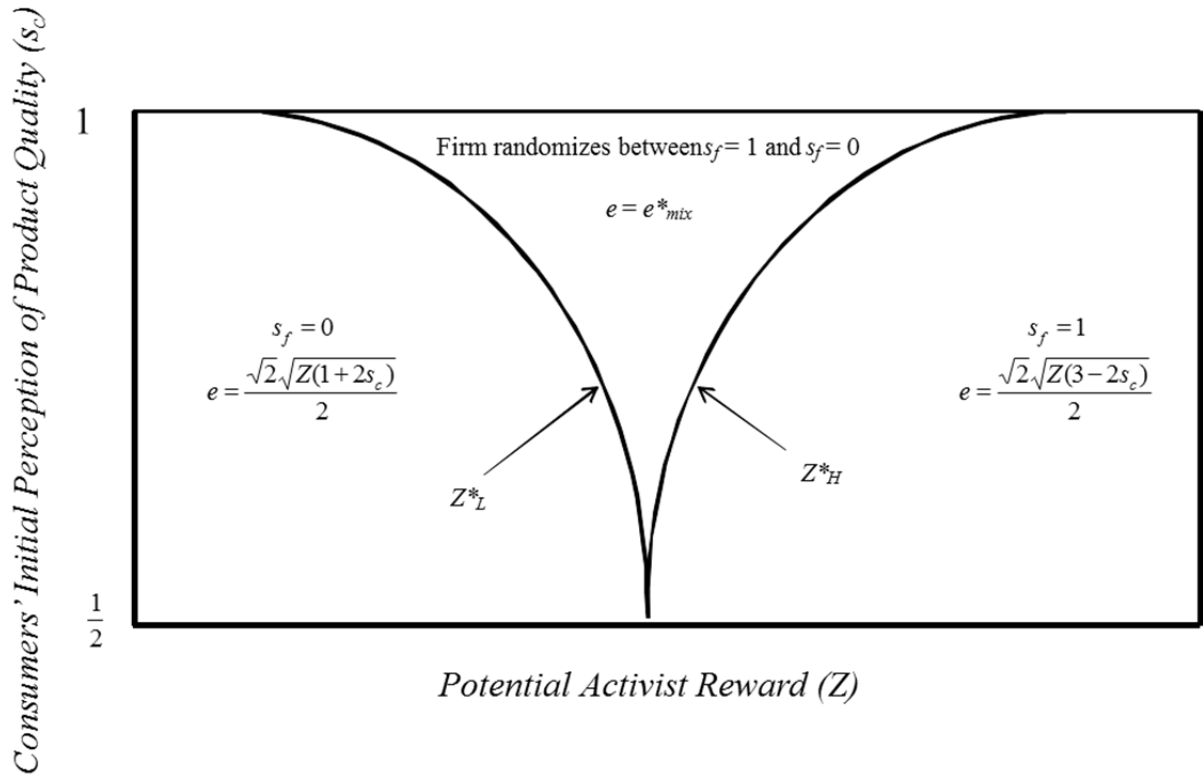
**Figure 2: Self-Regulation Given Judgments and Government Standards**



**Figure 3: Regulation and Market Interactions in the Presence of Activists**



**Figure 4: Equilibrium Self-Regulation Induced by Activists**



**Table 1: Summary of Main Findings**

<b>Model</b>	<b>When Do Firms Produce High-Quality Goods?</b>	<b>What Is the Role of High Government Standards?</b>
<b>Baseline (Observable Choices)</b>	<ul style="list-style-type: none"> <li>•When the marginal cost of producing high quality goods is low.</li> <li>•When the government chooses a high standard.</li> </ul>	<ul style="list-style-type: none"> <li>•Induces the firm to produce high-quality goods when it otherwise would not due to the high marginal cost of producing such goods.</li> </ul>
<b>Baseline (Unobservable Choices)</b>	<ul style="list-style-type: none"> <li>•Never, because doing so lowers profits and does not change consumers' beliefs.</li> </ul>	<ul style="list-style-type: none"> <li>•No influence.</li> </ul>
<b>Judicial Extension</b>	<ul style="list-style-type: none"> <li>•When the judicial penalty is sufficiently high.</li> <li>•When the future is highly valuable to the firm.</li> <li>•When the probability of disaster from low-quality goods is relatively high.</li> </ul>	<ul style="list-style-type: none"> <li>•Induces firm to produce high-quality goods when high probability of disaster from low-quality goods.</li> <li>•Induces firm to produce low-quality goods when low probability of disaster from low-quality goods.</li> </ul>
<b>Activist Extension</b>	<ul style="list-style-type: none"> <li>•When the activist receives sufficiently large benefit from informing the public.</li> </ul>	<ul style="list-style-type: none"> <li>•Helps activist induce the firm to produce high-quality goods at low effort level.</li> </ul>