A Theory of Government Regulation and Self-Regulation with the Specter of Nonmarket Threats

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Abstract

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 nonmarket reactions by interests such as trial attorneys and consumer activists, who might sue in the case of product-induced damages or reveal the firm's quality choice to consumers through investigatory and publicity activities. Equilibrium results identify conditions under which firms will engage in meaningful self-regulation, either by voluntarily selecting a high-quality standard for their product absent a government mandate, or by complying with a government mandate for high quality even though government lacks enforcement power. Our results have direct implications for how political actors choose to regulate certain industries based on the market value of different products, on the danger associated with various products, and on the nature of the nonmarket environment.

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A Theory of Government Regulation and Self-Regulation with the Specter of Nonmarket Threats

In thinking of the broad political-economic system that encompasses many commercial transactions, one can envision numerous strategic interactions among multiple actors. First, for any industry, a government may establish rules that influence the playing field for firms conducting business in that area. Second, firms may respond to these governmental rules by implementing production processes that lead to varying degrees of product qualities, quantities, and prices for their goods, which consumers may then choose to purchase. This interaction among firms, governments, and consumers does not take place in a vacuum. A large body of political science scholarship has taught us that government is (ostensibly) responsive to organized and unorganized stakeholders including consumers, voters, lobbyists, and firms, as well as other interests who help to shape the laws and rules that emerge from the policymaking process. Furthermore, firm and consumer market-based responses to government mandates (or lack thereof) do not constitute the conclusion of these interactions. Various nonmarket reactions, such as lawsuits, consumer boycotts, and interest group protests, may occur after firms have brought their products to market; and these nonmarket reactions might induce governments, as well as firms, to reconsider their decisions.

As depicted in Figure 1, this process of market regulation and commercial transactions raises several broad questions across traditional areas of academic inquiry. Scholars of economics might be interested in how firms respond to government mandates in determining the scope and qualities of products that they bring to the marketplace. Scholars of politics might be interested primarily in how lobbyists and constituents interact with their governments to influence the content of laws. Scholars of business strategy might be interested in whether firms choose to directly engage government during the standard setting process, or simply respond to

government mandates and potential nonmarket reactions as they arise. A fundamental question underlying much of this discussion 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? This question is not solely an academic point of inquiry, as events over the past decade have highlighted the relevance of debates over the virtues of regulation versus private market solutions and industry self-regulation. Two examples, in particular, illustrate the tensions that are central to these types of issues.

[Insert Figure 1 about here]

In the late 1990s, as consumer-oriented commercial websites were becoming commonplace, lawmakers and consumer activists voiced 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 protection for consumers. 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 significantly 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.[1] In stark contrast to the majority recommendation, the lone dissenter, Commissioner Orson Swindle, lambasted the majority's "embarrassingly flawed" report that abandoned "a self-regulatory approach in favor of extensive regulation, despite continued progress in self-regulation." The heart of Commissioner Swindle's 27-page critique focused on how the Commission had ostensibly failed to demonstrate how industry self-regulation was insufficient to achieve socially desirable ends. Moreover, he argued that the Commission majority had failed to account for any of the likely costs of such wide-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."[2]

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, and history has suggested that this was the appropriate choice. While cases of identity theft do occur, the private market has responded with various personal-information protections, such that consumers feel comfortable enough to actively engage in electronic commerce. While government regulation and enforcement might have facilitated a similar outcome, industry self-regulation appears to have worked well in this case.

[1] "Statement of Chairman Pitofsky" in *Privacy Online: Fair Information Practices in the Electronic Marketplace*. May 22, 2000.
[2] "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).

Questions may be raised, however, regarding the efficacy of industry self-regulation in the realm of financial services. Beginning in the 1970s, a new financial instrument was developed, which was broadly referred to as an "asset-backed security." An asset-backed security is generally a collection of loans originally made by banks, which are then sold into a secondary market (usually to other banks) and divided into shares, which are in turn sold to private and institutional investors. These financial instruments evolved further in the 1980s, as Wall Street investment firms began to combine different components of existing securities into different divisions, referred to as tranches, based on the underlying risk-levels of each security. These tranches were then combined, repackaged, and sold again into the secondary market to private and institutional investors.

As the market for these structured asset-backed securities rapidly expanded, the financial soundness of several of these investment instruments, particularly those that were composed of more risky tranches, became questionable. The uncertainty of the integrity of these securities became particularly problematic given that in 2002, the federal government decided to outsource the supervision of these markets to the private credit-rating agencies that grade securities based on their risk. Under the new rules, the grades that the credit-rating agencies gave to different securities would influence the amount of capital that banks had to hold in reserve given the value of their underlying debt. Given the complexity of these structured securities, given the ostensible pressure that rating agencies such as Standard & Poor's had to bestow good ratings on banks, and given the potential ability of banks to shop around to private agencies for attractive ratings, banks found themselves holding relatively little capital reserves given the status of their assets.

As interest rates plummeted in the early 2000s a significant number of Americans either purchased new homes or refinanced existing homes, which further added to the trading volume

of these structured securities. Given that some of these purchases and refinancing involved relatively risky loans (e.g., subprime lending), the expansion in new mortgages also led to a rapid expansion in risky debt, much of which was effectively underinsured by banks' existing capital requirements. Despite the potential risk in this market, a wide range of investment interests including standard commercial banks, insurance companies, pension funds, and others, started to trade in a security-backed asset pool totaling nearly $1.4 trillion.[3]

While a wide range of culprits is potentially to blame for the massive financial crisis of 2008, it is uncontroversial to argue that a substantial portion of the responsibility falls on the expansion of the asset-backed security market (and particularly mortgage-backed securities). 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 as well (potentially taking much of Wall Street with them). While it might be unfair to argue that active government intervention in this market would have prevented this crisis, a relatively clear consensus has emerged regarding the insufficiency of private and self-regulation to efficiently manage these types of products. As noted eloquently by Timothy Howard, the former CFO of Fannie Mae who had raised numerous concerns with the evolution of this market: "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."[4] History suggests otherwise.

Why did calls for self-regulation seem to work in the case of internet privacy but not financial services? More broadly speaking, under what conditions might we expect firms to meet or exceed government mandates (i.e., to engage in self-regulation), particularly when

[3] "Why it Collapsed." Corine Hegland. *National Journal*. April 11, 2009. p. 18.
[4] "Why it Collapsed." Corine Hegland. *National Journal*. April 11, 2009. p. 18.

government has limited enforcement capabilities? We engage these types of questions by developing a model of industry self-regulation given the implicit threat of nonmarket reactions. We allow the most minimal role for government regulation, one in which the government chooses a high or low quality standard for products, yet lacks effective enforcement power. Upon receiving the government-set mandate, a firm makes its quality choice, which has direct implications for the prices that it charges for its product (and for the subsequent profits that it reaps). 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 penalizing firms that produce harmful products.

Building on this parsimonious foundation, we identify conditions of the activist environment, and regarding the scope of judicial penalties, that can induce a firm to produce a high-quality product or service, both with and without explicit government regulations. 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 meaningfully enforce its chosen standards. In developing our theory, rather than considering the entirety of the political economic system as illustrated in Figure 1, we confine our attention to the latter elements, and analyze interactions between firms, consumers, and potential nonmarket interests following the establishment of government mandates. While our analysis therefore provides a somewhat limited lens through which to view this broader system, we hope that it establishes a baseline that can be used as a foundation for a more complete consideration of the determinants and consequences of government and private market interactions in establishing *de facto* rules and regulations.

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. Finally, 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

In addressing the role of government regulation without subsequent enforcement, our model adds to the scholarly work not only on governmental regulation but also on self-regulation, on corporate social responsibility, and on private politics. Compared to the wide body of research on government regulation of industry, a less-developed literature explicitly engages the concept of industry self-regulation.[5] Indeed, in this early formative stage of research, 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., Abolafia 1985), 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.

Empirical and theoretical advancements on self-regulation over the past decade have been considerable. The substantive focus of much of the self-regulation literature has been on

environmental policy.[6] In this area, scholars have developed theories analyzing how the voluntary adoption of environmental standards can influence both markets and subsequent government regulations. Lutz, Lyon, and Maxwell (2000), for example, demonstrate that the voluntary adoption of relatively high standards can preemptively influence the coerciveness of government regulation. Similarly, Maxwell, Lyon, and Hackett (2000) demonstrate how the initial threat of government regulation can induce firms to voluntarily reduce their pollution efforts. Other scholars (e.g., Arora and Gangopadhyay 1995) have demonstrated how consumers' willingness-to-pay for goods produced by green firms can induce companies to incorporate environmentally-friendly technologies into their production processes, leading to firm differentiation based on their environmental practices. This notion of market segmentation is relevant to a rapidly developing literature on the market forces that influence corporate social responsibility, such as the work of Baron (2007, 2008), Besley and Ghatak (2007), and Babnoli and Watts (2003).

Our model differs notably from these approaches both in the role for government that we offer and in the nature of firms' product quality choices. By incorporating a government standard that is effectively not enforceable, we expand the definition of self-regulation to include meeting a government regulation even without a penalty imposed for violating that regulation. Moreover, we assume that consumers are not entirely aware of a firm's choice regarding product qualities. Hence, we tackle the hard case of when self-regulation might ensue even when firm choices are relatively unobservable.

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[5] The body of work that speaks to government regulation is voluminous, and any attempt to address it the current context would be inadequate. For discussions on the economics and politics of regulation see Baron (1989), Glaeser and Shleifer (2003), Noll and Owen (1983), and Wilson (1980).

[6] King and Toffel (2007) provide an outstanding recent review of the various conceptions of self-regulation in the context of environmental policy.

We therefore are also contributing to the literature that explores differences between the perceptions and reality of socially responsible management practices. Along these lines, King and Lenox (2000) demonstrate that one of the more prominent self-regulatory institutions, the U.S. Chemical Manufacturer's Association Responsible Care Program, suffers from an adverse selection problem in that a disproportionately large number of poor performers join the program. Similarly, Rivera, de Leon, and Koerber (2006) demonstrate that ski areas participating in the Sustainable Slopes Program were no more environmentally sound than those areas outside the program. More broadly, Lenox and Nash (2003) demonstrate how viable sanction programs are crucial if self-regulatory trade associations hope to attract *good* performers and avoid otherwise pervasive adverse selection problems. Bringing the government back in, Short and Toffel (2008) demonstrate how firms are more likely to engage in voluntary audits of their compliance with existing environmental regulations if they have been recently subjected to government enforcement measures. Consistent with this strand of the literature, 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 involvement.

Finally, our incorporation of the nonmarket forces of courts and activists speaks to an emerging literature on private politics. Recently, scholars have theoretically investigated the ways in which non-governmental actors might effectively serve to discipline firms so as to engage in meaningful self-regulation. Baron (2001, 2003) systematically addresses these topics by advancing the concept of "private politics": situations in which private interests attempt to influence collective actions by firms (and thus influence social order, generally speaking) without relying on public modes of order, such as lawmaking institutions. His theories, for example, demonstrate how nonmarket activists can successfully induce firms to engage in

socially responsible practices by threatening (and launching) boycotts, engaging in media campaigns, and undertaking other activities aimed at influencing market competition.[7] Building on Baron's work, Innes (2006) demonstrates how the potential for consumer boycotts can induce firms either to commit to producing environmentally friendly products prior to bringing a product to market or to change their production technologies as the result of a boycott, even in the absence of government regulation. Also related to these approaches, Feddersen and Gilligan (2001) demonstrate how consumer activists can influence firm production decisions by strategically providing information about their choices to a (relatively) uninformed market.

Our work adds to these literatures on government regulation, self-regulation, and private politics, while differing from previous models in several ways. First, while effectively deriving a private politics equilibrium (similar to Baron and to Innes), government is still an important actor in our model, as we seek to identify conditions under which a political actor would explicitly want to establish industry standards, rather than leave standard setting to the market (and nonmarket) environment. Second, while we also consider the role of activists in disciplining firms (similar to Feddersen and Gilligan), we assume that activist intervention is a costly activity. Hence, we can identify how activists can influence market conditions based on their potential benefit from action. More broadly speaking, by accounting for the possibility of product-liability lawsuits, of strategic activists, 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 firms' decisions to self-regulate.

The Baseline Model

[7] 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.

To establish a baseline for our subsequent analysis, we begin by considering a world in which the government makes a very coarse decision regarding a regulatory mandate. More explicitly, we assume that the government can either set a "high" or "low" standard for product quality, and after establishing 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, which suggests best practices but does not have the force of law. Alternatively, one might also interpret government standards in our model as pertaining to firms that conduct business in an area where the government has no jurisdiction (e.g., U.S. labor practices have no influence over labor policies of U.S. firms that are sourcing in Asia). In our baseline model, we analyze scenarios in which the firm's quality decision is known with certainty as well as when consumers are less well-informed about the firm's quality choice.

If one assumes 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 chosen government regulatory mandate. In the case where 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 has mandated 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. Hence, firms will always meet government standards and will sometimes exceed them when their choices are publicly observable; but firms will never exceed government standards and only meet them when the government mandates low-quality goods, if their choices cannot be observed. These straightforward findings set the stage for our examination of nonmarket considerations in subsequent sections.

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 reaps its profits in the marketplace based on its quantity choice (q) in response to market demand. We leave to future work the strategic decisions of the government, focusing here instead on the subsequent market and nonmarket reactions to low ($s_g = 0$) and high ($s_g = 1$) government standards. We assume that the representative firm produces its product in a market where it faces the following inverse demand function:

$$p = \alpha - \beta q \qquad (1)$$

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

We assume that α 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:

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

where $d > 0$ captures the baseline price that a given firm can charge,[8] $s_g \in \{0, 1\}$ 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. 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 stamp of approval 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.

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:

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

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 $(d - c) > 1$.[9]

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

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

Market Clearance with Observable and Unobservable Firm Choices

[8] 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.

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 $s_f = 0$. In the market, the firm chooses its quantity of production to maximize these profits. Specifically, the equilibrium quantities $q^*\Big|_{s_g=1, s_{fm}=s_f=1} = \frac{d+2-c-\eta}{2\beta}$ and $q^*\Big|_{s_g=1, s_{fm}=s_f=0} = \frac{d-c}{2\beta}$ are produced when the firm chooses a low- and high-quality standard, respectively, given $s_g = 1$. These quantities, in turn, yield equilibrium profits equal to:

$\Pi^*|_{s_g=1, s_{fm}=s_f=1} = \frac{(d+2-c-\eta)^2}{4\beta} \geq \frac{(d-c)^2}{4\beta} = \Pi^*|_{s_g=1, s_{fm}=s_f=0}$. In other words, 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, we see that the equilibrium quantities produced by the firm would be $q^*\Big|_{s_g=0, s_{fm}=s_f=1} = \frac{d+1-c-\eta}{2\beta}$ and $q^*\Big|_{s_g=0, s_{fm}=s_f=0} = \frac{d-c}{2\beta}$ when the firm produces a low- or high-quality product, respectively. These quantities yield profits equal to

$\Pi^*|_{s_g=0, s_{fm}=s_f=1} = \frac{(d+1-c-\eta)^2}{4\beta}$ and $\Pi^*|_{s_g=0, s_{fm}=s_f=0} = \frac{(d-c)^2}{4\beta}$. Profits from the high-quality product could be greater than, or less than, the profits from choosing a low quality standard,

[9] The restrictions on d, c, and η were made to ensure that it is always in the firm's interest to produce some type of

depending on the marginal cost of producing high-quality goods, η. 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.

Proposition 1*: When government and firm choices are perfectly observable by the public, 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.

This proposition is illustrated in Figure 2, which identifies the conditions under which high-quality goods are produced by the firm in the absence of binding government regulations. For $\eta \in [1, 2]$, the firm chooses a quality standard that matches the government mandate. However, when $\eta < 1$, the marginal cost of producing high-quality goods is sufficiently low that, regardless of what standard the government chooses, high-quality goods will 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.

[Insert Figure 2 about here]

While this result is both relatively straightforward and normatively attractive, in that we can identify cases under which firms will voluntarily exceed government mandates ensuring the

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good, and thus to allow us to focus on the more substantively interesting cases and results.

production of high-quality goods, it relies on perfect information about firm choices of product quality. 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.

[Insert Figure 3 about here]

To analyze this scenario, we consider the same model as above, but now suppose the firm's quality decision is unobservable, as presented in Figure 3. 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 can be gleaned by consumers, and as a result, the market reacts as if $s_{fm} = s_c$. An interpretation of this assumption is that consumers could become informed, but the costs of doing so are prohibitively high. 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. Thus we set aside some market undermining behaviors here (Akerlof 1970). Nevertheless, we believe that a fairly unsophisticated, or naïve, public is plausible for most market transactions, given the baseline level of knowledge that most consumers possess about manufacturing and sourcing practices.

Given this formalization, if the government sets a high standard ($s_g = 1$) and the firm chooses $s_f = 1$, then the firm's profit is defined by:

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

In the market stage, the firm chooses its quantity to maximize profits, which yields $q^*\Big|_{s_g=1,s_f=1} = \frac{d + 2s_c - c - \eta}{2\beta}$ and profit equal to $\frac{(d + 2s_c - c - \eta)^2}{4\beta}$. In contrast, if the firm chooses $s_g = 0$, $\Pi^*\Big|_{s_g=1,s_f=0} = \frac{(d + 2s_c - c)^2}{4\beta}$, which clearly exceeds the profit that follows from a choice of high quality. Similar analysis reveals that if the government were to mandate 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.[10]

Proposition 2: *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.*

Having established a baseline for what occurs when the market possesses complete and perfect information versus incomplete information regarding firm production processes, we now turn to the extensions of identifying how *nonmarket* reactions, subsequent to production choices, might influence the propensity for firms to engage in meaningful self-regulation and either meet or exceed government mandates. For the purposes of analysis, one could focus on a variety of scenarios to consider the impact of nonmarket actors and reactions on firm decisions – ranging from consumer boycotts, to lawsuits, to public demonstrations intended to influence shareholder

[10] 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.

and consumer sentiment, and so forth. In the extensions that follow, we focus on two particular nonmarket reactions: the possibility of lawsuits and the role of information-providing activists.

Class Action Lawsuits and Self-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 in favor of 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 incident, a firm could plausibly 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 incomplete information game above, a product-induced disaster occurs with a certain probability, which is influenced by whether the firm initially chose a high-quality standard for its product. 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 profits that the firm can reap in the 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.

Consistent with the intuition in the incomplete information game, 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. Under certain conditions, however, the potential of a product-induced 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 given consumer expectations about the firm's product quality. 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.

We turn now to the formalization that yields these results. As presented in Figure 4, we now assume that after the firm has made its quality choice (s_f), the market ensues, subject to the specifications described above. After the first period of market behavior, we assume that with probability $\rho > 0$ a "disaster" occurs ($D = 1$), 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 $0 \leq \rho_1 < \rho_0 \leq 1$. In other words, the probability of disaster involves a baseline probability of an adverse event occurring, in conjunction with the level of quality chosen by the firm. Hence, if the firm chooses $s_f = 0$, the

probability of disaster equals the baseline probability, ρ_0, and high-quality products ($s_f = 1$) reduce this probability by ρ_1.

[Insert Figure 4 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.[11] 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 δ. More formally, second period profits in the case of an incident are defined as:

$$\Pi(Period\ 2)\big|_{D=1} = \delta[(d + s_f(1 + s_g) - \beta q - (c + \eta s_f))q - J] \qquad (6)$$

where $J \geq 0$ is the penalty that is handed down by the court as the result of its judgment.

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, 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.

[11] The court here acts automatically, rather than playing a more strategic role.

The model therefore features both the incentives to produce low-quality goods in light of consumer ignorance evident in Proposition 2 and the incentives for high quality under certain circumstances as in Proposition 1. 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 $J^*\big|_{s_g=0}$ and $J^*\big|_{s_g=1}$ are given in the Appendix, and can be analyzed using comparative statics techniques. Doing so yields the following proposition.

Proposition 3: *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 ρ_0 when $s_g=1$, and is decreasing in ρ_0 when $s_g = 0$ for sufficiently large s_c. Moreover, regardless of the government mandate, J* is:*

a) decreasing in δ, and
b) increasing in ρ_1 and η and decreasing in d and s_c iff ρ_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 Proposition 3 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 Proposition 3 thus characterize when the range of high-quality good production increases (when J^* decreases) or when it decreases (for increasing 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 (ρ_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 lower market value of high-quality goods, if their choice is revealed after a disaster. 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 government mandate, when firms have a larger stake in the future (δ 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 (ρ_0 low) it is difficult to induce a firm with a 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. 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.[12] A similar logic underlies the results regarding the reduction in the probability of disaster upon producing high-quality goods (ρ_1) and the marginal costs of high-quality good production (η).

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 ($J^*\big|_{s_g=0}$) to that for a high standard ($J^*\big|_{s_g=1}$). The results are given in the Appendix and are characterized in the following proposition.

Proposition 4: *When the baseline probability of disaster (ρ_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.*

[12] This logic may become clearer and the model predictions more intuitive if the judicial penalty differed based on the firm's quality choice. Exploring the case of $J = 0$ if the firm produced a high-quality good, an approach we plan to consider in the next iteration of the model, may shed more light on this issue.

The intuition behind Proposition 4 is aided by consideration of Figure 5. 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 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 5 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 our model, given the 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 detection, 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 the higher government standard.

Activists and Self-Regulation

Having identified how the possibility of lawsuits might induce self-regulation, we now consider how similar outcomes could possibly be obtained even without having to rely on any type of public 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 expends 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 punish those with low-quality goods.

This extension regarding activist behavior is relevant to many private sector activities. Often, 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 who hold certain goals. For example, 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. As such, these interested parties have an incentive to invest effort in uncovering the true nature of the production processes undertaken by various firms, and to try to reveal this 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 heavily influenced by consumers' expectations regarding their 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 given a high governmental standard than given a 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 6, following the first period of market clearance, 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 naïve 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 uncover the true product quality.

[Insert Figure 6 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 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 ½ consumer beliefs are static across the two periods, with probability ¼ the activist is believed but wrong, and ¼ of the time the activist is believed and correct. This last probability is increasing in effort while the other two are declining.

Regarding the activist's utility, we assume that the activist values rewarding high-quality firms and punishing low-quality firms.[13] Although the activist does not have the resources to punish and reward firms directly, the information revealed to consumers serves this role quite

well.[14] 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:

$$EU_A = -Z \mid s_{fm} - s_f \mid -e \qquad (7)$$

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 its actual choice. One might interpret Z as the 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 $s_c \geq 0.5$.[15]

The first step in deriving the equilibrium involves finding the optimal level of effort for each possible case of firm and quality government standards. First, if the firm chooses to produce high-quality goods ($s_f = 1$), the activist wishes, in equilibrium, to exert effort level equal to $e^*\big|_{s_f=1} = \frac{\sqrt{2}\sqrt{Z(3-2s_c)}}{2}$. 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

[13] 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 fundraising needed to continue their activities into the future, for example.

[14] A model of activist-led boycotts could be advanced in a similar manner to what we offer here.

[15] When $s_c < 0.5$ we find that the results of the model are quite similar to what we present here, the exception being when $Z \in [Z^*_L, Z^*_H]$, where preliminary analysis suggests that there are multiple pure strategy equilibria – one

sinks some minimal effort level to investigate and publicize the firm's true production choices. As such, it is sensible that $e^*\big|_{s_f=1}$ 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 firms' actual choices. This case holds for sufficiently large Z (for $Z \geq Z^*_H$, as described in the Appendix). For Z below this value, the activist's low effort level is insufficient to induce the firm to choose to produce a high-quality product.

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 $e^*\big|_{s_f=0} = \frac{\sqrt{2}\sqrt{Z(1+2s_c)}}{2}$. While higher than $e^*\big|_{s_f=1}$ (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 $Z \leq Z^*_L$, as described in the Appendix). Note that unlike $e^*\big|_{s_f=1}$, $e^*\big|_{s_f=0}$ 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, yet consumers are 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 enough 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.

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involving the firm producing high-quality goods, and the other involving the firm producing low-quality goods. Further analysis is required to speak definitely about this phenomenon.

[Insert Figure 7 about here]

In between Z^*_L and Z^*_H, as shown in Figure 7, 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 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. The probability x^* increases monotonically in Z from Z^*_L to Z^*_H.

This equilibrium as a whole is characterized as follows.

Proposition 5: *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 $e^*\big|_{s_f=0} = \dfrac{\sqrt{2}\sqrt{Z(1+2s_c)}}{2}$;

b) for $Z \geq Z^*_H$, the firm produces high-quality goods ($s_f = 1$) and the activist exerts effort level $e^*\big|_{s_f=1} = \dfrac{\sqrt{2}\sqrt{Z(3-2s_c)}}{2}$; 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}.*

Proposition 5 does not note differences between the case of a high government standard ($s_g = 1$) and a low government standard ($s_g = 0$). 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 $e^*\big|_{s_f=1}$ and $e^*\big|_{s_f=0}$ 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.[16] And, in the mixed strategy part of the equilibrium, e^*_{mix} also differs across these two cases. Proposition 6 notes the relative value of e^*_{mix} between the high and low government standard cases.

Proposition 6: *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 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 (lower probability of being detected) 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 standard, as characterized in Proposition 7.

[16] The order of these cutpoints between the cases of high and low government mandates is not consistent, but rather depends on values taken by key model parameters.

Proposition 7: *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 (δ) 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 naïve expectation of 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 η is sufficiently low.*

The intuition behind this set of findings is as follows. First, 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. Second, our result suggests that firms with substantial 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 only holds when high-quality goods are relatively cheap to produce in the case of a low government mandate. Put simply, firms with higher brand names tend to have a greater incentive in both periods of the model to produce higher quality goods than firms with lower brand names, and are thus induced to do so 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 (η) are high. Here, firms with high 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 conditioned by a high level of activist effort to produce the high-quality good.

Third, 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' naïveté 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.

Electronic Commerce and Financial Services

In considering the model findings, it is useful to return to our initial discussion about the potential virtues of industry self-regulation in the areas of internet privacy and financial services. More specifically, why was self-regulation ostensibly successful in internet privacy, but arguably less successful in managing financial markets and mortgage-lending institutions? Our theory provides some insight into this question.

Regarding internet privacy, while advocates of free markets favored the Clinton administration's decision not to impose federal privacy regulations on electronic commerce, the decision was made without a clear articulation of what institutions (if any) could effectively ensure that firms made the "right" choices, absent government oversight and enforcement activity. Similar to the actors in our model, government was deciding between setting a high standard ($s_g = 1$) or a low standard ($s_g = 0$) for internet privacy protections, and firms were making (unobservable) choices regarding their level of privacy protection. While Proposition 1 suggests that if these choices were perfectly observable, all firms would choose the socially appropriate level of privacy protections, Proposition 2 points to the clear incentives that firms had to only engage 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, Proposition 3 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 (in his dissent) argued that existing consumer protection and anti-fraud laws would be sufficient to induce self-regulation, as consumers would be able to 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, Proposition 3 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 were to emerge, they would likely involve the more prominent firms within 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.[17]

While disciplining high-profile firms via the judiciary might seem relatively difficult, Proposition 7 suggests how activists could possibly succeed where litigation fails. In the absence of explicit government regulation for online privacy ($s_g = 0$), 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 could for low-profile firms. Consistent with this intuition, history demonstrates that over the last several years, the major industry players (e.g., Microsoft, Amazon, eBay, etc.) have been very quick to respond to the

[17] 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

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 the financial services market. 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, which clearly dealt with a wide range of vibrant interest groups, the interest group environment surrounding financial services is notably less dense. In terms of the model, it might be fair 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. If anything, some of the most likely interest groups such as ACORN might have had a vested interest in facilitating opacity, as it ensured that their primary constituencies maintained strong lines of credit. As such, it might be

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of more systematic exploration.

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 Proposition 2 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.

Conclusions 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 endowed with 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 emerge 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 government enforcement. When the potential judicial penalty that follows from a product-

induced disaster is sufficiently high, or when activists have a sufficiently high reward from investigating and publicizing company practices, firms will either 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.

Building on this theoretical foundation, there are several theoretical and empirical extensions that would enhance our understanding of the relationships among governments, firms, and nonmarket institutions in facilitating meaningful regulation and self-regulation. First, and most notable, the government should be "brought back in" to the process by explicitly modeling 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 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. By modeling firms, interest groups, and other parties affecting the government's initial regulatory decision, future work can assess how firms' lobbying efforts interact with their propensities for self-regulation.

It might also be useful also to explore how government chooses to set regulatory standards when it possesses reasonably strong enforcement capacity. For a variety of industries it seems plausible that the government is better able to enforce its mandates than the way it is modeled here. As such, it would be worthwhile to identify the conditions under which

government might seek to impose and enforce industry mandates, rather than effectively "outsourcing" regulation to the self-regulatory environment that we currently analyze. This extension is particularly worthwhile if one believes that firms, interest groups, and other parties are able to influence the government's initial regulatory standard, as suggested above.

Finally, our theory points to many directions for potential empirical exploration. 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 examinations 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 (and influences on) government and self-regulation.

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Figure 1: Political Economy of Regulation and Self-Regulation

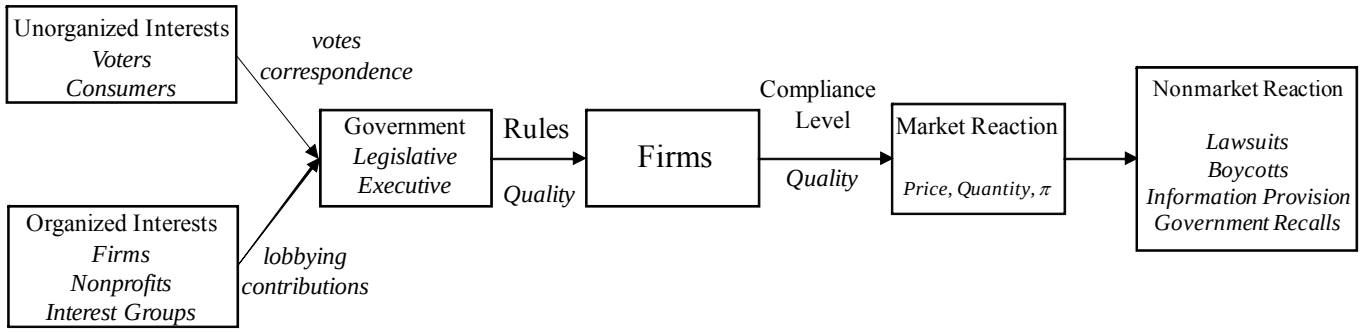


Figure 2: Conditions for Self-Regulation Given Perfect Information

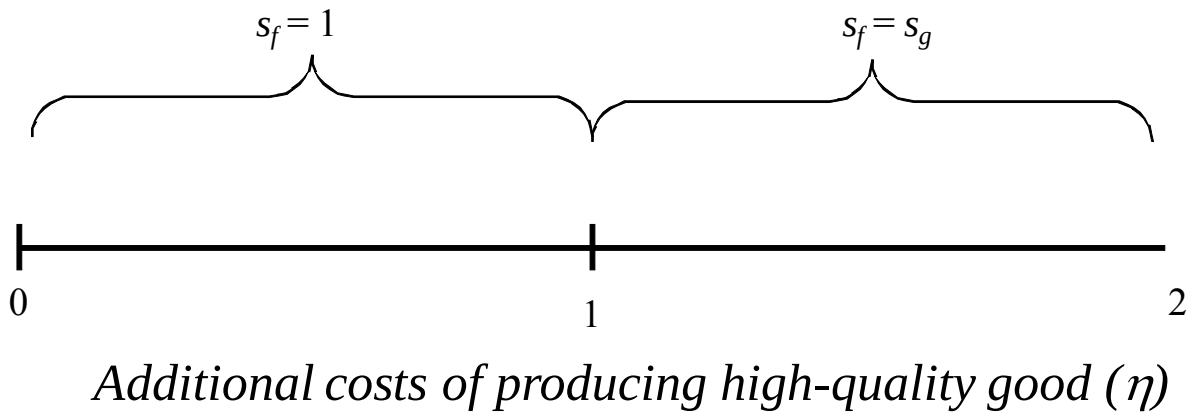


Figure 3: Regulation and Market Interactions with Incomplete Information

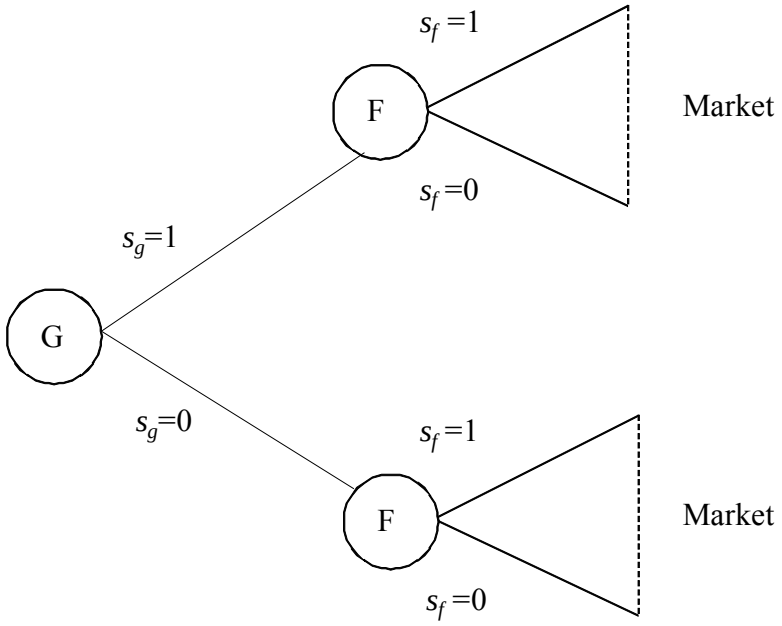


Figure 4: Regulation and Market Interactions with Judicial Institutions

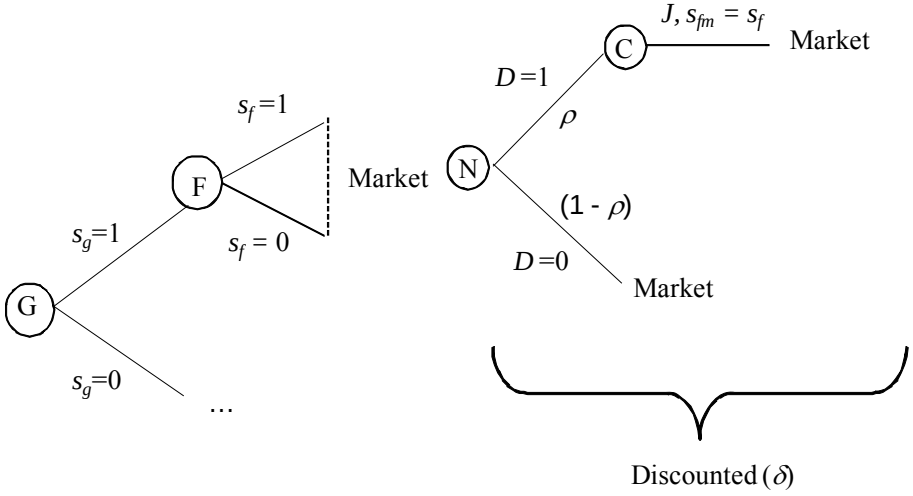


Figure 5: Self-Regulation Given Judgments and Government Standards

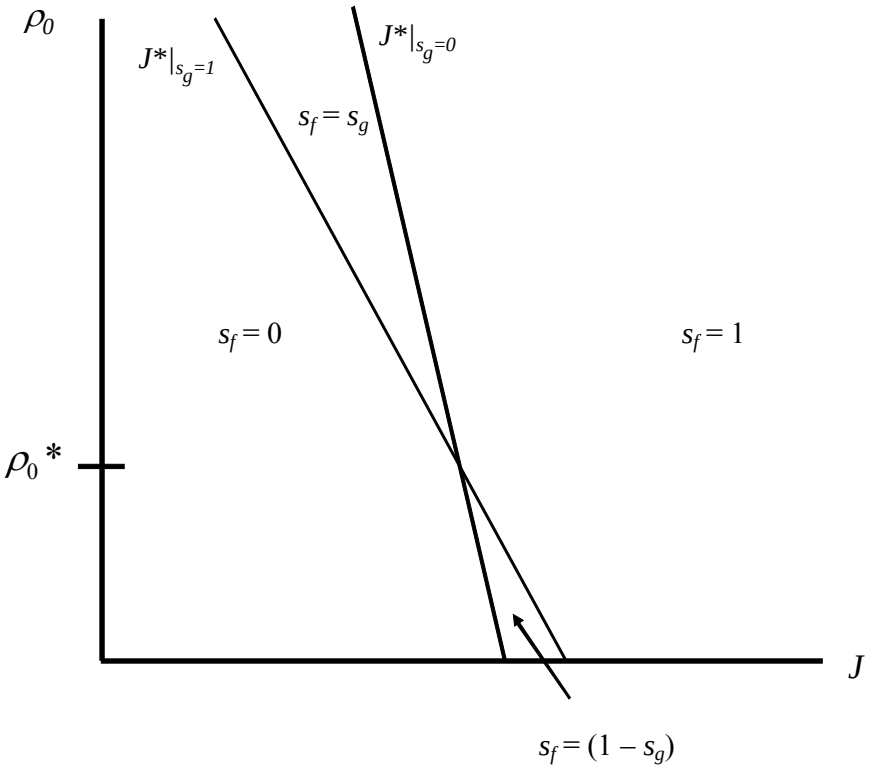


Figure 6: Regulation and Market Interactions in the Presence of Activists

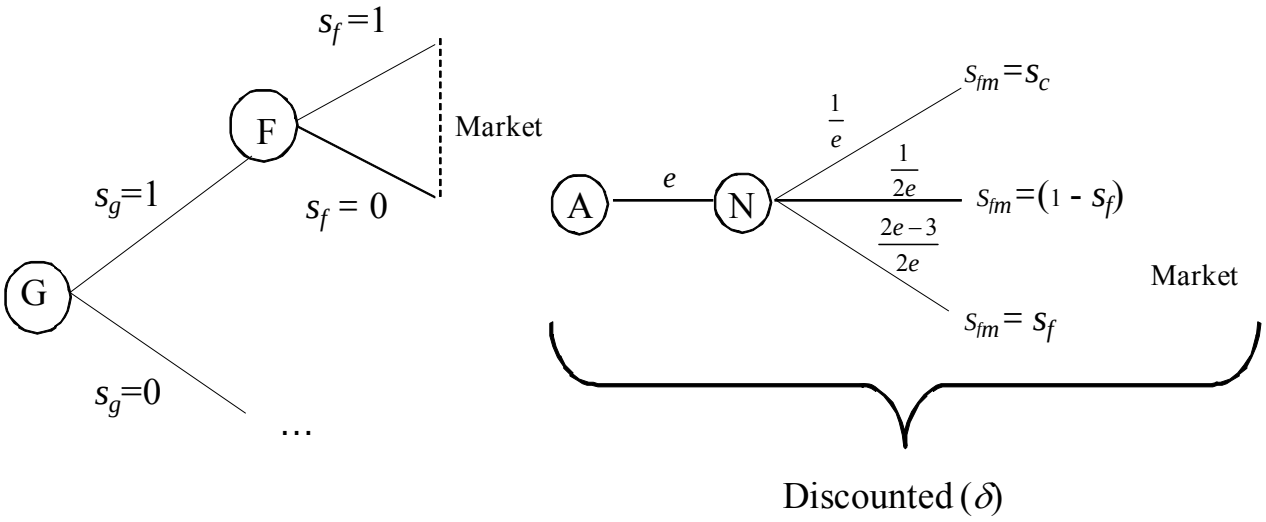
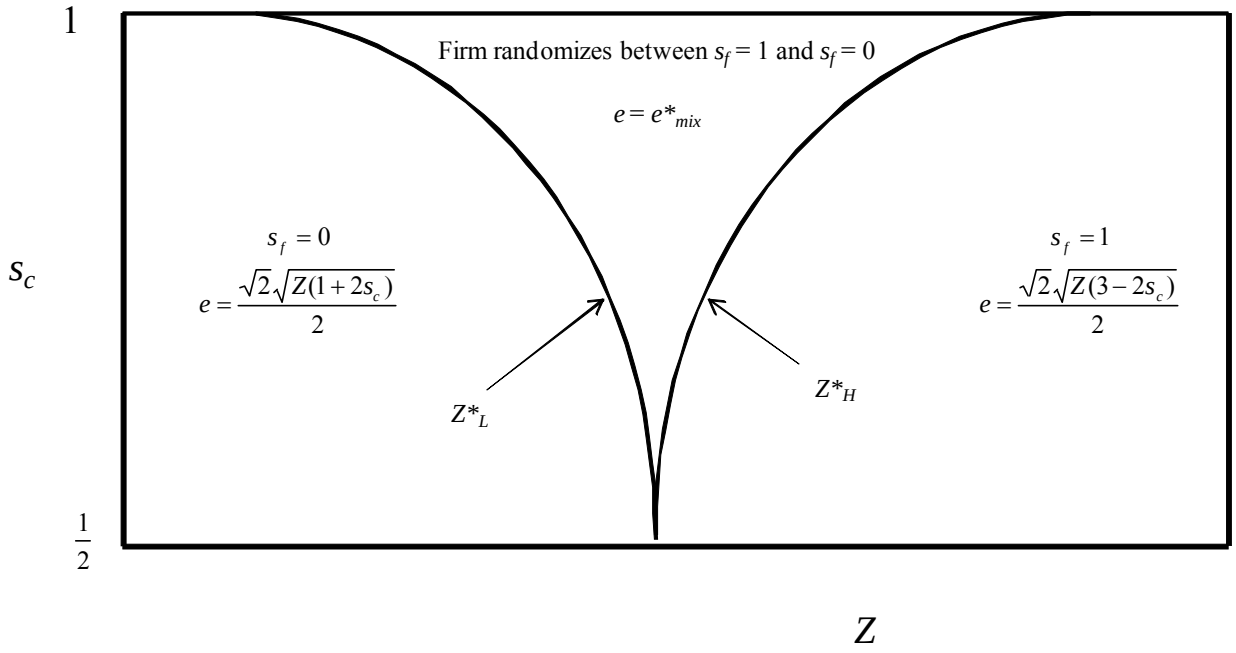


Figure 7: Equilibrium Self-Regulation Induced by Activists



Appendix

Proof of Proposition 1

Suppose government and firm choices are perfectly observable by the public, and government mandates 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 government mandates 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 Proposition 2

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 $\Pi\Big|_{s_g=1, s_f=1} = (d + 2s_c - \beta q - c - \eta)q$. Differentiating this expression with respect to q yields $q^*\Big|_{s_g=1, s_f=1} = \frac{d + 2s_c - c - \eta}{2\beta}$ 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 $s_g = 0$, then the firm's profit is defined by: $\Pi\Big|_{s_g=1, s_f=0} = (d + 2s_c - \beta q - c)q$. Differentiating this expression with respect to q yields:

$\frac{\partial \Pi\big|_{s_g=1,s_f=0}}{\partial q} = -2\beta q + d + 2s_c - c \Rightarrow q^* = \frac{d + 2s_c - c}{2\beta}$. Hence, $\Pi^*\big|_{s_g=1,s_f=0} = \frac{(d + 2s_c - c)^2}{4\beta}$, which is clearly greater than $\Pi^*\big|_{s_g=1,s_f=1}$, 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 $\Pi\big|_{s_g=0,s_f=1} = (d + s_c - \beta q - c - \eta)q$. Differentiating this expression with respect to q yields:

$\frac{\partial \Pi\big|_{s_g=0,s_f=1}}{\partial q} = -2\beta q + d + s_c - c - \eta \Rightarrow q^* = \frac{d + s_c - c - \eta}{2\beta}$. Hence,

$\Pi^*\big|_{s_g=0,s_f=1} = \frac{(d + s_c - c - \eta)^2}{4\beta}$. In contrast, if s_f=0, then the firm's profit is defined by

$\Pi\big|_{s_g=0,s_f=0} = (d + s_c - \beta q - c)q$. Differentiating this expression with respect to q yields:

$\frac{\partial \Pi\big|_{s_g=0,s_f=0}}{\partial q} = -2\beta q + d - s_c - c \Rightarrow q^* = \frac{d + s_c - c}{2\beta}$. Hence, $\Pi^*\big|_{s_g=0,s_f=0} = \frac{(d + s_c - c)^2}{4\beta}$, which is clearly greater than $\Pi^*\big|_{s_g=0,s_f=1}$ $\forall\ \eta \in (0, 2]$. Hence, regardless of what government standard is chosen, the firm will always choose $s_f = 0$.

Proof of Proposition 3

To prove the first part of Proposition 3 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:

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

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 δ. Likewise, the firm's expected profits if $s_f = 0$ can be characterized as the following:

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

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 $s_g = 0$,

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

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

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

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

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 Proposition 3 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:

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

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

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

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

$$\frac{\partial J^*|_{s_g=1}}{\partial d} = \frac{2\delta\rho_1(1-s_c)+\eta(1+\delta)-2\delta\rho_0}{2\beta\delta\rho_1} < 0 \text{ if } \rho_0 \geq \frac{2\delta\rho_1(1-s_c)+(1+\delta)\eta}{2\delta},$$

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

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

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:

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

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

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

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

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

Proof of Proposition 4

To prove Proposition 4, it is sufficient to identify the value of ρ_0 such that $J^*|_{s_g=1} = J^*|_{s_g=0}$. To identify this value, note that

$$J^*|_{s_g=1} - J^*|_{s_g=0} = \frac{\delta(\rho_1 - \rho_0)(2d - 2c - 2\eta + 2\eta s_c + 3) + \delta\rho_1 s_c(2c - 2d - 3s_c) + (1+\delta)2\eta s_c}{4\beta\delta\rho_1}, \text{ and}$$

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 Proposition 5

To prove Proposition 5, 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:

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

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:

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

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., $s_c > .5$).

Given these optimal activist effort levels, we can calculate the firm's expected utility for choosing $s_f = 1$ as follows:

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

$$+ \frac{1}{2e^*|_{s_g=1,s_f=1}}(\frac{(d-c-\eta)^2}{4\beta}) + (\frac{2e^*|_{s_g=1,s_f=1}-3}{2e^*|_{s_g=1,s_f=1}})(\frac{(d-c-\eta+2)^2}{4\beta})]$$

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 actually 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 will not change, with probability $(\frac{1}{2e^*|_{s_g=1,s_f=1}})$ the activist will be 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 rvelation of the firm's choice, yielding firm profits equal to $\Pi^*|_{s_g=1,s_{fm}=s_f=1}$. By the same logic, the firm's expected profits from choosing $s_f = 0$ is as follows :

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

$$+ \frac{1}{2e^*|_{s_g=1,s_f=0,}}(\frac{(d-c+2)^2}{4\beta}) + (\frac{2e^*|_{s_g=1,s_f=0}-3}{2e^*|_{s_g=1,s_f=0}})(\frac{(d-c)^2}{4\beta})],$$

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 can characterize the firm's expected profit if it deviates to $s_f = 1$ from $s_f = 0$ as:

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

$$+\frac{1}{2e^*|_{s_g=1,s_f=0}}(\frac{(d-c-\eta)^2}{4\beta}) + (\frac{2e^*|_{s_g=1,s_f=0}-3}{2e^*|_{s_g=1,s_f=0}})(\frac{(d-c-\eta+2)^2}{4\beta})].$$

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 can characterize the firm's expected profit if it engages in such a deviation as:

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

$$+\frac{1}{2e^*|_{s_g=1,s_f=1}}(\frac{(d-c+2)^2}{4\beta}) + (\frac{2e^*|_{s_g=1,s_f=1}-3}{2e^*|_{s_g=1,s_f=1}})(\frac{(d-c)^2}{4\beta})]$$

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 $Z \le Z^*_L|_{s_g=1}$, the firm chooses a low standard , for $Z \ge Z^*_H|_{s_g=1}$ the firm chooses a high standard, and for $Z \in (Z^*_L\big|_{s_g=1}, Z^*_H\big|_{s_g=1})$, 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 $Z \in (Z^*_L\big|_{s_g=1}, Z^*_H\big|_{s_g=1})$, 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 $e^*_{mix}\big|_{s_g=1}$ 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 $e^*_{mix}\big|_{s_g=1}$, we then identify the probability that the firm plays $s_f = 1$ (*i.e.*, $x^*\big|_{s_g=1}$) 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:

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

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 $e^*_{mix}\big|_{s_g=1}$ that supports the firm's mixed strategy above yields the optimal probability distribution $x^*\big|_{s_g=1}$ that supports the mixed strategy equilibrium when $Z \in (Z^*_L\big|_{s_g=1}, Z^*_H\big|_{s_g=1})$. Due to space considerations, these optimal closed-form $e^*_{mix}\big|_{s_g=1}$ and $x^*\big|_{s_g=1}$ 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 Propositions 6 and 7

To prove Proposition 6, one must compare the magnitude 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 Proposition 7, one must differentiate $e^*_{mix}|_{s_g=1}$ and $e^*_{mix}|_{s_g=0}$ with respect to δ, *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.