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Private Politics and Public Regulation

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Abstract

Private politics are often introduced by market participants in the absence of public regulation. But when is private politics enough, efficient, or better than administratively costly public regulation? We present a novel framework in which we can study the interaction between regulation, self-regulation by the firm, and boycotts by the activists in a dynamic game. Our main results are the following. (i) The possibility to self-regulate saves on administrative costs, it therefore also leads to delays. (ii) The possibility to self-regulate benefits activists but harms the firm without the public regulator in place, the reverse is true with the regulator being present in the game. (iii) Without the public regulator, a boycott raises the likelihood of self-regulation, whereas if the regulator is present, it raises the likelihood of public regulation. (iv) Activism is a strategic complement to self-regulation, but a strategic substitute to public regulation. (v) In addition, the analysis generates a rich set of testable predictions regarding the regulatory outcomes and the duration of boycotts.

Keywords: Private politics, boycotts, war of attrition, activism, regulation, self-regulation, corporate social responsibility (CSR).

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1 Introduction

The recent literature on regulatory regimes highlights a number of trade-offs. For example, Shleifer (2005) and Djankov Glaeser, La Porta, Lopez-de-Silanes, and Shleifer (2003) describe different regulatory regimes as loci on an Institutional Possibility Frontier. When choosing the extent of the regulatory state, as opposed to relying on market forces, the society trades off the costs of potential chaos (disorder) and of excess rigidity (dictatorship). The society thus selects the most efficient means of regulation (Mulligan and Shleifer, 2005), which, by definition, is an alternative on the frontier. This paper contributes to the literature with a *positive* analysis of regulation by studying the regulatory environment that emerges in a game between the government (the public regulator), the sellers (firms), and the consumers (activists). We investigate *when* the market discipline provides a sufficient motivation for the firms to self-regulate, and *how* this motivation is affected by the threat of public regulation. The outcome of this game, and the corresponding regulatory environment, are driven by the interactions between the actors in interesting and perhaps surprising ways.

Market forces may, at times, be sufficiently strong to prompt firms to choose socially responsible actions because of accompanying price premiums (Feddersen and Gilligan, 2001; Bartling, Weber, and Yao, 2015). In other words, firms may self-regulate as the result of market forces alone. However, it is now quite common for firms to self-regulate as a result of pressure from activist groups. These groups seek to curb or limit certain business practices and may start campaigns and threaten to organize a boycott if their demands are not met (Baron, 2003). Textbook examples of effective and successful boycotts include those of Shell by Greenpeace in 1995 over sinking the outdated offshore oil storage facility Brent Spar, and of Citigroup by Rainforest Action Network (RAN) from 2000 to 2004 over lending to companies engaged in non-sustainable mining and logging. The campaign against Shell included organizing a successful boycott in Germany where sales at Shell gas stations fell by as much as 40% and an occupation of Brent Spar by Greenpeace activists. After two months of protests, the company gave in.[1] The campaign by RAN against Citigroup was much longer, and involved episodes like Columbia University students cutting their Citibank cards as well as picketing the residences of Citigroup's senior executives, but was also ultimately

[1] See Diermeier (1995). The statement released by Shell on June 20, 1995, contained: "Shell's position as a major European enterprise has become untenable. The Spar had gained a symbolic significance out of all proportion to its environmental impact. In consequence, Shell companies were faced with increasingly intense public criticism, mostly in Continental northern Europe. Many politicians and ministers were openly hostile and several called for consumer boycotts."

successful.[2]

Interestingly, not every boycott leads to self-regulation. For example, a number of activist groups boycotted Nestlé over its practice of marketing infant formula to mothers in the 1980s and 1990s. They formed coalitions such as INFACT (Infant Formula Action Coalition) in the U.S. and Canada and IBFAN (International Baby Food Action Network) in other countries such as Sweden, India, and New Zealand. Several years of boycotts did not lead to any credible voluntary action by Nestlé; instead the boycotts led to governmental interventions. In India, for example, the government effectively banned Nestlé's promotions of breast-milk substitutes and feeding bottles in 2003.[3] In other cases, the government intervened *before* activist campaigns. In 2010, McDonald's Happy Meals were banned in San Francisco by the city Board of Supervisors on the grounds that including a free toy with an unhealthy meal promotes obesity in children. While such practices by large corporations might be obvious targets for activists, in this instance public regulation came first.[4]

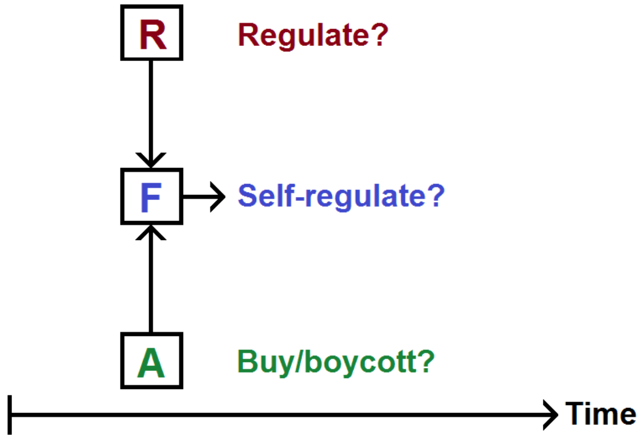
These examples suggest that the interaction between activists' campaigns and government regulation is quite complex. In the cases of Shell and Citi, activists succeeded in achieving their goals without government intervention. In the case of Nestlé, activists were unable to force the company to alter its practices but nevertheless prompted governments to act. In the case of McDonald's, government activity preempted and arguably crowded out possible efforts from activists. These differences raise a number of important questions. When is the firm's incentive to self-regulate sufficient, and how does it depend on the threat of boycotts or public regulation? What determines whether boycotts will be initiated, long-lasting, and successful? Do the answers depend on whether a public regulator is present or active? These questions are important, since "any case for public intervention relies crucially on the presumptive failure of market discipline to control disorder" (Shleifer, 2005: 444).

To address these questions, we present a simple but novel game between the public regulator (R), a firm (F), and a buyer or activist group (A). Our story does not require asymmetric information. The model is dynamic and we impose no assumptions on the sequence of moves. We analyze several

[2] See Baron and Yurday (2004).

[3] See Saunders (1996) and http://www.infactcanada.ca/The%20History%20of%20the%20Campaign.pdf.

[4] On November 2, 2010, the San Francisco Board of Supervisors supported, with 8-3 vote, a ban on McDonald's Happy Meal. According to the act, companies could not give away a free toy with a meal if the nutritional value of the meal exceeded certain parameters. The Board subsequently overturned the veto of Mayor Gavin Newsom, thereby leaving McDonald's with a list of choices: pull out Happy Meals from the menu, cut the portion, or remove the toy. McDonald's in San Francisco now avoids the effects of the law by charging 10 cents for a toy, a price that parents are reported to be willing to pay. (See http://abcnews.go.com/blogs/health/2011/11/30/mcdonalds-skirts-ban-charges-10-cents-per-happy-meal-toy/)



environments which only differ only in whether all three or just two of the players are present/active. This way, we can compare regulatory regimes and isolate the effect of each player.

The game between F and R is a simple stopping game. If R steps in by regulating F, the game is over. Alternatively, as long as the game is ongoing, F can decide to end the game by self-regulating. Thus, there are three possible outcomes: no regulation, public regulation, or self-regulation by the firm (see the figure). We follow Mulligan and Shleifer (2005) by assuming that a fixed cost is imposed if the regulator controls the firm.[5] This administrative cost is avoided if the firm self-regulates, so both F and R prefer self-regulation to public regulation. Thus, in contrast to Djankov et al. (2003), we do not *assume* that public regulation is on the efficiency frontier: while public regulation has a larger administrative cost, the cost of self-regulation will come in the form of *delay*.

If R were the *only* player in the game (because, for example, there was no way for F to credibly promise to self-regulate), the outcome would be simple. The regulator would then control the firm immediately and for as long as administrative costs were out weighted by regulatory benefits. The result would then be in line with Mulligan and Shleifer (Proposition 2), stating that R regulates more if this is inexpensive. This result, however, is dramatically reversed when F can self-regulate: in this case, we show that the larger the administrative costs of public regulation, the more likely it is that the outcome will be public regulation rather than self-regulation.

The explanation for this perverse result is the following. Since self-regulation is less expensive,

[5] Mulligan and Shleifer (2005: 1446) argue that "*It takes some political and administrative resources to organize a community to draft and adopt each new regulation, especially when the government enters a new area. In many cases, a new bureau must be set up and staffed to administer the new regulation, including finding violators. At least for some communities, these costs might be significant.*" Their empirical findings (p. 1468) also suggest that "*the results are strongly supportive of the fixed cost.*"

the public regulator acts (by controlling the firm) if and only if the firm is unlikely to self-regulate. The firm, however, self-regulates if and only if the regulator is expected to act. This contradiction implies that there cannot be an equilibrium in pure strategies. The unique equilibrium is in mixed strategies. The firm self-regulates over time at a (Poisson rate) just large enough that, for the regulator, waiting to regulate remains best response. If the administrative cost of regulating the firm is larger, the regulator is willing to wait even if the likelihood of self-regulation is smaller. It is then more likely that the regulator will, in equilibrium, step in and regulate the firm before the firm has chosen to self-regulate.

After this analysis of whether public regulation can drive socially responsible behavior, we next study whether market forces could suffice. That is, we replace the regulator by the activist in the game. The activist, however, cannot impose regulation on the firm. The activist can be interpreted as a buyer group and it can only decide to not buy from the firm, that is, it can boycott. A boycott is costly for the activist since it must forgo consumer surplus, buy an imperfect substitute, or inform other consumers to do so. A boycott is also costly to the firm, of course, since it may lose market shares. Since the boycott is costly to both A and F, each party hopes the other will concede and end the game. The firm can end the game by self-regulating, while the activist can end the game by stopping the costly boycott. We thus find it natural to model the boycott as a war of attriton.

The war of attrition is anticipated even before the boycott starts. Thus, the firm is willing to self-regulate even before a costly boycott begins, if it believes that the activist is quite likely to start one. The activist, in turn, is tempted to start a boycott only if the firm is otherwise unlikely to self-regulate. Thus, there is, again, no equilibrium in pure strategies, and the unique equilibrium is in mixed strategies.

With these two games as benchmarks, we finally explore the game with all three players A, F, and R. Interestingly, even though we (deliberately) assume that R does not care about the boycott *per se*, we show that R is in equilibrium imposing regulation more often during boycotts than at other points in time. In contrast, when the regulator is present, the firm self-regulates at the same rate whether or not there is an ongoing boycott.

The analyses of boycotts as wars of attrition, both with and without a public regulator, are novel and generate a large set of testable predictions. Still, our most important contribution may be in comparing the regimes: (i) While self-regulation Pareto dominates public regulation, the firm takes advantage of this fact and thus delays before regulation is introduced; the delay is so large that public regulation is an equally good choice. (ii) Thus, while the possibility to self-regulate is good for A but bad for F when there is no public regulator present, the opposite is true when R is a player in the game. (iii) In the absence of the regulator, the firm self-regulates in order to prevent or end a boycott; in contrast, if the regulator is present, self-regulation occurs a rate that makes the regulator just willing to wait and hope for self-regulation. (iv) When the regulator is absent, the activist initiates and continues a boycott since this motivates the firm to self-regulate; in contrast, when the regulator is present, the motivation to start or continue a boycott is that public regulation is, in equilibrium, more likely to occur during a boycott than at other times. (v) While activism is a strategic complement to self-regulation, it is a strategic substitute for public regulation.

The literature on public regulation is too large to be surveyed here. However, the papers we have already mentioned do contain several relevant references. Our contribution to this literature is to explore the interaction between public regulation and private politics. The term 'private politics' was coined by David Baron (2001; 2003) to describe non-market interactions between individuals, NGOs, and companies, and the term has since been at the center of a relatively small but growing literature. The puzzle why firms *self-regulate* was addressed by Baron (2001), who assumed that a company's reputation positively affects demand for its product and thus is worth investing in. When (flow) investments in Corporate Social Responsibility (CSR) affect the firm's reputation (stock), then activists can increase the firm's investment in CSR by occasionally destroying its reputation when it becomes too good (Besanko, Diermeier and Abito, 2011).[6]

The *activists* play a more central role in Baron and Diermeier (2007) where firms are faced with demands to adopt certain practices or else face a damaging campaign. The analysis is extended by Baron (2009) who studies two competing firms and allows the activist to be an (imperfect) agent of citizens. Baron (2012) further develops this case by allowing for two activist groups, one more moderate and one more aggressive. It then makes sense for each of the two competing firms to cooperate with the moderate group, as it makes a boycott less likely.[7]

The *boycott* itself has attracted quite a bit of attention, as it is one of the most typical, and certainly the most visible, implementations of private politics. Diermeier and Van Mieghem (2008) model boycotts as a dynamic process, where each of the (infinitesimal) consumers decides whether to

[6] The idea that socially responsible actions of companies have a positive impact on their reputation and performance has found empirical support. For example, Dean (2004) finds that a pre-existing reputation at the time of crisis affects consumers' perception of a brand after the crisis, while Minor and Morgan (2011) document that companies with good reputation take a lower hit on their stock price as a result of a crisis.

[7] See also Baron (2010), which looks at cooperative arrangements where various types of activist groups can enforce cooperative behavior.

participate depending on the number of other consumers boycotting the product. When consumers are heterogenous, Delacote (2009) observes that boycotts are less effective since consumers who buy a lot (and thus could hurt the firm most) are also the ones with the highest cost of boycotting. Innes (2006) builds a theory of boycotts under symmetric information suggesting that an activist either targets a large firm with a short boycott that would show that the activist invested in preparation, or targets a small firm, in which case the boycott is persistent, as the firm finds it too costly to satisfy the demands of the activist. In the latter case, activists in order to redistribute customers to a larger, more responsible firm. Baron (2014b) specializes the model to study multiple firms, multiple activists, and the matching between them.

In contrast to the literature above, we find it natural to model the boycott as a *war of attrition* between the activists and the firm. Related to this, but as a distinct contribution, our model is fully dynamic and we impose no assumption on the sequence of moves. This allows us to analyze and derive predictions regarding the length of boycotts and the likelihood of various types of actions at any point in time.

Furthermore, our paper has been one of the first to study government regulation and self-regulation, that is, private and public politics, in a unified framework. Few papers study self-regulation in the shadow of the government. For example, Maxwell, Lyon, and Hackett (2000) let firms lobby for regulation in order to effectively restrict entry to the market where they operate, and self-regulation allows the firm to stay in business. In Baron (2014a), the government as well as activists have preferences over the degree of the firm's self-regulation. In equilibrium, the firm will satisfy the demands of the government up to the point where the government would reach a gridlock if it attempts further regulation, but it might also put in place additional self-regulation in order to prevent an activist campaign. In Lyon and Salant (2013), activists target individual firms and force them to self-regulate in order to change their behavior in subsequent lobbying game. For instance, a firm that has been forced to reduce its level of emission will later prefer that other firms do the same and thus support rather than oppose public regulation. In another recent paper, Daubanes and Rochet (2013) study an environment where regulators are perfectly informed about the social optimum but are captured by the industry, while activists are poorly informed but committed to their cause. The authors derive conditions under which the presence of activists improves social welfare. As in our model, activists cannot accept monetary transfers, but unlike our model, the firm can get transfers from the government. All these papers either involve a static model or assume a particular sequence of moves, and therefore they miss the dynamic interactions we believe are important.

The next section presents the three players and their simple strategy sets. In Section 3, we analyze all interesting institutional arrangements: we start by solving the game with only the firm and the regulator, and then only the firm and the activist, before we combine the models and allow for all three players in the same game. While we begin by assuming that the activist can afford only one boycott, Section 3.4 shows how our results survive when multiple campaigns are permitted. The different institutional arrangements are compared in Section 4, illuminating the interaction between private politics and public regulation. After a brief concluding section, Appendix A presents all proofs while Appendix B shows presents an extension to multiple activist groups or regulators. Appendix C presents *all* equilibria in *all* the subgames, besides the interior equilibria emphasized in the main text.

2 The Model

The game has up to three players: the firm F (it), the regulator R (she), and the activist A (he). Time is continuous and infinite, and we do not impose any assumption on the sequence of moves. We proceed with introducing the (very simple) action sets of each of the players one by one. To simplify, the flow payoffs in the status quo are normalized to zero, and r is the common discount rate.

At any point in time, before the game ends, F can decide whether or not to self-regulate. We assume self-regulation is an irreversible action that ends the game: if F self-regulates, it cannot later reverse this decision. The firm's flow cost of self-regulation is $c > 0$, such that F realizes the present-discounted payoff $-c/r$ at the moment it decides to self-regulate. To A, the flow benefit of self-regulation is $b > 0$. The net flow benefit or surplus to the regulator, when the firm has self-regulated, is measured by $s > 0$. We do not assume any relation between these parameters, although the case where $s = b - c$ is a natural benchmark if the regulator internalizes the payoffs of F and A and has no other interests.

The strategy space for R is also binary. As long as the game has not yet ended, R can decide whether or not to impose public regulation on F. Public regulation is also irreversible and thus an action which ends the game. Regulating F is more expensive than self-regulation for both F and R. For example, R may need to monitor and frequently visit the firm, and F must deal with red tape, documentation, paperwork, or bureaucratic rules. Alternatively, R may be 'clumsy' and unable to regulate F in the most efficient manner. To capture these additional costs, we assume that if F is regulated by R, F's flow cost increases to $c + k$, where $k > 0$. The flow benefit to R is $s - q$, where $q \in (0, s)$ measures R's additional cost of monitoring the firm. In other words, we assume that both R and F prefer self-regulation to regulation. The conflict of interest emerges because R ranks the status quo lowest, while F favors the status quo.[8]

The activist is assumed to pay no regulatory costs and experiences the flow benefit b regardless of whether regulation is public or private (i.e., whether R has imposed regulation on F, or F has self-regulated). Since A cannot impose any regulation, he cannot end the game. However, if A is a buyer (or a buyer group), he can certainly decide whether to stop buying the product. That is, as long as the game has not ended, A can choose, at any point in time, to start a boycott. If the boycott has already started, A can decide to end it.

The boycott is costly for both F and A: F pays a flow cost $h > 0$, where the *harm* h represents lower sales or disruptions to F's operations; A bears a flow cost of $e > 0$, where e represents *expenses* such as the need to keep the public interested, organize events that are interesting to the media, and perhaps also A's lost consumer surplus when the good is not purchased. We assume that $h > c$, so self-regulation is better for F than an eternal boycott (otherwise, the boycott would have no bite on its own).

Initiating a boycott may also involve a fixed cost for A, such as the cost of initially informing and organizing customers. It is convenient to measure this expense as $\underline{e}/r$, such that $\underline{e}$ is the flow-cost equivalence. We permit $\underline{e} < 0$, in which case A actually benefits from initiating or announcing a boycott; after all, announcing a boycott may lead to publicity and member support. Similarly, in addition to the flow cost h, F may experience an instantaneous cost if a boycott starts. Intuitively, F may suffer some reputational harm as soon as customers become aware of the boycott, independently of how long the boycott lasts. It is convenient to measure this immediate harm as $\underline{h}/r$, where $\underline{h}$ is the flow-cost equivalence. However, a fraction $\delta \in [0, 1]$ of this cost may be recovered the moment when (and if) the boycott is called off by A. If δ is large, the consumers are quite "forgiving" and the firm's initial loss is soon restored. These assumptions and parameters are in line with Baron (2012).[9]

The following table summarizes the flow payoffs of the game. Note that R's flow payoff is unaltered by a boycott; this assumption is made for simplicity, and it will become clear that small departures from this assumption will not alter our results.

[8] The equilibrium would be straightforward if either $q > 0$ or $k > 0$. In either case, R would regulate immediately.

[9] In Baron (2012), β denotes the share that may not be recovered if the boycott is called off. With our notation, $\beta = 1 - \delta$.

Payoffs	Status quo	Self-regulation	Regulation	Boycott	At start	At end
Activist	0	b	b	$-e$	$-\underline{e}$	0
Firm	0	$-c$	$-(c+k)$	$-h$	$-\underline{h}$	$\delta \underline{h}$
Regulator	0	s	$s-q$	0	0	0

All parameters are publicly known and each player maximizes the present discounted value of expected payoffs. The players cannot commit to their strategies or actions in advance. We start by assuming that once a boycott has taken place and ended, it is impossible to start a new boycott (Section 3.4 relaxes this assumption). This implies that the game has three possible subgames, referred to as *phases*: Phase 0 is the initial phase of the campaign where the boycott has not yet started; Phase 1 refers to an ongoing boycott; Phase 2 begins if the boycott is recalled by A.

As in most dynamic games, we have a large set of subgame-perfect equilibria. We thus restrict attention to Markov-perfect equilibria (MPEs), so that the strategies only depend on payoff-relevant partitions of histories, i.e., whether the boycott has started and/or ended. Consequently, each player's probability of acting must be independent of how much time the players have spent in each phase. The MPE can thus be characterized by the Poisson rates $\{\phi_t, \gamma_t, \alpha, \rho\}$, $t \in \{0, 1, 2\}$. The Poisson rate $\phi_t \in [0, \infty]$ measures the equilibrium rate of self-regulation during Phase $t \in \{0, 1, 2\}$, while $\gamma_t \in [0, \infty]$ is the rate of public regulation. For example, the probability of self-regulating within a small time interval dt during the boycott is $\phi_1 dt$, so $\phi_1 = \infty$ would mean immediate self-regulation. In equilibrium, A starts a boycott at Poisson rate $\alpha \in [0, \infty]$, and during a boycott, A ends it at rate $\rho \in [0, \infty]$.

3 Analysis

The analysis is organized as follows. We first investigate the equilibrium in the game between the firm and the regulator only. The second subsection studies the game between the firm and the activist, this time ruling out the regulator. Section 3.3 combines the two parts and investigates the equilibrium with all three players active in the game. Section 4 draws important conclusions by comparing the three regulatory regimes.

3.1 Public Regulation vs. Self-regulation

We first analyze the game when F and R are the only players in the game. As long as neither regulation nor self-regulation have taken place, the game is practically a stopping game. The firm can stop the game by self-regulating and ensure the payoff $-c/r$ to F and s/r to R, while R can stop the game by directly regulating the firm, giving payoffs $-(c+k)/r$ to F and $(s-q)/r$ to herself. Note that both players would actually prefer self-regulation to direct regulation when k and q are positive. Despite these rankings, there is no equilibrium where F self-regulates immediately: if F did so, R would simply wait; but if R never imposed regulation, F would not self-regulate.

A stationary MPE is characterized by two Poisson rates: ϕ, the rate of self-regulation by F, and γ, the rate of direct regulation by R. For F, it is a best response to self-regulate if and only if γ is large. For R, it is a best response to regulate F if and only if ϕ is small. The two best response curves cross exactly once, permitting a unique equilibrium. Once we have derived the equilibrium Poisson rates, it is straightforward to derive the expected delay before the game ends, as well as the likelihood of the two alternative regulatory outcomes. For example, since the game ends at rate $\phi+\gamma$, the expected duration of the game is simply $1/(\phi+\gamma)$, and the probability of self-regulation is $\phi/(\phi+\gamma)$. These formula generate several testable implications.

Proposition 1 *(i) There is a unique equilibrium, and it is in mixed strategies:*

$$\begin{aligned}\phi &= r\frac{s-q}{q} \in (0,\infty)\,,\\ \gamma &= r\frac{c}{k} \in (0,\infty)\,.\end{aligned}$$

(ii) The expected delay before regulation or self-regulation is introduced is:

$$\frac{1}{\phi+\gamma} = \frac{1/r}{c/k+s/q-1} \in (0,\infty)\,.$$

(iii) The probability for regulation to be public is:

$$\frac{\gamma}{\phi+\gamma} = \frac{c/k}{c/k+s/q-1} \in (0,\infty)\,.$$

The comparative statics of part (i) are interesting. If q decreases, R's cost of regulating F directly becomes smaller. Then, all things equal, R would prefer immediate regulation. The best response for F would then be to self-regulate immediately, which in turn makes R better off waiting. In equilibrium, for R to remain indifferent, F must self-regulate at a higher rate, which means that ϕ is a decreasing function of q. Thus, as R becomes more efficient, its intervention is less likely to be required, as F will be more likely to self-regulate quickly. Similarly, a larger surplus s makes R more tempted to regulate unless F self-regulates at a higher rate, which is precisely what will happen in equilibrium.

It follows that the more costly the additional cost of the 'red tape,' the longer we should expect to wait before any kind of regulation is introduced (part ii). Thus, administrative cost-savings (large

q or k) increases delay. The intuition is that, on the one hand, F becomes more eager to preempt direct regulation when k is large, and R can thus regulate at a lower rate while still ensuring that F is willing to act. On the other hand, R's reluctance to pay the additional administrative cost is abused by F, which thus becomes less likely to self-regulate at any point in time. This also explains the perverse result that the more costly administration is to R, the more likely R is to eventually administer the regulation (part iii).

The equilibrium expected payoffs are the following. The firm gets $u^F = -c/r$ since one best response is to self-regulate. The regulator must receive $u^R = (s-q)/r$, since direct regulation is a best response for her. If the activist is present (although passive), his expected payoff is:[10]

$$u^A = \frac{b}{r}\frac{\phi+\gamma}{\phi+\gamma+r} = \frac{b}{r}\left(1-\frac{1}{c/k+s/q}\right). \tag{1}$$

In other words, the activist is better off if the stakes are high (s and c are large) while the additional cost of public regulation (k and q) are small. This is precisely the situation where regulation is not delayed for very long.

3.2 Private Politics

While the previous section studied self-regulation in the shadow of the government, we now focus on self-regulation in the shadow of private politics. That is, we now study the game between F and A only.

When A can afford only one boycott, the game can be solved by backwards induction. Thus, consider first Phase 2, the situation *after* the boycott has ended. In this phase, only F is capable of taking an action. Since self-regulation is costly, F prefers to stick to the status-quo and not self-regulate:

$$\phi_2 = 0.$$

This outcome implies that both players receive a payoff of zero when entering Phase 2. This is anticipated during the boycott, Phase 1. The boycott is costly for both players, but each of them can unilaterally stop the costly game. If A ends the boycott, we enter Phase 2, where A's flow payoff of 0 is larger than his flow payoff during the boycott, $-e < 0$. But F can also end the boycott by self-regulating and pay the cost c, which is assumed to be smaller than the firm's cost of the boycott, $h > c$.[11] Thus, on the one hand, each player would strictly benefit from acting

[10] The activist is indifferent between self-regulation and government regulation, and the joint arrival rate of these regulations is $\phi+\gamma$.

[11] If instead $c > h$, F would never give in during a boycott, and thus A would immediately end it.

and stopping the game if the *other* player is *not* expected to end the game anytime soon. On the other hand, each player benefits more if the other player acts. Thus, the boycott is a war of attrition where each player hopes that the opponent will concede. Note the difference to the previous subsection, where F favored the status quo.

As in any war of attrition, there are two corner solutions: $(\phi_1, \rho) = (\infty, 0)$ and $(\phi_1, \rho) = (0, \infty)$. In both these equilibria, the boycott ends immediately. The more interesting equilibrium is the one in mixed strategies where the boycott lasts, in expectation, a positive amount of time. Only in this equilibrium can the boycott actually be observed. Since both players are acting with a positive probability in this equilibrium, we call it *interior.*

Proposition 2 *(i) There is a unique interior equilibrium in the boycott game:*

$$\phi_1 = r\frac{e}{b} \in (0, \infty), \tag{2}$$

$$\rho = r\frac{h-c}{\delta\underline{h}+c} \in (0, \infty). \tag{3}$$

(ii) The expected duration of the boycott is:

$$\frac{1}{\rho+\phi_1} = \frac{1/r}{e/b + (h-c)/(c+\delta\underline{h})}.$$

(iii) The probability that the boycott succeeds is:

$$\frac{\phi_1}{\rho+\phi_1} = \frac{1}{1+b(h-c)/e(c+\delta\underline{h})}.$$

While there is no self-regulation *after* the boycott ($\phi_2 = 0$), the firm may be willing to self-regulate *during* the boycott ($\phi_1 > 0$) since the boycott is harmful. As a simple consequence, self-regulation is more likely during than after the boycott. This obviously explains why A is willing to continue a boycott even if it is expensive.

Part (ii) is quite intuitive. Boycotts can be expected to last a long time if the stakes are high (in that b or c are large) relative to the costs (e and h) of continuing the boycott.

The more surprising result is part (iii) of the proposition. It is apparently *not* the case that the boycott succeeds if and only if the benefit of self-regulation (b) outweights the cost (c). On the contrary, the boycott is likely to succeed if b is small while c is large! It is well known that mixed-strategy equilibria often gives counter-intuitive results, and the explanation is here the following. If the stakes are high for a player in the game, then conceding is attractive only if the other players are less likely to concede. If the player is just willing to concede, it must thus be that if he/it values success more, the other player gives in at a lower rate, so a failure becomes more likely. In other words, boycotts over issues about which A does not care too much (b small) tend to be short and effective. In contrast, if A cares more deeply about the issue, F will regulate at a lower rate and the boycott will be longer and less effective. This is a consequence of A's inability to commit to a longer boycott from the start.[12]

This intuition also explains why the boycott is more likely to succeed if A finds the boycott costly. If e is large, A is willing to continue the boycott only if F is likely to self-regulate (which implies that ϕ_1 must increase). Hence, the boycott is *more* likely to succeed if e is large. If h is large, however, F is willing to wait only if A is expected to soon call off the boycott (i.e., ρ must increase), implying that the boycott must be *less* likely to succeed.

To complete the analysis of Phase 1, note that the activist's equilibrium payoff is $u_1^A = 0$, since ending the boycott is a best response. The firm's equilibrium payoff is $u_1^F = -c/r$, since self-regulation, which generates this payoff, is a best response of the firm.

Consider now Phase 0, before the boycott has started. Suppose that, in this initial phase of the campaign, the players anticipate that starting a boycott will lead to the interior equilibrium analyzed above.[13] The boycott is costly to F, who is therefore willing to self-regulate if A is sufficiently likely to initiate a boycott. If self-regulation is likely, however, then A prefers to *wait* rather than to start an expensive boycott. As before, A wishes that F acts, but unlike the previous case, F wants A to wait rather than to act. The equilibrium is therefore unique and it may be in mixed strategies.

Suppose the interior equilibrium is expected during the boycott. The incentive to start a boycott is then quite small: once the costly boycott has started, it is a best response for A to immediately end it, even though this ensures no self-regulation in perpetuity. If $\underline{e} > 0$, a boycott will then never start, and F will therefore never self-regulate.[14] If $\underline{e} < 0$, however, A *gains* from starting a boycott (e.g., reputation-wise), and so a boycott is possible.[15] The more "aggressive" A is (i.e., the smaller $\underline{e}$ is), the more likely self-regulation before a boycott starts. If self-regulation is costly (c is high), then it is more likely that A will need to boycott (thus, α must be higher). However,

[12] For example, RAN cared deeply about rainforest (saving it was the sole purpose of their existence as an activist group), but was almost ready to give up after many years of campaigning when Citigroup got a blow to its reputation due to relations with Enron. This event increased Citigroup's need to restore its reputation. In terms of our model, we may interpret this as an increase in $\delta\underline{h}$ and, consequently, a decrease in ρ, the rate at which the activist (RAN) would give up. This event thus increased the likelihood of success, according to Proposition 2.

[13] Appendix C characterizes *all* equilibria for Phase 0 for each of the three equilibria of Phase 1.

[14] A boycott may be possible when $\underline{e} > 0$ if the players expect the equilibrium $(\phi_1, \rho) = (\infty, 0)$ for Phase 1 (see Appendix C).

[15] If this gain is very large ($-\underline{e} > b$), it becomes a dominant strategy for A to start a boycott, and fearing this, F would self-regulate immediately. In the more interesting, intermediate case where $\underline{e} \in (-b, 0)$, F must self-regulate at a positive rate to prevent a boycott.

if the reputational harm from a boycott ($\underline{h}$) is large, then α is lower, and it is more likely that self-regulation will occur *before* the boycott. The following proposition verifies these intuitions and adds additional insights.

Proposition 3 *(i) Anticipating the interior equilibrium for Phase 1, the unique equilibrium for Phase 0 is:*

$$\alpha = r\frac{c}{\underline{h}} \text{ and } \phi_0 = r\frac{(-\underline{e})}{b+\underline{e}}$$

if $\underline{e} \in (-b, 0)$*. If* $\underline{e} > 0$*, then* $\alpha = \phi_0 = 0$*, and if* $\underline{e} < -b$*, then* $\alpha = \phi_0 = \infty$*.*[16]

(ii) If $\underline{e} \in (-b, 0)$*, the probability for a boycott is:*

$$\frac{\alpha}{\phi_0 + \alpha} = \frac{1}{1 + (-\underline{e})\,\underline{h}/c\,(b - (-\underline{e}))}.$$

The proposition suggests that boycotts are likely to occur over 'big' issues, which are beneficial to A and costly for F, while less important issues are likely to be settled in the pre-boycott phase. Furthermore, firms with recognizable brands, which have a lot to lose ($\underline{h}$ large), are more likely to be socially responsible and self-regulate before experiencing a boycott. This is in line with stylized facts; such companies often choose to self-regulate and invest in CSR.

3.3 Public Regulation Meets Private Politics

While the above subsections analyzed the two-player games, we now consider the situation where A, F, and R are all present. In Phase 2, once the boycott has ended, A is no longer capable of taking any action. The game is then between F and R only, and the outcome is exactly as described by Proposition 1, Section 3.1. We thus have that, in Phase 2, there is a unique stationary MPE characterized as follows:

$$\phi_2 = r\frac{s-q}{q} \text{ and } \gamma_2 = r\frac{c}{k}.$$

Section 3.1 also characterized the payoffs to F, R, and A in this subgame. This is anticipated during Phase 1 of the game, when each of the three players can decide whether to end the game.

Just as in Phase 1 where R is not present, the war of attrition has multiple equilibria. We will again focus on the interior equilibria where each player acts with some positive probability.[17]

Remarkably, the rate of self-regulation ϕ_1 during the boycott is the same as in the post-boycott game, ϕ_2. In both cases, the rate of self-regulation must be such that R is just indifferent between

[16] The equilibrium need not be unique in the borderline cases, $\underline{e} = 0$ and $\underline{e} = -b$. If $\underline{e} = -b$, any $\alpha \geq rc/\underline{h}$ is an equilibrium if just $\phi_0 = \infty$. If $\underline{e} = 0$, any $\alpha \leq rc/\underline{h}$ is an equilibrium if just $\phi_0 = 0$.

[17] Just as in the case without the regulator, there are two other equilibria in addition to the interior one. We describe both in Appendix C: in one equilibrium, the firm gives in immediately and the activist never gives in during a boycott; in the other, the regulator takes no action during the boycott but the firm self-regulates at a higher rate (so high that $\phi_1 + \gamma_1$ stays the same as in Proposition 4).

waiting and administering regulation.[18] However, for A to be willing to continue the costly boycott, the aggregate level of regulation must occur at a faster rate during the boycott than after it. Consequently, it is the *regulator* who must step in and regulate at a faster rate during the boycott. This implies that the activist is motivated to continue the boycott because public regulation is more likely during the boycott is than after it.

We say that a boycott 'succeeds' if it is terminated by either public regulation or self-regulation.

Proposition 4 *(i) There is a unique interior equilibrium during the boycott:*

$$\begin{aligned} \phi_1 &= r\frac{s-q}{q} = \phi_2, \\ \gamma_1 &= r\left[\left(\frac{c}{k}+\frac{s}{q}\right)\frac{e}{b}+\frac{c}{k}\right] > \gamma_2, \\ \rho &= r\left[\left(\frac{c}{k}+\frac{s}{q}\right)\frac{e}{b}\frac{k}{\delta\underline{h}}+\frac{h}{\delta\underline{h}}\right] \in (0,\infty)\,. \end{aligned}$$

(ii) The expected duration of the boycott is:

$$\frac{1}{\phi_1+\gamma_1+\rho} = \frac{1/r}{(c/k+s/q)\left[1+\left(1+k/\delta\underline{h}\right)e/b\right]-1+h/\delta\underline{h}}.$$

(iii) The boycott succeeds with probability:

$$\frac{\phi_1+\gamma_1}{\phi_1+\gamma_1+\rho} = \frac{(c/k+s/q)\left[1+e/b\right]-1}{(c/k+s/q)\left[1+\left(1+k/\delta\underline{h}\right)e/b\right]-1+h/\delta\underline{h}}.$$

The boycott ends sooner if it is expensive, just as earlier in Section 3.2 (and with the same intuition). Further, if regulation is very beneficial to A, he is willing to end the boycott only if regulation during Phase 1 is, in any case, unlikely. Since the rate of self-regulation does *not* depend on b, it must be the case that R regulates less if b is large, and this implies a longer-lasting boycott, as above. By comparing to Proposition 2 and the case without R, we can see that A is more likely to call off the boycott before it has succeeded (in that ρ is larger) when R is present.

The proposition delivers a large number of empirically testable predictions. For example, the boycott is more likely to be long-lasting and result in self-regulation is if b is large, c is small, or e is small. If consumers are forgiving ($\delta\underline{h}$ large) or the boycott is inexpensive to F (h small), the boycott is likely to be long-lasting but successful.

The equilibrium payoffs in this subgame are the following. The firm receives $-c/r$ since self-regulation is a best response. The regulator receives $(s-q)/r$, since direct regulation is a best

[18] This result is driven by the assumption that R is indifferent whether the boycott continues or ends. If R disliked the boycott, F would self-regulate at a higher rate during the boycott. Thus, the key insight is *not* that self-regulation must be independent of whether there is a boycott, but that (even) if this happens to be the case, the rate of public regulation must differ across the phases, *even if* the regulator herself should be rather indifferent as to whether there is a boycott.

response for her. The payoff to the activist is $u_1^A = u_2^A$ as given by equation (1), since a best response for him is to end the boycott and enter Phase 2.

Consider next Phase 0, before the boycott has started. At this stage, the firm can already self-regulate rather than risk future boycotts or public regulation. Similarly, R can decide to regulate and, in this way, end the game. If A decides to start the boycott, however, we enter Phase 1 described above. As before, we here focus on the interior equilibrium where all players act with some chance.

Just as before, the rate of self-regulation is such that R is indifferent between regulating and postponing regulation. A is willing to start a costly boycott only if this increases the chance for either kind of regulation. Consequently, R must impose regulation at a lower rate before the boycott has started if $\underline{e} > 0$. Therefore, the motivation for A to start a boycott is that *public* regulation becomes more likely, not that F becomes more likely to self-regulate (it won't).

Proposition 5 *(i) Suppose that the players anticipate the interior Phase 1 equilibrium. There is a unique interior equilibrium in the pre-boycott phase if* $\underline{e} \in (0, bq/s\,[1 + ks/cq])$*:*

$$\begin{aligned}
\phi_0 &= \phi_1 = \phi_2 = r\frac{s-q}{q} \in (0,\infty)\,, \\
\gamma_0 &= r\frac{bc/k\underline{e} - (c/k + s/q)\,s/q}{b/\underline{e} + c/k + s/q} \in (0,\gamma_2)\,, \\
\alpha &= r\frac{k}{\underline{h}}\frac{(c/k+s/q)^2}{b/\underline{e} + c/k + s/q} \in (0,\infty)\,.
\end{aligned}$$

(ii) The probability for a boycott is then:

$$\frac{\alpha}{\phi_0 + \gamma_0 + \alpha} = \frac{(c/k+s/q)^2\,\underline{e}/\underline{h}}{(c/k+s/q)^2\,\underline{e}/\underline{h} + (c/k+s/q)\,(b-\underline{e})\,/k - b}.$$

The proposition provides a rich set of comparative statics. For example, if $\underline{e}$ is small, then A is quite tempted to initiate the boycott unless R regulates at a higher rate. Thus, an "aggressive" activist with a small cost of initiating a boycott will in fact be less likely to ever actually start one. If b is large, A has more to gain from initiating a boycott, because he wants regulation more and a boycott is a way to get it faster. To keep A willing to wait, regulation must be more likely.

Parameter $\underline{e}$ deserves some further discussion. If $\underline{e} > bq/s\,(1 + ks/cq)$, A will not start the boycott even if $\gamma_0 = 0$. But if $\underline{e}$ decreases, it becomes less expensive to initiate a boycott and A is willing to wait only if γ_0 increases, which must thus be the case in equilibrium. Therefore, for a larger γ_0, F becomes more eager to self-regulate unless the boycott is less likely to start. Consequently, α must increase in $\underline{e}$ to keep F indifferent. This intuition also suggests that if $\underline{e}$

approaches zero, γ_0 converges to γ_2 from above, and α converges to zero. If $\underline{e} < 0$, A would be willing to postpone the boycott only if $\phi_0 + \gamma_0 > \phi_2 + \gamma_2$, which can only hold if $\gamma_0 = 0$, implying that the equilibrium is not strictly "interior".[19] In this case, the pre-boycott game between F and A is similar to the one in the previous section where the regulator was absent.

The equilibrium payoffs at the very start of Phase 0 are the following. The firm gets $-c/r$ since self-regulation is a best response. The regulator receives $(s-q)/r$, since public regulation is a best response. The payoff to the activist is given by (1), minus the cost $\underline{e}/r$ of starting the boycott.

3.4 Multiple Campaigns and Equilibria

The analysis above could employ backward induction to solve the game because we assumed that activists can organize only one boycott. This assumption is quite weak: given the rates of public regulation characterized earlier, A would never *want* to start another boycott, because the probability of public regulation is larger after the boycott than before if $\underline{e} > 0$.[20] If $\underline{e} = 0$, however, an activist may be motivated to start another boycott after the first one failed. Thus, we now set $\underline{e} = 0$ and show that our main results continue to hold if multiple and sequential corporate campaigns are permitted.

If a corporate campaign can be re-started, then Markov-perfection must imply that the equilibrium rates of actions must be the same before and after the boycott, since the two subgames are equivalent, although the rates can of course be different *during* the boycott. As before, Phase 0 refers to the situation without a boycott and Phase 1 to a situation with a boycott currently in place. There are now multiple Markov-perfect equilibria since what matters for A is the rate of actions during boycotts *relative* to other times. For example, if ϕ_0 is large, A may be willing to start a boycott if just ϕ_1 is even larger.

Consider first the situation where R is not a player in the game.

Proposition 6 *Suppose multiple boycotts are possible and there is no regulator. For every* $\phi_0 > 0$

[19] Indeed, $\phi_0 + \gamma_0 > \phi_2 + \gamma_2$ implies that either $\gamma_0 > \gamma_2$ or $\phi_0 > \phi_2$. In the first case, F would stricty prefer to self-regulate (it is indifferent in Phase 2, without a threat of boycott!), which means that R would not regulate, a contradiction. This implies that $\phi_0 > \phi_2$, but then we know (from the definition of ϕ_2) that R strictly prefers to wait, so $\gamma_0 = 0$.

[20] When rates must be identical before and after a boycott, A would never start a boycott if $\underline{e} > 0$, given that a best response is to immediately end it: this is costly, and nothing would be achieved. If $\underline{e} < 0$, A would prefer to start and end boycotts as often as possible.

there is an interior equilibrium where

$$\begin{aligned}
\phi_1 &= \phi_0\left(1+\frac{e}{b}\right)+r\frac{e}{b}>\phi_0,\\
\alpha &= r\frac{c}{\underline{h}},\\
\rho &= r\frac{h-c}{\delta\underline{h}}.
\end{aligned}$$

The proposition confirms the main findings from Section 3.2: The firm is self-regulating at a higher rate during boycotts than at other times, particularly if the boycott is costly to A relative to his benefit from regulation. If self-regulation is costly to the firm, the boycott must start at a higher rate and end at a slower rate (i.e., more time will be spent in the boycott phases).

Consider next the situation with the regulator present.

Proposition 7 *Suppose multiple boycotts are possible and there is a regulator. There is no equilibrium where $\gamma_0 > rc/k$, but for every $\gamma_0 \in (0, rc/k)$ there is an interior equilibrium where:*

$$\begin{aligned}
\phi_1 &= \phi_0 = r\frac{s-q}{q},\\
\gamma_1 &= \gamma_0\left(1+\frac{e}{b}\right)+r\frac{es}{bq}>\gamma_0,\\
\alpha &= r\frac{c-k\gamma_0/r}{\underline{h}},\\
\rho &= r\frac{h-c}{\delta\underline{h}}+\frac{k\gamma_1}{\underline{h}\delta}=r\frac{h-c}{\delta\underline{h}}+r\frac{sek/bq+(1+e/b)\,k\gamma_0/r}{\underline{h}\delta}.
\end{aligned}$$

Just as in Section 3.3, the rate of self-regulation is constant over time and independent of the presence of a boycott. Furthermore, the rate of public regulation must be larger during a boycott than at other times, particularly if the boycott is costly to A relative to his potential gain (i.e., if e/b is large). As before, boycotts and public regulation are strategic substitutes: If γ_0 increases (then γ_1 must increase, as well), the boycott starts at a lower rate and ends at a higher rate. Boycotts are thus both rarer and shorter when the R's activity (measured by γ_0) is large. Conversely, if the probability of a boycott (α) is large, then the probabilities of public regulation (both γ_0 and γ_1) must decrease.

4 Comparisons and Results

This section summarizes the main contribution of the paper. The above rather mathematical description of the equilibria is certainly interesting in and of itself, and provides a large set of empirically testable implications. Several of the comparative static results are also robust in that they hold whether or not the regulator is present in the game.[21] Other results, however, are sensitive to whether the regulator is present. In fact, some of the consequences of private politics are completely reversed when combined with public regulation. This section contrasts the different institutional arrangements to illuminate how private politics and public regulation differ and interact.

4.1 Private Politics vs. Public Regulation

Is private politics working? Is it sufficient and perhaps even better than public regulation? To address these questions we start by comparing (i) only private politics with (ii) only public regulation.

Without the regulator R, the game between A and F may lead to self-regulation or boycotts. However, the outcome is likely to be delayed, and the boycott itself is costly for both parties. The outcome of the boycott is not efficient, in the sense that it is *not* the case that the boycott succeeds if and only if $b > c$. However, the final outcome is necessarily free of administrative costs.

With public regulation (and no private politics), on the other hand, the regulator R will regulate the firm at costs that are (by assumption) larger than the costs of self-regulation. Though this outcome is less efficient than self-regulation, it comes without the delay associated with private politics.

Result 1

(i) Without R, private politics lead to an outcome without administrative costs, but the process is delayed and costly.

(ii) With R, and without private politics, the regulatory outcome is costly, but the process is without delay or costs.

4.2 Is Self-Regulation Beneficial?

To further explore the relationship between private and public politics, we here investigate the impact of self-regulation. So far, we have taken for granted that F is able to commit to self-regulation. In some situations, however, firms have no such credibility, commitment power, or ability to verify its action. The strategy to self-regulate is therefore not available to F.

[21] For example, if regulation is very beneficial to A, (so that parameter b is large), then the boycott tends to last longer. If regulation is costly to F (in that parameter c is large), then the boycott is more likely to be successful. If the boycott is expensive for A (e is large), then the boycott is likely to be shorter. If the boycott is harmful to F (h large), then it is both shorter, and more likely to fail. If F expects a large gain when the boycott ends ($\delta \underline{h}$ is large), e.g., because customers are "forgiving", then A must end the boycott and give up at a lower rate in equilibrium. Thus, forgiving consumers imply that the boycott is likely to be long-lasting as well as successful. All these comparative statics results hold with as well as without a regulator.

The consequence of allowing for self-regulation depends on the institutional arrangements. In the presence of A but without R, it is the possibility for F to self-regulate that motivates A to target F. The ability to self-regulate is then bad for F but good for those benefitting from regulation. In contrast, when R is present (with or without A), the inability to self-regulate would imply immediate public regulation. The ability to self-regulate makes R hope for an outcome free of administrative costs, but this process involves delay. With R, the possibility to self-regulate is thus good for F but bad for A.

Result 2

(i) Without R, the ability to self-regulate makes regulation more likely, the activist better off, and the firm worse off.

(ii) With R, the ability to self-regulate makes regulation delayed, the activist worse off, and the firm better off.

4.3 What Drives Self-Regulation?

What drives self-regulation and CSR? Perhaps the most visible consequence of introducing the regulator above was on the effect on self-regulation. In the game between the firm and the activist only, the firm was motivated to self-regulate to pre-empt a boycott (if the boycott had not yet started) or to end an ongoing, costly boycott. Thus, the likelihood of self-regulation depended on the parameters characterising the activist's preferences. With the regulator in place, however, the firm was motivated by the fear of being directly regulated by the buraucrat. In this case, the likelihood of self-regulation was only dependent on the parameters characterizing the regulator's preferences. The reason for this was that the public regulator was assumed to value regulation, but not whether there was a boycott in place. As a result, the rate of self-regulation was constant and independent of whether or not a boycott was (or had been) ongoing.

Result 3

(i) Without R, self-regulation is driven by the threat of a costly or long-lasting boycott.

(ii) With R, self-regulation is driven by the threat of costly public regulation.

4.4 The Effects and Drivers of Boycotts

The rationale for a boycott is quite different in the cases with and without a public regulator. In the absence of R, the purpose of starting a costly boycott is that F is more likely to self-regulate during the boycott. In the presence of the regulator, the rate of self-regulation is pinned down, and only the total rate of regulation may respond to A's actions. Namely, the rate of public regulation is higher during the boycott and lower before the boycott. Thus, in the presence of a regulator, A's motivation to start and continue a costly boycott is that R is more likely to act during a boycott than at other times.

Result 4

(i) Without R, a boycott raises the likelihood of self-regulation.

(ii) With R, a boycott raises the likelihood of public regulation.

4.5 Strategic Complements vs. Substitutes

The above results reveal how private politics and public regulation interact. If there is no regulator in place, the ability to self-regulate is necessary for a boycott to have any impact, and the possibility to boycott is necessary for the firm to bother with self-regulation. Activism and self-regulation are thus stratetic complements: the possibility of one motivates the other.

The interaction between activism and public regulation is rather different. By comparing Propositions 2 and 4, one can show that A is more likely to give up the boycott (in that ρ is larger) when R is a player in the game. This result also follows by comparing Propositions 6 and 7, or single-handedly from Proposition 7 when we consider equilibria where R is more active (i.e., when γ_1 or γ_0 is larger): the more active R, the faster A will end the boycott; the slower the boycott will start; and the less likely it is that it will ever start. Conversely, if we consider equilibria (described by Proposition 7) where A is more active (α is larger), then it must be that both γ_1 and γ_0 are smaller. Activism and public regulation are thus strategic substitutes.

Result 5

(i) Private politics and self-regulation are strategic complements.

(ii) Private politics and public regulation are strategic substitutes.

The interaction between public regulation and self-regulation cannot be described in terms of complementarity/substitutability. Instead, we may say that while public regulation motivates self-regulation, self-regulation discourages public regulation.

The comparative analysis above is interesting for at least two reasons. First, it is important to know what happens when private politics become a more common feature of business and the economy. It may be particularly important to know how the benefit of public regulation depends on whether private politics is likely.

Second, even for a given institutional landscape there may be multiple equilibria. Depending on the parameters, we may not only have an equilibrium where all three players are active; we may also have equilibria where only two players are active (leaving out the regulator or the activist, in particular). In this situation, the discussion above provides insight into how the equilibria differ and which is preferable to whom.[22]

5 Conclusion

This paper develops a unified framework for studying regulation, self-regulation, and activism, and the interactions between them. The model is dynamic and does not impose strong restrictions on the sequence of moves.

In the game between the regulator and the firm, there cannot be an equilibrium in pure strategies: The firm is willing to self-regulate only if the regulator is likely to regulate, but the regulator intervenes only when it is unlikely that the firm will self-regulate. The unique equilibrium is in mixed strategies and the outcome is likely to be public regulation if, perversevely, the regulator finds this costly. Public regulation is introduced despite the fact that both the firm and the regulator would rather prefer self-regulation as an outcome.

In the game between the firm and the activist, the model of the boycott becomes a war of attrition: the firm hopes that the activist gives in by ending the boycott, while the activist hopes the firm gives in by self-regulating. The firm self-regulates to preempt or end a boycott, while the boycott is started or continued because the firm is more likely to self-regulate during a boycott than at other times.

When all three players are present, we explain why the firm self-regulates at the same (Poisson) rate whether or not there is a boycott in place. Public regulation, in contrast, is more likely to be introduced during a boycott than at other times, and this is what motivates the boycott when the regulator is present, despite the assumption that the regulator has no contact with the activist and does not care about the boycott per se.

Our analytical results allow us to characterize the length and likelihood of boycotts, the probabilities of success, and the probabilities for self-regulation versus public regulation. These results generate a rich set of testable comparative statics. Nevertheless, our most interesting findings come from comparing the different institutional settings. While the possibility to self-regulate provides benefits to the activist but costs to the firm when there is no (active) regulator in the game, the

[22] A more detailed description of all the equilibria of the game is available in Appendix C.

reverse holds when an active regulator is present. Compared to public regulation, private politics and self-regulation may lead to an outcome that is more efficient and without administrative costs, but the process is likely to be costly and delayed.

Our main results are robust in that they continue to hold if we allow for multiple sequential boycotts. Appendix B also permits multiple activist groups and multiple firms, while our working paper (Appendix C) characterizes all equilibria, beyond the interior ones emphasized above. Our workhorse model has thus proven to be sufficiently flexible to allow extensions in several directions. This is promising for future research, which we believe should also permit multiple competing firms, collaboration between activists and firms, and more complicated interaction (such as lobbying) between the firms, the activists, and the regulator. This research agenda will give us a deeper understanding of the relationships between private politics and public regulation.

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Appendix A: Proofs

Proof of Proposition 1. (i) Expected payoffs of waiting can be calculated with the same method as in the proof of Proposition 2 (see below). The firm is willing to self-regulate if and only if the flow cost of self-regulation is smaller than the expected flow cost when risking direct regulation:

$$c \leq \frac{\gamma (c+k)}{\gamma + r} \Leftrightarrow \gamma \geq r\frac{c}{k}.$$

The regulator is willing to regulate directly if and only if the associated flow payoff is larger than what she can expect from waiting:

$$s - q \geq \frac{\phi s}{r + \phi} \Leftrightarrow \phi \leq r\frac{s-q}{q}. \tag{4}$$

The two best-response curves cross exactly once, establishing the result. Part (ii) and (iii) follow straightforwardly (using the same methods as in the next proof). ■

Proof of Proposition 2. (i) If A decides to continue and never end the boycott, his expected payoff is driven by F's rate of self-regulation, ϕ_1:

$$\int_0^\infty \phi_1 \exp(-\phi_1 t) \left(\int_0^t (-e) \exp(-r\tau)\, d\tau + \int_t^\infty b \exp(-r\tau)\, d\tau \right) dt = \frac{1}{r}\left(\frac{\phi_1 b - re}{\phi_1 + r} \right). \tag{5}$$

Here, t denotes the moment at which F self-regulates; this time is distributed exponentially with density $\phi_1 \exp(-\phi_1 t)$. Alternatively, A can receive zero by terminating the boycott. A is thus willing to continue if:

$$\frac{1}{r}\left(\frac{\phi_1 b - re}{\phi_1 + r} \right) \geq 0 \Leftrightarrow \phi_1 \geq r\frac{e}{b}.$$

F's strategy during the boycott depends on how likely it thinks A is to stop. The expected payoff from never self-regulating is:

$$\int_0^\infty \rho \exp(-\rho t) \left(\int_0^t (-h) \exp(-r\tau)\, d\tau + \delta \left(\underline{h}/r\right) \exp(-rt) \right) dt = \frac{1}{r}\left(\frac{r}{\rho + r}(-h) + \frac{\rho}{\rho + r}\delta \underline{h} \right),$$

while the payoff from self-regulating immediately is $-c/r$. Thus, F is willing to continue if

$$\frac{1}{r}\left(\frac{-rh}{\rho + r} + \frac{\rho \delta \underline{h}}{\rho + r} \right) \geq -\frac{c}{r} \Leftrightarrow \rho \geq r\frac{h - c}{\delta \underline{h} + c}.$$

If $\phi_1 = re/b$, A is willing to randomize and F is indeed randomizing, so both inequalities must bind, giving (2)-(3). If $\phi_1 > re/b$, A strictly prefers to continue, giving $\rho = 0$, so F strictly prefers to stop, giving $\phi_1 = \infty > re/b$. If $\phi_1 < re/b$, $\rho = \infty$, ensuring $\phi_1 = 0 < re/b$. We thus have three equilibria.

(ii) The boycott lasts longer than t if and only if neither A nor F act before t, i.e., with probability $e^{-\rho t} e^{-\phi_1 t}$. The duration of the boycott is thus distributed exponentially with density $(\rho + \phi_1) e^{-(\rho + \phi_1)t}$ and expected duration $1/(\rho + \phi_1)$. When we substitute from part (i), we arrive at the proposition.

(iii) The probability that F acts (self-regulates) earlier than A is $\int_0^\infty \left(\phi_1 e^{-\phi_1 t}\right) e^{-\rho t} dt = \phi_1/(\phi_1 + \rho)$. The result now follows from part (i). ■

Proof of Proposition 3. (i) The firm F is willing to self-regulate in Phase 0 if the cost of doing so immediately is smaller than the cost of waiting for a boycott and self-regulating thereafter:

$$\frac{c}{r} \leq \frac{\alpha}{\alpha + r} \left(\frac{\underline{h} + c}{r} \right) \Leftrightarrow \alpha \geq r \frac{c}{\underline{h}}.$$

If A starts the boycott, his payoff is $-\underline{e}$ since in the subgame that follows, it is a best response to end the boycott; he is thus willing to start the boycott if:

$$\frac{b}{r} \frac{\phi_0}{\phi_0 + r} \leq -\frac{\underline{e}}{r}. \tag{6}$$

If $\underline{e} \in (-b, 0)$, then (6) is equivalent to $\phi_0 \leq -r\underline{e}/\left(b + \underline{e}\right)$, so best-response functions cross once only, giving a unique solution. If $\underline{e} > 0$, (6) cannot hold, so a boycott never starts, and thus $\alpha = 0$ and $\phi_0 = 0$. If $\underline{e} < -b$, (6) holds for any ϕ_0, thus $\alpha = \infty$ and $\phi_0 = \infty$. Part (ii) follows straightforwardly as before. ■

Proof of Proposition 4. (i) Note that R is willing to regulate if and only if (4) holds, just as in Phase 2:

$$\phi_1 \leq r \frac{s - q}{q} \in (0, \infty). \tag{7}$$

Player A is willing to end the boycott if his payoff from continuing is smaller than the payoff in the post-boycott game (1):

$$\begin{aligned} -\frac{e}{r} + \left(\frac{b + e}{r} \right) \frac{\phi_1 + \gamma_1}{\phi_1 + \gamma_1 + r} &\leq \frac{b}{r} \left(1 - \frac{1}{c/k + s/q} \right) \Leftrightarrow \\ \phi_1 + \gamma_1 &\leq r \left[\left(\frac{c}{k} + \frac{s}{q} \right) \left(1 + \frac{e}{b} \right) - 1 \right]. \end{aligned} \tag{8}$$

The firm's payoff from self-regulation is $-c/r$, while if it never self-regulates, the payoff is:

$$\begin{aligned} & -r \int_0^\infty \left(\int_0^t (-h) \exp(-r\tau) d\tau + \int_t^\infty \left[\frac{\gamma_1}{\rho + \gamma_1} (-c - k) + \frac{\rho}{\rho + \gamma_1} (\delta \underline{h} - c) \right] \exp(-r\tau) \right) \cdot \\ & (\rho + \gamma_1) \exp(-(\rho + \gamma_1)t) dt \\ & = \int_0^\infty \left[h(1 - \exp(-rt)) + \frac{\gamma_1}{\rho + \gamma_1} (c + k) \exp(-rt) + \frac{\rho}{\rho + \gamma_1} (c - \delta \underline{h}) \exp(-rt) \right] \cdot \\ & (\rho + \gamma_1) \exp(-(\rho + \gamma_1)t) dt \\ & = h - \int_0^\infty [-h(\rho + \gamma_1) + \gamma_1(c + k) + \rho(c - \delta \underline{h})] \exp(-(\rho + \gamma_1 + r)t) dt \\ & = h - \frac{-h(\rho + \gamma_1) + \gamma_1(c + k) + \rho(c - \delta \underline{h})}{\rho + \gamma_1 + r} = \frac{rh + \gamma_1(c + k) + \rho(c - \delta \underline{h})}{\rho + \gamma_1 + r}. \end{aligned}$$

Thus, F is willing to self-regulate if and only if:

$$c \leq \frac{rh + \gamma_1 \left(c + k\right) + \rho \left(c - \delta \underline{h}\right)}{\rho + \gamma_1 + r} \Leftrightarrow \rho \leq \frac{r \left(h - c\right) + \gamma_1 k}{\delta \underline{h}}. \tag{9}$$

In an interior equilibrium, all these inequalities must hold as equalities; solving the equations completes the proof. Part (ii)-(iii) follow straightforwardly as before. ■

Proof of Proposition 5. (i) Just as in Phase 1, R is willing to regulate if and only if (4) holds. A is willing to initiate the boycott if and only if his Phase 1 payoff, less the cost of initiating the boycott, is larger than the payoff of waiting:

$$\frac{b}{r}\left(1-\frac{kq}{ks+cq}\right)-\frac{\underline{e}}{r}\geq\frac{b\left(\phi_0+\gamma_0\right)}{r\left(r+\phi_0+\gamma_0\right)}\Leftrightarrow\phi_0+\gamma_0\leq\frac{r}{1+\left(c/k+s/q\right)\underline{e}/b}\left(\frac{c}{k}+\frac{s}{q}\right)-r.$$

Substituting for $\phi_0=r\left(s-q\right)/q$, we find that F is willing to self-regulate if the flow cost of doing so is smaller than the flow cost of risking regulation or boycott:

$$c\leq\frac{\alpha\left(c+\underline{h}\right)+\gamma_0\left(c+k\right)}{\alpha+\gamma_0+r}.$$

All inequalities bind in the interior solution; solving the equations completes the proof. Part (ii) follows straightforwardly as before. ■

Proof of Proposition 6. For either $\alpha\in(0,\infty)$ or $\rho\in(0,\infty)$, A must be indifferent between stopping or not starting a boycott, giving the expected payoff $(b/r)\,\phi_0/\left(\phi_0+r\right)$, and continuing a boycott, giving the payoff (5). The latter payoff is larger if and only if

$$\phi_1\geq\phi_0+\frac{e\left(\phi_0+r\right)}{b}. \tag{10}$$

If (10) holds with equality, A is willing to randomize in both phases. Since (10) implies that, $\phi_1\in(0,\infty)$, F must be indifferent during the boycott, requiring:

$$\frac{c}{r}=\frac{h}{r}+\frac{\rho}{\rho+r}\left(-\frac{h+\delta\underline{h}}{r}+\frac{\alpha}{\alpha+r}\left(\frac{c+\underline{h}}{r}\right)\right). \tag{11}$$

When there is no boycott, F is willing to wait whenever

$$\frac{c}{r}\geq\frac{\alpha}{\alpha+r}\left(\frac{c+\underline{h}}{r}\right)\Leftrightarrow\alpha\leq r\frac{c}{\underline{h}}. \tag{12}$$

In an interior equilibrium, all inequalities bind, giving the results. Note that we also have non-interior equilibria, e.g., $\phi_0=0$, $\phi_1=re/b$, $\alpha\leq rc/\underline{h}$ if $\rho=r\left(h-c\right)/\left[c+\delta\underline{h}-\left(c+\underline{h}\right)\alpha/\left(\alpha+r\right)\right]$, so that (11) holds. ■

Proof of Proposition 7. In an interior equilibrium, A is indifferent between boycotting and not, and (10) must hold as equality after replacing ϕ with the total Poisson rate of any kind of regulation, so

$$\gamma_1+\phi_1=\gamma_0+\phi_0+\left(\gamma_0+\phi_0+r\right)e/b.$$

When R is indifferent (and thus willing to regulate) in Phase 0 as well as Phase 1, the start/end of the boycott does not affect R's payoff, and to make R indifferent, we must have $\phi_0=\phi_1=r\left(s-q\right)/q$, just as in Section 3. When we substitute this into the first equality, we get $\gamma_1=\gamma_0+\left(\gamma_0+rs/q\right)e/b$.

Finally, when there is no boycott, F is indifferent to self-regulation if:

$$\frac{c}{r}=\frac{\alpha}{\alpha+\gamma_0+r}\left(\frac{c+\underline{h}}{r}\right)+\frac{\gamma_0}{\alpha+\gamma_0+r}\frac{c+k}{r},$$

which gives α as a function of γ_0. When there is a boycott, F is indifferent to self-regulation if (9) holds as equality, as before, so $\rho=\left[r\left(h-c\right)+\gamma_1k\right]/\delta\underline{h}$, which gives ρ as a function of γ_0 (since γ_1 is a function of γ_0). Solving the equations concludes the proof. ■

Appendix B: Multiple Activists and Regulators

The basic model is flexible enough to allow for multiple activists (and even for multiple regulators). In fact, there is an interesting parallel between activists and regulators. The game between R and F is similar to the game between A and F, provided that in the latter, both players anticipate the equilibrium where F gives in immediately after the boycott has started (the games are then identical if we set $s = b$, $q = \underline{e}$, and $k = \underline{h}$). This suggests that R can be interpreted as a "tough" (or credible) activist who is always successful in achieving regulation if he decides to do so.

With this interpretation of R in mind, Section 3 may be thought of as a game between a firm F, a "soft" activist A, and a tough activist R; the latter is committed to never give up on a campaign, which prompts F to give in immediately to R, but not to A. Our results in Section 5 may thus be interpreted as follows: A becomes even "softer" (in that his boycotts are rarer and shorter) in presence of R, and R is less active before A has started a boycott than after it has ended, i.e., when A is no longer a player in the game. This suggests an effect of crowding out of activists by other activists.

Below, we study a setting where A and R are both tough or soft (before we permit $n > 2$ activist groups or regulators). We start with the first case: Consider the same game as in Section 3.3, but assume that once A starts the campaign, F is expected to give in immediately (this is indeed an equilibrium, albeit different than the interior one studied above). If, however, R acts first (at Phase 0), then R pays the extra cost q/r (as before). Thus, A hopes that R stops the game while R hopes that A stops instead, just like in a war of attrition. The firm, however, prefers the status quo. We will again focus on the interior equilibrium for Phase 0.

Proposition B1. *When both A and F are "tough", there is a unique interior equilibrium in Phase 0:*

$$\begin{aligned}
\phi_0 &= r\frac{bk/\underline{e} - c + \underline{h}\frac{s-q}{q} - k}{\underline{h} + k}, \\
\alpha &= r\frac{sk/q + c - bk/\underline{e}}{\underline{h} + k}, \\
\gamma_0 &= r\frac{c - \underline{h}\left[\frac{s}{q} - \frac{b}{\underline{e}}\right]}{\underline{h} + k}.
\end{aligned}$$

A full characterization of the equilibria, and the corresponding proofs, can be found in Appendix C. By comparing these results to those in the cases without A or without F, we can see that the presence of both A and R means that F is less likely to self-regulate. Players A and R both hope that the other player will act, and each is willing to take the burden and end the game only if F self-regulates at a low rate. Intuitively, the free-riding problem between A and R means that F can relatively safely postpone self-regulation. Of course, rather than interpreting A and R as both being "tough" activists, we could interpret both as (different) regulators, each trying to free-ride on the other. Alternatively, one can obviously think of R as a regulator and A as a tough activist. For any of these situations, the outcome is described by the proposition above.

Since the regulator, as mentioned, may be interpreted as a tough activist, the proposition implies that we have the following equilibrium for two symmetric activist groups (where $s = b$, $q = \underline{e}$ and

$k = \underline{h}$):

$$\begin{aligned}
\phi_0 &= r\frac{b}{\underline{e}} - r - r\frac{c}{2\underline{h}}, \\
\alpha_1 &= r\frac{c}{2\underline{h}}, \\
\alpha_2 &= r\frac{c}{2\underline{h}},
\end{aligned}$$

which implies $\alpha \equiv \alpha_1 + \alpha_2 = r\frac{c}{\underline{h}}$, just as before. The result in the case of n symmetric activist groups would be similar.

Proposition B2. *With n symmetric "tough" activists and no regulator, there is a unique interior equilibrium where each activist starts a boycott at rate α_i where:*

$$\begin{aligned}
\alpha_i &= r\frac{c}{n\underline{h}}, \\
\phi_0 &= r\frac{b}{\underline{e}} - r - r\frac{c}{\underline{h}}\left(1 - \frac{1}{n}\right).
\end{aligned}$$

Proof. To see this, note that with n symmetric activist groups, the total $\alpha = n\alpha_i$ is the same (to make F indifferent), and so for one activist to stay indifferent,

$$\begin{aligned}
b - \underline{e} &= \frac{\phi_0 + \alpha(1 - 1/n)}{\phi_0 + \alpha(1 - 1/n) + r} b \Rightarrow \phi_0 + \alpha(1 - 1/n) = r\frac{b - \underline{e}}{\underline{e}} = r\frac{b}{\underline{e}} - r \Rightarrow \\
\phi_0 &= r\frac{b}{\underline{e}} - r - \alpha(1 - 1/n) = r\frac{b}{\underline{e}} - r - r\frac{c}{\underline{h}}(1 - 1/n). \blacksquare
\end{aligned}$$

Now, suppose instead that there are several "soft" activist groups (or regulators), which means that when one of them targets the firm by ending Phase 0, then this player and the firm start a war or attrition as studied in Section 2.2. Furthermore, suppose that the *interior* equilibrium is expected once a boycott starts: Each of the two players hopes the other one will give in. If one group has ended its boycott, another group can take over and start a new boycott. This, of course, increases the incentive to stop a boycott unless, as will be the case in equilibrium, the rate of self-regulation is much smaller when there is no boycott compared to the times when there is a boycott. Likewise, the incentives to start a boycott are diminished, unless the firm is very unlikely to self-regulate without an active boycott.

To show this result in a simple way, we make the following assumptions: there is no regulator (or that she is "soft" as well); the activist groups are identical; one cannot start a boycott if another activist group is already running one, but everyone can run multiple sequential boycotts (i.e., we are within the world of Section 4); moreover, there is no cost of starting a boycott ($\underline{e} = 0$). Although we have multiple equilibria, we can still do some comparisons.

Proposition B3. *Suppose there are n activist groups. Then we must have $\phi_0 < \phi_1$. Furthermore, as n increases, ϕ_0 is decreasing for any fixed ϕ_1 (and likewise, ϕ_1 is increasing for any fixed ϕ_0). Moreover, for every $\phi_1 > 0$ we have an interior equilibrium where:*

$$\begin{aligned}
\alpha_i &= r\frac{c}{n\underline{h}}, \\
\rho &= r\frac{h - c}{\delta\underline{h}}, \\
\phi_0 &= \frac{b(\phi_1 + r)}{b + e}\left(1 - \frac{(1 - 1/n)\, ce/b\underline{h}}{\phi_1/r + 1 + (h - c)/\delta\underline{h}}\right) - r.
\end{aligned}$$

Proof. The firm's indifference conditions self-regulate pin down α and ρ, just as in Lemma *6*. An activist must be indifferent between starting and continuing a boycott and doing nothing until another activist group starts it (at total rate $\alpha(1-1/n)$), ends it (at rate ρ), and only then start and continue a boycott. This gives rise to the following equation:

$$\begin{aligned}\frac{\phi_1}{\phi_1+r}\frac{b}{r}-\frac{r}{\phi_1+r}\frac{e}{r} &= \frac{\phi_0}{\phi_0+\alpha(1-1/n)+r}\frac{b}{r}\\ &+\frac{\alpha(1-1/n)}{\phi_0+\alpha(1-1/n)+r}\left[\frac{\phi_1}{\phi_1+\rho+r}+\frac{\rho}{\phi_1+\rho+r}\left[\frac{\phi_1}{\phi_1+r}-\frac{r}{\phi_1+r}\frac{e}{b}\right]\right]\frac{b}{r}.\end{aligned}$$

Substituting for α and ρ and rearranging, we get:

$$\begin{aligned}\frac{\phi_1}{\phi_1+r}\left(1-\frac{r}{\phi_1}\frac{e}{b}\right) &= \frac{\phi_0}{\phi_0+r\frac{c}{\underline{h}}(1-1/n)+r}\\ &+\frac{r\frac{c}{\underline{h}}(1-1/n)}{\phi_0+r\frac{c}{\underline{h}}(1-1/n)+r}\left[\frac{\phi_1}{\phi_1+r}\left(1-\frac{r}{\phi_1}\frac{e}{b}\left(1-\frac{\phi_1+r}{\phi_1+r\frac{h-c}{\delta\underline{h}}+r}\right)\right)\right],\end{aligned}$$

and thus

$$\phi_0=\frac{\phi_1}{\phi_1+r}\left(1-\frac{r}{\phi_1}\frac{e}{b}\right)[\phi_0+r]-r\frac{c}{\underline{h}}(1-1/n)\left[\frac{e}{b}\left(\frac{r}{\phi_1+r\frac{h-c}{\delta\underline{h}}+r}\right)\right].$$

Rearranging again, we get

$$\begin{aligned}\frac{\phi_1}{\phi_1+r}\left(1-\frac{r}{\phi_1}\frac{e}{b}\right)[\phi_0+r]-\phi_0 &= r\frac{c}{\underline{h}}(1-1/n)\left[\frac{e}{b}\left(\frac{r}{\phi_1+r\frac{h-c}{\delta\underline{h}}+r}\right)\right]\Rightarrow\\ \frac{\phi_0+r}{\phi_1+r} &= \frac{b}{b+e}\left(1-\frac{(1-1/n)\,ce/b\underline{h}}{\phi_1/r+1+(h-c)/\delta\underline{h}}\right)<1,\end{aligned}$$

which yields ϕ_0 as a function of ϕ_0. ■

Appendix C: Characterization of all equilibria

The main text focused on "interior" equilibria, where all players have a positive chance of acting in every phase of the game. These equilibria are the empirically relevant (and thus the most interesting) ones, if we are to study boycotts. Moreover, this restriction left us with a unique MPE for each case considered in Sections 2 and 3, which helped us study comparative statics. In this appendix, we characterize all equilibria for the models of Sections 2 and 3, for completeness.

C1 The case without a public regulator

For the case without R, there was a unique equilibrium in phase 2, and in that equilibrium, F would never self-regulate and A could no longer act.

In phase 1, however, we noted in Section 3 that there were exactly three equilibria (as in a typical war of attrition game between two players). It thus remains to characterize all equilibria of phase 0, before the boycott has started. It turns out that for each of the equilibria played in phase 1, the corresponding equilibrium of phase 0 is determined uniquely. If the equilibrium $(\phi_1,\rho)=(0,\infty)$

is expected, then A never starts a boycott (unless A receives a large benefit from simply starting one). If the equilibrium $(\phi_1, \rho) = (\infty, 0)$ is expected, so that F will give in immediately once the boycott has started, then A is tempted to start a boycott even if this is costly. In that case, F is willing to self-regulate in phase 0, and we end up having a unique equilibrium in mixed strategies if $\underline{e} > 0$. More precisely, we have the following:

Lemma C1 ***(Before the boycott)***

(i) If the interior equilibrium of phase 1 is anticipated, the phase 0 equilibrium is as in Proposition 3:

$$\alpha = r\frac{c}{\underline{h}} \text{ and } \phi_0 = r\frac{-\underline{e}}{b+\underline{e}},$$

if $\underline{e} \in (-b, 0)$. If $\underline{e} > 0$, then $\alpha = \phi_0 = 0$, and if $\underline{e} < -b$, then $\alpha = \phi_0 = \infty$.[23]

(ii) If equilibrium $(\phi_1, \rho) = (0, \infty)$ is played in phase 1, then in phase 0, the equilibrium is

$$\alpha = r\frac{c}{\underline{h}(1-\delta) - c} \text{ and } \phi_0 = r\frac{-\underline{e}}{b+\underline{e}},$$

provided that $\underline{h}(1-\delta) > c$ and $\underline{e} \in (-b, 0)$. If $\underline{h}(1-\delta) > c$ and $\underline{e} < -b$, then $\phi_0 = \alpha = \infty$; if $\underline{h}(1-\delta) > c$ and $\underline{e} > 0$, then $\phi_0 = \alpha = 0$. If $\underline{h}(1-\delta) \leq c$ and $\underline{e} > 0$, then $\phi_0 = \alpha = 0$; if $\underline{h}(1-\delta) \leq c$ and $\underline{e} < 0$, then $\phi_0 = 0$, $\alpha = \infty$.

(iii) If equilibrium $(\phi_1, \rho) = (\infty, 0)$ is played in phase 1, then in phase 0, the equilibrium is

$$\alpha = r\frac{c}{\underline{h}} \text{ and } \phi_0 = r\frac{b-\underline{e}}{\underline{e}},$$

provided that $\underline{e} \in (0, b)$. If $\underline{e} > b$, then $\alpha = \phi_0 = 0$, and if $\underline{e} < 0$, then $\alpha = \phi_0 = \infty$.

*Proof of Lemma C1**:** (i)* This is proved in the proof of Proposition 3.

(ii) Anticipating $(\phi_1, \rho) = (0, \infty)$, A prefers to start a boycott if:

$$(-\underline{e}) \geq \frac{\phi_0 b}{\phi_0 + r} \Leftrightarrow \phi_0 (b + \underline{e}) \leq -r\underline{e},$$

while F prefers self-regulation if

$$c \leq \frac{\alpha}{\alpha + r}\underline{h}(1-\delta) \Leftrightarrow \alpha\left[\underline{h}(1-\delta) - c\right] \geq rc$$

So, if $\underline{e} < -b$, A starts a boycott immediately; if $\underline{e} > 0$, A never starts a boycott. If $\underline{h}(1-\delta) < c$, F never self regulates, but if $\underline{h}(1-\delta) > c$, F will if α is sufficiently high. This produces the results.

(iii) The proof is analoguous and thus omitted. ■

[23] If $\underline{e} = -b$, then any $\alpha \geq rc/\underline{h}$, $\phi_0 = \infty$ is an equilibrium. If $\underline{e} = 0$, then any $\alpha \leq rc/\underline{h}$, $\phi_0 = 0$ is an equilibrium.

C2 The case with a public regulator: During the boycott

Consider the case with a public regulator. In Section 3.1, we showed that the equilibrium in phase 2 is unique, with F and R acting with positive rates. We use this to study equilibria in phase 1.

It turns out that with R, we have three equilibria in phase 1, just like without R (see above). One is the interior one, studied in Section 3. In the second one is where F gives in immediately during a boycott ($\phi_1 = \infty$), just as in the case without R. In this equilibrium, A will never end the boycott ($\rho = 0$), since he anticipates to win. Similarly, there is no reason for R to step in, so $\gamma_1 = 0$. Thus, F is then self-regulating not because of the threat of public regulation, but because of A's commitment to continue, just as in the analoguous equilibrium without R.

There is a third equilibrium, which is similar to the interior one without R: there, $\gamma_1 = 0$, $\phi_1 \in (0, \infty)$, which is large enough so that A is just indifferent between continuing or stopping the boycott, which implies $\phi_1 > \phi_0 + \gamma_0$ (where ϕ_0 are γ_0 are for an equilibrium where phase 1 can be reached), and this, in turn, ensures that $\phi_1 > \phi_0$ and that R is not willing to step in during a boycott. Similarly, A must end the boycott at a rate that makes F indifferent between self-regulating and not.[24]

More precisely, we have the following characterization.

Lemma C2 ***(During the boycott)*** *There are three equilibria in phase 1:*

$$\begin{aligned}
\textit{(I)}\ (\phi_1, \gamma_1, \rho) &= \left(r\frac{s-q}{q}, r\frac{cq\,(b+e)+kse}{bkq}, r\frac{hb+e\,(c+sk/q)}{\delta \underline{h} b} \right); \\
\textit{(II)}\ (\phi_1, \gamma_1, \rho) &= (\infty, 0, 0)\,; \\
\textit{(III)}\ (\phi_1, \gamma_1, \rho) &= \left(r\left[\left(\frac{c}{k} + \frac{s}{q} \right) \left(1 + \frac{e}{b} \right) - 1 \right], 0, r\frac{h-c}{\delta \underline{h}} \right).
\end{aligned}$$

Proof of Lemma C2. Consider the following possibilities:

(1) Suppose $\gamma_1 \in (0, \infty)$. Then R randomizes so (7) must bind, implying that F randomizes so (9) binds. This means that $\rho \in (0, \infty)$ and that A randomizes, requiring (8) to bind. Thus, when $\gamma_1 \in (0, \infty)$, the equilibrium must be interior, and thus it coincides with the one in Proposition 4.

(2) Suppose $\gamma_1 = \infty$. Then (8) is violated, thus A prefers to wait, so $\rho = 0$; but then F prefers to self-regulate immediately. If so, R prefers to wait, implying $\gamma_1 = 0$; a contradiction.

(3) Suppose $\gamma_1 = 0$. If we pick ϕ_0 and ρ that make (8)-(9) hold as equalities, then R would indeed prefer to wait; this yields equilibrium III. If F acts at a faster rate, A prefers $\rho = 0$, making F prefer $\phi_1 = \infty$, which is thus equilibrium II (again, R prefers to wait). If F acts at a slower rate, A prefers $\rho = \infty$, making F prefer $\phi_1 = 0$, but then R will prefer to act, so it is impossible to have $\gamma_1 = 0$. Thus, only equilibria I-III exist. ■

[24] In principle, there is another equilibrium (or even family of equilibria), similar to the other corner equilibrium in the case without R. In these equilibria, F never gives in during the boycott ($\phi_1 = 0$), A ends the boycott as soon as it can ($\rho = \infty$), and R either does not regulate, or regulates at a rate low enough so that A does not want to continue the boycott; more precisely, $\gamma_1 \leq r\left[\left(\frac{c}{k} + \frac{s}{q}\right)\left(1 + \frac{e}{b}\right) - 1\right]$. However, these equilibria are non-robust, in the sense that R is indifferent between regulating immediately and waiting for A to end the boycott and regulating after that only because this happens instantly. If there was some upper limit on how fast A can end the boycott, then R would strictly prefer to regulate ($\gamma_1 = \infty$), which would, in turn, prompt F to self-regulate immediately, contradicting $\phi_1 = 0$. Because of this non-robustness, we exclude these equilibria from further consideration.

C3 Before the boycott: Anticipating equilibrium (I)

Section 3.3 assumed that the players anticipated the interior equilibrium (I) when they played the game in phase 0. In that case, there is a unique interior equilibrium in phase 0. However, depending on the parameters, there may be up to two other equilibria. If $\underline{e}$ is large enough, there is an equilibrium in phase 0 where A never takes an action (this equilibrium is identical to the one in phase 2, since this becomes, in fact, a game without a boycott). In this equilibrium, R regulates at a rate higher than the rate in the interior equilibrium, and this gives A an incentive to abstain from a costly boycott.

If $\underline{e}$ is small, there is an equilibrium which resembles the phase-0 equilibrium in the case without R (as in Section 2.3), where $\gamma_0 = 0$, and the game is between A and F only. Since R does not take any action, F must self-regulate at a higher rate to make A willing to postpone a boycott. This ensures, in turn, that R is willing to remain passive. But for F to be willing to self-regulate when R is passive, A must initiate the boycott with a probability that is larger than when R were an active player. This confirms our previous finding that A is more active when R is absent than when R is present.

Lemma C3 ***(Before the boycott I)*** *If the interior equilibrium (I) is anticipated during the boycott, the equilibria in phase 0 are:*

(i) $\underline{e} < -\frac{b}{c/k+s/q}$*, the unique equilibrium is* $\gamma_0 = 0$ *and* $\phi_0 = \alpha = \infty$*.*

(ii) If $\underline{e} \in \left(-\frac{b}{c/k+s/q}, 0\right)$*, the unique equilibrium is "without R":*

$$(\phi_0, \gamma_0, \alpha) = \left(r\frac{ks+cq}{kq+(ks+cq)\,\underline{e}/b} - r, 0, r\frac{c}{\underline{h}.}\right).$$

(iii) If $\underline{e} > \frac{bcq^2}{(ks+cq)s}$*, the unique equilibrium is "without A":* $(\phi_0, \gamma_0, \alpha) = (\phi_2, \gamma_2, 0)$*.*

(iv) If $\underline{e} \in \left[0, \frac{bcq^2}{(ks+cq)s}\right]$*, we have three equilibria: one as in (ii); another as in (iii); and a third one, characterized by Proposition 5.*

Proof. There are three possibilities.

(1) If $\phi_0 < r\frac{s-q}{q}$, R regulates immediately, making F willing to self-regulating immediately, which violates the assumption $\phi_0 < r\frac{s-q}{q}$.

(2) If $\phi_0 = r\frac{s-q}{q}$, R is willing to randomize. We have three subcases. Let $\hat{R}_0^A$ be the sum of regulation, $\hat{R}_0^A \equiv \phi_0 + \gamma_0$, such that A is indifferent:

$$\begin{aligned} \frac{\hat{R}_0^A}{\hat{R}_0^A + r}\frac{b}{r} &= \frac{R_2}{R_2+r}\frac{b}{r} - \frac{\underline{e}}{r} \Rightarrow \\ \hat{R}_0^A &= \frac{r\left(\frac{R_2}{R_2+r}b - \underline{e}\right)}{b - \left(\frac{R_2}{R_2+r}b - \underline{e}\right)} = r\frac{1}{\frac{1}{c/k+s/q} + \frac{\underline{e}}{b}} - r. \end{aligned} \tag{1}$$

(a) If $\phi_0 + \gamma_0 < \hat{R}_0^A$, then A prefers to start the boycott immediately, making F willing to self-regulate immediately, which violates $\phi_0 = r\frac{s-q}{q}$.

(b) If $\phi_0 + \gamma_0 = \hat{R}_0^A$, then A is willing to randomize. This equation pins down γ_0:

$$\gamma_0 = r\frac{ks+cq}{kq+(ks+cq)\,\underline{e}/b} - r - r\frac{s-q}{q} = r\frac{cq-(ks+cq)\,\underline{e}s/bq}{kq+(ks+cq)\,\underline{e}/b}; \tag{2}$$

this is positive only if

$$\underline{e} \leq \frac{bcq^2}{(ks+cq)\,s}.$$

Furthermore, note that, in this situation, $\gamma_0 < rc/k = \gamma_2$ if and only if $\underline{e} > 0$. So, F is then willing to randomize only if A starts the boycott with a positive probability. F is indifferent if:

$$\begin{aligned}\frac{c}{r} &= \frac{\alpha}{\alpha+\gamma_0+r}\left(\frac{c+\underline{h}}{r}\right)+\frac{\gamma_0}{\alpha+\gamma_0+r}\left(\frac{c+k}{r}\right)\Rightarrow \\ \alpha\underline{h} &= cr-\gamma_0 k = r\frac{(c+ks/q)^2\,\underline{e}/b}{k+(c+ks/q)\,\underline{e}/b}. \qquad (3)\end{aligned}$$

Thus, we have an equilibrium here if

$$0 \leq \underline{e} \leq \frac{bcq^2}{(ks+cq)\,s}.$$

Otherwise, this case does not yield an equilibrium. Indeed, if $\underline{e} < 0$, then from (2), $\gamma_0 > rc/k = \gamma_2$, so F prefers immediate self-regulation, which violates $\phi_0 = r\frac{s-q}{q}$. In the case $\underline{e} > \frac{bcq^2}{(ks+cq)s}$, we have $\phi_0 + \gamma_0 > \hat{R}_0^A$ for all $\gamma_0 \geq 0$, again a contradiction

(c) If $\phi_0+\gamma_0 > \hat{R}_0^A$, then A never starts a boycott, and then F is willing to randomize if $\gamma_0 = \gamma_2$. This is an equilibrium if the resulting $\phi_0 + \gamma_0$ is indeed larger than $\hat{R}_0^A$, which requires:

$$r\frac{s-q}{q}+r\frac{c}{k} > r\frac{ks+cq}{kq+(ks+cq)\,\underline{e}/b}-r \Rightarrow \underline{e} > 0.$$

Thus, if $\underline{e} > 0$, there is an equilibrium with

$$\alpha = 0,\ \phi_0 = \phi_2,\ \gamma_0 = \gamma_2.$$

(3) Suppose $\phi_0 > r\frac{s-q}{q}$. In this case, R prefers not to intervene, so $\gamma_0 = 0$. Immediate self-regulation ($\phi_0 = \infty$) is possible only if A prefers to boycott even in that case, which requires $\underline{e} < -\frac{b}{c/k+s/q}$; in this case, we have a (unique) equilibrium $\gamma_0 = 0$, $\alpha = \infty$, $\phi_0 = \infty$. If $\underline{e} > -\frac{b}{c/k+s/q}$, then ϕ_0 cannot be too high, for then A would prefer to wait and then, in the absence of any threat, F would prefer to wait as well. On the other hand, ϕ_0 cannot be too low either, since then A would prefer to start a boycott, thus making F willing to self-regulate immediately. We thus must have an equilibrium where both A and F randomize. A is indifferent if

$$\phi_0 = r\frac{ks+cq}{kq+(ks+cq)\,\underline{e}/b}-r,$$

which, as noted, is larger than $r\frac{s-q}{q}$ iff

$$r\frac{ks+cq}{kq+(ks+cq)\,\underline{e}/b}-r > r\frac{s-q}{q} \Rightarrow \frac{ks+cq}{kq+(ks+cq)\,\underline{e}/b} > \frac{s}{q},$$

which is satisfied if $\underline{e} \leq 0$, or if $\underline{e} > 0$ is so small that

$$cq^2 > s\,(ks+cq)\,\underline{e}/b \Rightarrow \underline{e} < \frac{bcq^2}{s\,(ks+cq)}.$$

In its turn, F is willing to randomize, whenever α satisfies

$$\frac{c}{r} = \frac{\alpha}{\alpha+r}\left(\frac{c+\underline{h}}{r}\right) \Rightarrow \alpha = r\frac{c}{\underline{h}}.$$

Thus, if $\underline{e} < \frac{bcq^2}{(ks+cq)s}$, we have an equilibrium $\gamma_0 = 0$, $\phi_0 = r\frac{ks+cq}{kq+(ks+cq)\underline{e}/b} - r$ and $\alpha = r\frac{c}{\underline{h}}$. The lemma summarizes all three cases. ■

C4 Before the boycott: Anticipating equilibrium (II)

Suppose the players anticipate that, if a boycott starts, then F gives in immediately (equilibrium II in Lemma C2). If A benefits from starting a boycott, A will immediately start one and thus F will immediately self-regulate; in turn, R will remain passive). But if starting the boycott is costly to A, then A hopes that R regulates so that A does not need to pay the set-up cost, while R hopes that A initiates a boycott, so that F self-regulates. The game between A and R is similar to a war of attrition where, in addition to an interior equilibrium in mixed strategies, we can have equilibria where one of A and R stays passive.

If A and R are both active players, but when both these players gain so little from the boycott (s/q and $b/\underline{e}$ are small) that they are willing to act only if the other player is acting with a low probability, then A and R are taking an action with such a small probability that F remains passive ($\phi_0 = 0$). This is thus a fourth type of equilibrium, although it cannot exist for the same parameters which permits the interior equilibrium. Whether F is active when both A and R are active depends on the sign of

$$\kappa \equiv \frac{s-q}{q} - \frac{c}{\underline{h}}.$$

Note that κ is positive if s/q is sufficiently large but negative if c is sufficiently large.

Lemma C4 ***(Before the boycott II)*** *If the equilibrium $(\phi_1 = \infty, \rho = 0, \gamma_1 = 0)$ is anticipated during the boycott, the equilibria in phase 0 are:*[25]

(i) If $\underline{e} < 0$, the unique equilibrium is $\phi_0 = \infty, \alpha = \infty, \gamma_0 = 0$.

(ii) If $b/\underline{e} \in (0, 1 + \max\{0, \kappa\})$, the unique equilibrium is "without A": $\phi_0 = \phi_2, \alpha = 0, \gamma_0 = \gamma_2$.

(iii) If $b/\underline{e} > \frac{s}{q} + \frac{c}{k}$, the unique equilibrium is "without R": $\phi_0 = r\frac{b-\underline{e}}{\underline{e}}, \alpha = r\frac{c}{\underline{h}}, \gamma_0 = 0$.

(iv) If $b/\underline{e} \in [1, 1 + \max\{0, -\kappa\}\, \underline{h}/k]$, there are three equilibria: one is as in (ii); another is as in case (iii), and the third one is "without F":

$$\begin{aligned}
\phi_0 &= 0 \\
\alpha &= r\frac{s-q}{q} \\
\gamma_0 &= r\frac{b-\underline{e}}{\underline{e}}
\end{aligned}$$

(v) If $b/\underline{e} \in \left[1 + \max\{\kappa, -\kappa\underline{h}/k\}, \frac{s}{q} + \frac{c}{k}\right]$, there are three equilibria: One is as in case (ii); another is as in case (iii), and the third one is interior:

$$\begin{aligned}
\phi_0 &= r\frac{bk/\underline{e} - c + \underline{h}\frac{s-q}{q} - k}{\underline{h} + k} \\
\alpha &= rk\frac{s/q + c/k - b/\underline{e}}{\underline{h} + k} \\
\gamma_0 &= r\frac{c - \underline{h}\left[\frac{s}{q} - \frac{b}{\underline{e}}\right]}{\underline{h} + k}
\end{aligned}$$

[25] In the borderline case $\underline{e} = 0$, there are a continuum of equilibria of the form $\alpha \geq r\frac{c}{\underline{h}}$, $\phi_0 = \infty$, and $\gamma_0 = 0$.

Proof. Obviously, if $\underline{e} < 0$, A prefers to boycott immediately, so the unique equilibrium is $\phi_0 = \alpha = \infty$, $\gamma_0 = 0$. Hereinafter, assume $\underline{e} > 0$. There are five possibilities regarding ϕ_0.

(1) Suppose $\phi_0 = r\frac{s-q}{q}$. A cannot strictly prefer a boycott, since then F would self-regulate immediately. Furthermore, if we have $\alpha > 0$, R strictly prefers to wait, but then A is indifferent only $\phi_0 = r\frac{b-\underline{e}}{\underline{e}}$, which equals $r\frac{s-q}{q}$ only when $\underline{e} = bq/s$ (in that exact case, there is an equilibrium $\phi_0 = r\frac{s-q}{q}$, $\gamma_0 = 0, \alpha = r\frac{c}{\underline{h}}$). If $\underline{e} \neq bq/s$, we must have $\alpha = 0$, meaning that $\gamma_0 = \gamma_2 = rc/k$. A is then actually willing to wait if and only if he would get weakly less from initiating the boycott:

$$b - \underline{e} \leq \frac{R_0}{R_0 + r} b = b\left(\frac{s/q - 1 + c/k}{s/q + c/k}\right) \Leftrightarrow \underline{e} \geq \frac{b}{s/q + c/k}.$$

So, there is an equilibrium "without A" (similar to phase 2) if $\underline{e} \geq \frac{b}{s/q+c/k} \Leftrightarrow \frac{b}{\underline{e}} \leq \frac{s}{q} + \frac{c}{k}$ and $\underline{e} > 0$. If exactly $\underline{e} = bq/s$, we also have an equilibrium $\phi_0 = r\frac{s-q}{q}$, $\gamma_0 = 0, \alpha = r\frac{c}{\underline{h}}$.

(2) If $\phi_0 \in \left(r\frac{s-q}{q}, \infty\right)$, then $\gamma_0 = 0$. For F to be indifferent, it must be that

$$\alpha = r\frac{c}{\underline{h}}.$$

A must therefore be indifferent, so,

$$\phi_0 = r\frac{b - \underline{e}}{\underline{e}},$$

which is indeed larger than $r\frac{s-q}{q}$ if

$$\frac{b}{\underline{e}} > \frac{s}{q},$$

So, if $\frac{b}{\underline{e}} > \frac{s}{q}$, there is an equilibrium $\gamma_0 = 0$, $\alpha = r\frac{c}{\underline{h}}$, $\phi_0 = r\frac{b-\underline{e}}{\underline{e}}$.

(3) If $\phi_0 = 0$, we must have

$$cr \geq \gamma_0 k + \alpha \underline{h}. \tag{4}$$

A and R must both be indifferent, which implies

$$\alpha = r\frac{s-q}{q}, \tag{5}$$
$$\gamma_0 = r\frac{b - \underline{e}}{\underline{e}}, \tag{6}$$

and for F to be willing to choose $\phi_0 = 0$, we must have

$$\begin{aligned} \frac{c}{r} &\geq \frac{\alpha}{\alpha + \gamma_0 + r}\left(\frac{c + \underline{h}}{r}\right) + \frac{\gamma_0}{\alpha + \gamma_0 + r}\left(\frac{c + k}{r}\right) \Leftrightarrow \\ c &\geq \alpha\underline{h}/r + \gamma_0 k/r = \frac{s-q}{q}\underline{h} + \frac{b - \underline{e}}{\underline{e}}k \Leftrightarrow \\ b/\underline{e} &\leq \frac{c}{k} - \frac{s-q}{qk}\underline{h} + 1. \end{aligned}$$

If this holds and $\gamma_0 = r\frac{b-\underline{e}}{\underline{e}} \geq 0$, i.e., if $b/\underline{e} \in \left[1, \frac{c}{k} - \frac{s-q}{qk}\underline{h} + 1\right]$, then we have an equilibrium with $\phi_0 = 0$ and (5)-(6).

(4) If $\phi_0 \in \left(0, r\frac{s-q}{q}\right)$, F must be indifferent, so:

$$cr = \gamma_0 k + \alpha \underline{h}. \tag{7}$$

R regulates if:

$$\frac{s-q}{r} \geq \frac{\alpha+\phi_0}{\alpha+\phi_0+r}\frac{s}{r} \Rightarrow \alpha+\phi_0 \leq r\frac{s-q}{q}.$$

A starts the boycott if

$$b-\underline{e} \geq \frac{R_0}{R_0+r}b \Rightarrow b \geq (R_0+r)\,\underline{e}/r \Rightarrow R_0 \leq r\frac{b-\underline{e}}{\underline{e}}.$$

Consider the following subcases:

(a) If $\alpha+\phi_0 < r\frac{s-q}{q}$, R regulates immediately, violating (7).

(b) If $\alpha+\phi_0 > r\frac{s-q}{q}$, R prefers to wait, so $\gamma_0 = 0$. From (7), we get

$$\alpha = r\frac{c}{\underline{h}}.$$

For A to be willing to randomize, we must have

$$\phi_0 = r\frac{b-\underline{e}}{\underline{e}},$$

which is indeed in $\left(0, r\frac{s-q}{q}\right)$ if

$$0 < r\frac{b-\underline{e}}{\underline{e}} < r\frac{s-q}{q} \Rightarrow b/\underline{e} \in (1, s/q)\,.$$

Furthermore, the condition for this case (b), $\alpha+\phi_0 > r\frac{s-q}{q}$, is satisfied if

$$r\frac{b-\underline{e}}{\underline{e}} + r\frac{c}{\underline{h}} > r\frac{s-q}{q} \Rightarrow \frac{b}{\underline{e}} > \frac{s}{q} - \frac{c}{\underline{h}}.$$

Thus, if $\max\left\{\frac{s}{q}-\frac{c}{\underline{h}}, 1\right\} < b/\underline{e} < s/q$, then we have an equilibrium $\gamma_0 = 0$, $\phi_0 = r\frac{b-\underline{e}}{\underline{e}}$, $\alpha = r\frac{c}{\underline{h}}$.

(c) If $\alpha+\phi_0 = r\frac{s-q}{q} \Rightarrow \alpha \in (0,\infty)$, A must be willing to randomize, so we must have $R_0 = r\frac{b-\underline{e}}{\underline{e}}$. We then have three indifference conditions:

$$\begin{aligned}
\alpha+\phi_0 &= r\frac{s-q}{q}, \\
\phi_0+\gamma_0 &= r\frac{b-\underline{e}}{\underline{e}}, \\
cr &= \gamma_0 k + \alpha\underline{h}.
\end{aligned}$$

Solving for the rates explicitly:

$$\begin{aligned}
\alpha-\gamma_0 &= r\frac{s-q}{q} - r\frac{b-\underline{e}}{\underline{e}} = r\frac{s}{q} - r\frac{b}{\underline{e}}, \\
cr &= \gamma_0 k + \underline{h}\left[r\frac{s}{q} - r\frac{b}{\underline{e}} + \gamma_0\right] \\
\gamma_0 &= r\frac{c-\underline{h}\left[\frac{s}{q}-\frac{b}{\underline{e}}\right]}{\underline{h}+k} > 0 \text{ if} \\
c &> \underline{h}\left[\frac{s}{q}-\frac{b}{\underline{e}}\right] \text{ or } \frac{b}{\underline{e}} > \frac{s}{q} - \frac{c}{\underline{h}}.
\end{aligned}$$

Furthermore,

$$\begin{aligned}
\phi_0 &= r\frac{b-\underline{e}}{\underline{e}} - \frac{cr - r\underline{h}\left[\frac{s}{q} - \frac{b}{\underline{e}}\right]}{\underline{h}+k} = r\frac{bk/\underline{e} - c + \underline{h}\frac{s-q}{q} - k}{\underline{h}+k} \\
&> 0 \text{ if } b/\underline{e} > 1 + c/k - \underline{h}\frac{s-q}{qk}.
\end{aligned}$$

And,

$$\begin{aligned}
\alpha &= r\frac{s-q}{q} - r\frac{b-\underline{e}}{\underline{e}} + \frac{cr - r\underline{h}\left[\frac{s}{q} - \frac{b}{\underline{e}}\right]}{\underline{h}+k} \\
&= rk\frac{s/q + c/k - b/\underline{e}}{\underline{h}+k} > 0 \text{ if } \frac{b}{\underline{e}} < s/q + c/k.
\end{aligned}$$

So, this interior equilibrium exists if

$$\begin{aligned}
\max\left\{\frac{s}{q} - \frac{c}{\underline{h}}, 1 + c/k - \underline{h}\frac{s-q}{qk}\right\} &< \frac{b}{\underline{e}} < s/q + c/k \Rightarrow \\
1 + \max\left\{\frac{s-q}{q} - \frac{c}{\underline{h}}, -\frac{\underline{h}}{k}\left[\frac{s-q}{q} - \frac{c}{\underline{h}}\right]\right\} &< \frac{b}{\underline{e}} < s/q + c/k.
\end{aligned}$$

(5) If $\phi_0 = \infty$, then A does not want to start the boycott ($\underline{e} > 0$), and R does not want to regulate either. If so, F would prefer to wait, which is a contradiction.

The lemma follows from combining the above cases. ■

C5 Before the campaign: Anticipating equilibrium (III)

Suppose the players anticipate that, if a boycott starts, then R stays passive while F and A play the mixed strategy equilibrium III in Lemma C2. In that case, R may be strictly better off during a boycott compared to his utility from regulation. In phase 0, the the start of the boycott may therefore be good news to R, even if she does not care about the boycott per se. This can happen only if F is very likely to self-regulate during a boycott.

In this situation, there may be multiple equilibria in phase 0, before the boycott has started. In addition to an interior solution, there may be equilibria where only two players are active.

Define

$$\kappa' \equiv \frac{s-q}{q} - \frac{c}{\underline{h}}\left(\frac{s/q + (b/e+1)\,c/k}{(s/q + c/k)(b/e+1) + \frac{h-c}{\delta \underline{h}}\frac{b}{e}}\right) > \kappa.$$

Lemma C5 ***(Before the boycott III)*** *If the equilibrium III ("without R") is anticipated during the boycott, then equilibria at phase 0 are the following:*

(i) If $\underline{e} \leq -\frac{b}{c/k+s/q}$, *the unique equilibrium is* $\gamma_0 = 0$, $\alpha = \infty$, $\phi_0 = \infty$.

(ii) If $\underline{e} \in \left(-\frac{b}{c/k+s/q}, 0\right)$, *the unique equilibrium is "without R":*

$$\gamma_0 = 0,\ \alpha = r\frac{c}{\underline{h}} \text{ and } \phi_0 = r\frac{c/k + s/q}{1 + (c/k + s/q)\,\underline{e}/b} - r.$$

(iii) If $\kappa' > 0$, then there exists

$$\underline{e}_R \equiv \frac{b}{1+\kappa'} - \frac{b}{c/k+s/q} < \underline{e}_A \equiv b\left(1 - \frac{1}{c/k+s/q}\right)$$

such that:

(iii-a) If $\underline{e} > \underline{e}_R$, the unique equilibrium is "without A" as in phase 2.

(iii-b) If $\underline{e} \in [0, \underline{e}_R]$, there are three equilibria: One as in (ii), another as in (iii-a), and the third is interior:

$$\begin{aligned}
\gamma_0 &= r\frac{c}{k} - r\frac{(c/k+s/q)^2}{1+(s/q-1-\kappa')\,k/c}\left(\frac{\underline{e}}{b+\underline{e}\,(c/k+s/q)}\right) \in (0,\infty)\,, \\
\alpha &= \frac{k}{\underline{h}}r\left[\frac{(c/k+s/q)^2}{1+(s/q-1-\kappa')\,k/c}\left(\frac{\underline{e}}{b+\underline{e}\,(c/k+s/q)}\right)\right] \in (0,\infty)\,, \\
\phi_0 &= r\left(\frac{c/k+s/q}{1+(c/k+s/q)\,\underline{e}/b}\right)\left(1+\frac{(c/k+s/q)\,\underline{e}/b}{1+(s/q-1-\kappa')\,k/c}\right) - r\frac{c+k}{k} \in (0,\infty)\,.
\end{aligned}$$

(iv) If $\kappa' < 0$, then there exists

$$\underline{e}_F \equiv \frac{b\,(s/q-1-\kappa')}{s/q-1-\kappa'\,(1+c/k)} - \frac{b}{c/k+s/q} < \underline{e}_A$$

such that:

(iv-a) If $\underline{e} > \underline{e}_A$, the unique equilibrium is "without A" as in phase 2.

(iv-b) If $\underline{e} \in [0, \underline{e}_F)$, there are three equilibria: one is as in (ii), one as in (iii-a), and the third is interior as in (iii-b).

(iv-c) If $\underline{e} \in [\underline{e}_F, \underline{e}_A]$, there are three equilibria: one is as in (ii), one is as in (iii-a), and the third is "without F":

$$\begin{aligned}
\phi_0 &= 0, \\
\alpha &= r\frac{\underline{h}}{c}\left(\frac{s-q}{q}\right)\left(\frac{s-q}{q} - \kappa'\right), \\
\gamma_0 &= r\frac{c/k+s/q}{1+(c/k+s/q)\,\underline{e}/b} - r.
\end{aligned}$$

Proof of Lemma C5:

Suppose that equilibrium III, $(\phi_1, \gamma_1, \rho) = \left(\frac{(ks+cq)(b+e)}{bkq}r - r, 0, \frac{r(h-c)}{\delta\underline{h}}\right)$, is anticipated. Then in phase 1, R receives the following expected continuation payoff:

$$\begin{aligned}
u^R_{1,\underline{h}} &= \frac{\phi_1}{\phi_1+\rho+r}\frac{s}{r} + \frac{\rho}{\phi_1+\rho+r}\frac{s-q}{r} = \frac{s}{r} - \frac{s+q\rho/r}{\phi_1+\rho+r} \\
&= \frac{s}{r} - \frac{s}{r}\frac{1+(h-c)\,q/s\delta\underline{h}}{(s/q+c/k)\,(1+e/b)+(h-c)\,/\delta\underline{h}}.
\end{aligned}$$

Given this, R is willing to stay passive by not regulating in phase 0 only if

$$\begin{aligned}
\frac{s-q}{r} &\leq \frac{\phi_0}{\phi_0+\alpha+r}\frac{s}{r}+\frac{\alpha}{\phi_0+\alpha+r}u^R_{1,\underline{h}} \Rightarrow \\
\frac{s-q}{r} &\leq \frac{\phi_0}{\phi_0+\alpha+r}\frac{s}{r}+\frac{\alpha}{\phi_0+\alpha+r}\left(\frac{s}{r}-\frac{s}{r}\frac{1+\frac{h-c}{\delta\underline{h}}\frac{q}{s}}{(s/q+c/k)(1+e/b)+\frac{h-c}{\delta\underline{h}}}\right) \Rightarrow \\
\phi_0 &\geq \left(\frac{s-q}{q}\right)r-\alpha\left(\frac{se/bq-(1+e/b)\,c/k}{(s/q+c/k)(1+e/b)+\frac{h-c}{\delta\underline{h}}}\right) \Rightarrow \\
\left(\frac{s-q}{q}\right)r &\leq \phi_0+\alpha\left(\frac{s/q+(b/e+1)\,c/k}{(s/q+c/k)(b/e+1)+\frac{h-c}{\delta\underline{h}}\frac{b}{e}}\right). \qquad (8)
\end{aligned}$$

From (3), it follows that F is willing to remain passive by not self-regulating if

$$c \geq \alpha\frac{\underline{h}}{r}+\gamma_0\frac{k}{r}, \qquad (9)$$

while from (1), A is willing to remain passive if

$$\phi_0+\gamma_0 \geq \hat{R}^A_0 = r\frac{1}{\frac{1}{c/k+s/q}+\frac{\underline{e}}{b}}-r, \qquad (10)$$

whenever $\frac{\underline{e}}{b} \in \left(-\frac{1}{c/k+s/q}, 1-\frac{1}{c/k+s/q}\right)$. If $\underline{e} > b\left(1-\frac{1}{c/k+s/q}\right) \equiv \underline{e}_A$, the dominant strategy of A is to never start a boycott (in that case, the unique equilibrium is as in phase 2 with $\alpha = 0$). If $\frac{\underline{e}}{b} < -\frac{1}{c/k+s/q}$, his dominant strategy is to start a boycott immediately, regardless of $\phi_0+\gamma_0 \leq \infty$ (in that case, the unique equilibrium is $\alpha = \phi_0 = \infty$, $\gamma_0 = 0$). From now on, consider the case $\frac{\underline{e}}{b} \in \left(-\frac{1}{c/k+s/q}, 1-\frac{1}{c/k+s/q}\right)$. Note that none of the rates may be infinite in this interval (for example, if $\alpha = \infty$, F prefers immediate self-regulation but then $\alpha = 0$ would be optimal for A). Thus, if $\gamma_0 > 0$, (8) binds; if $\phi_0 > 0$, (9) binds; and if $\alpha > 0$, (10) binds. This also implies that at most one rate may equal 0.

Consider the following possibilities:

(i) Equilibria "without A", where $\alpha = 0$. Then, ϕ_0 and γ_0 must be as in phase two. From (10), A is willing to remain passive if and only if $\underline{e} \geq 0$.

(ii) Equilibria "without R", where $\gamma_0 = 0$. Then the best response functions of A and R cross only once, yielding:

$$\alpha = \frac{c}{\underline{h}} \text{ and } \phi_0 = r\frac{1}{\frac{1}{c/k+s/q}+\frac{\underline{e}}{b}}-r.$$

From (8), we know that R is willing to remain passive only if (substituting for α and ϕ_0)

$$\begin{aligned}
\left(\frac{s-q}{q}\right)r &\leq r\frac{1}{\frac{1}{c/k+s/q}+\frac{\underline{e}}{b}}-r+r\frac{c}{\underline{h}}\left(\frac{s/q+(b/e+1)\,c/k}{(s/q+c/k)(b/e+1)+\frac{h-c}{\delta\underline{h}}\frac{b}{e}}\right) \Rightarrow \\
\frac{1}{\frac{1}{c/k+s/q}+\frac{\underline{e}}{b}}-1 &\geq \frac{s-q}{q}-\frac{c}{\underline{h}}\left(\frac{s/q+(b/e+1)\,c/k}{(s/q+c/k)(b/e+1)+\frac{h-c}{\delta\underline{h}}\frac{b}{e}}\right) \equiv \kappa' \Rightarrow \qquad (11) \\
\underline{e} &\leq \underline{e}_R \equiv \frac{b}{1+\kappa'}-\frac{b}{c/k+s/q}.
\end{aligned}$$

So, this is an equilibrium if $\underline{e} \in \left(-\frac{b}{c/k+s/q}, \min\{\underline{e}_A, \underline{e}_R\}\right)$. Note that $\underline{e}_R < \underline{e}_A$ if and only if $\kappa' > 0$.

(iii) Equilibria "without F", where $\phi_0 = 0$. In this case, equilibrium must have interior rates for A and R (otherwise, one of them would act immediately and $\phi_0 = \infty$ would be the best response). This implies, given (8) and (10):

$$\begin{aligned}
\alpha &= r\left(\frac{s-q}{q}\right)\frac{(s/q+c/k)(b/e+1)+\frac{h-c}{\delta \underline{h}}\frac{b}{e}}{s/q+(b/e+1)c/k} \\
&= r\frac{\underline{h}}{c}\left(\frac{s-q}{q}\right)\left(\frac{s-q}{q}-\kappa'\right), \\
\gamma_0 &= r\frac{1}{\frac{1}{c/k+s/q}+\frac{e}{b}} - r.
\end{aligned}$$

From (9), we know that for F to be willing to remain passive, we must have

$$\begin{aligned}
c &\geq \alpha\frac{\underline{h}}{r} + \gamma_0\frac{k}{r} \\
&= \underline{h}\left(\frac{s-q}{q}\right)\frac{(s/q+c/k)(b/e+1)+\frac{h-c}{\delta \underline{h}}\frac{b}{e}}{s/q+(b/e+1)c/k} + \frac{k}{r}\left(r\frac{1}{\frac{1}{c/k+s/q}+\frac{e}{b}} - r\right) \Rightarrow
\end{aligned}$$

$$\frac{1}{\frac{1}{c/k+s/q}+\frac{e}{b}} - 1 \leq \frac{c}{k} - \frac{\underline{h}}{k}\left(\frac{s-q}{q}\right)\frac{(s/q+c/k)(b/e+1)+\frac{h-c}{\delta \underline{h}}\frac{b}{e}}{s/q+(b/e+1)c/k} \tag{12}$$

$$= \frac{c}{k}\left(\frac{s-q}{q}\right)\left[(-\kappa')/\left[\frac{c}{\underline{h}}\left(\frac{s/q+(b/e+1)c/k}{(s/q+c/k)(b/e+1)+\frac{h-c}{\delta \underline{h}}\frac{b}{e}}\right)\left(\frac{s-q}{q}\right)\right]\right] \Rightarrow \tag{13}$$

$$\underline{e} \geq \underline{e}_F \equiv \frac{b}{\frac{-\kappa' c}{k(s/q-1-\kappa')}+1} - \frac{b}{c/k+s/q} = \frac{b\,(s/q-1-\kappa')}{s/q-1-\kappa'(1+c/k)} - \frac{b}{c/k+s/q}.$$

We know that $\underline{e}_F > 0$ (if $\underline{e} \downarrow 0$, the left-hand side of (12) approaches $c/k + (s-q)/q$, while the right-hand side is less than c/k, violating the equation). Furthermore, $\underline{e}_F < \underline{e}_A$ if and only if $\kappa' < 0$ (as can be seen from (13)). So, the equilibrium "without F" exists if and only if $\underline{e} \in (\underline{e}_F, \underline{e}_A)$, requiring $\kappa' < 0$.

(iv) Interior equilibria: If $\underline{e} \in (\underline{e}_F, \underline{e}_A)$, we have an equilibrium "without F". If, in this situation, ϕ_0 were to be positive, then α would have to be lower in order to keep R willing to regulate, and γ_0 would have to decrease to make A willing to postpone the boycott. Then, however, F would stricly prefer to remain passive; this contradicts the assumption that ϕ_0 is positive. Consequently, there is no interior equilibrium if $\underline{e} \geq \min\{\underline{e}_F, \underline{e}_A\}$. If $\underline{e} = \underline{e}_F < \underline{e}_A$, we know that all the equations hold with equality for $\phi_0 = 0$:

$$\begin{aligned}
\left(\frac{s-q}{q}\right)r &= \phi_0 + \alpha\left(\frac{s/q+(b/e+1)c/k}{(s/q+c/k)(b/e+1)+\frac{h-c}{\delta \underline{h}}\frac{b}{e}}\right), \\
c &= \alpha\frac{\underline{h}}{r} + \gamma_0\frac{k}{r}, \\
\phi_0 + \gamma_0 &= r\frac{1}{\frac{1}{c/k+s/q}+\frac{e}{b}} - r.
\end{aligned}$$

For ϕ_0 to become positive, α must decrease, and, in its turn, γ_0 must increase, but this is possible only if $\underline{e}$ becomes lower than $\underline{e}_F < \underline{e}_A$, which is thus an upper boundary for the interior equilibrium.

Solving the equations gives:

$$\begin{aligned}
\left(\frac{s-q}{q}\right) r &= \phi_0 + \alpha \left(\frac{s/q + (b/e+1)\, c/k}{(s/q + c/k)\,(b/e+1) + \frac{h-c}{\delta \underline{h}} \frac{b}{e}} \right), \\
c &= \alpha \frac{\underline{h}}{r} + \gamma_0 \frac{k}{r}, \\
\gamma_0 &= r\frac{c}{k} - r \frac{(c/k + s/q)^2}{1 + (s/q - 1 - \kappa')\, k/c} \left(\frac{\underline{e}}{b + \underline{e}\,(c/k + s/q)} \right).
\end{aligned}$$

Similarly,

$$\begin{aligned}
\alpha &= r \frac{c - \gamma_0 \frac{k}{r}}{\underline{h}} = r\frac{c}{\underline{h}} - \frac{k}{\underline{h}} r \left[\frac{c}{k} - \frac{(c/k + s/q)^2}{1 + (s/q - 1 - \kappa')\, k/c} \left(\frac{\underline{e}}{b + \underline{e}\,(c/k + s/q)} \right) \right] \\
&= \frac{k}{\underline{h}} r \left[\frac{(c/k + s/q)^2}{1 + (s/q - 1 - \kappa')\, k/c} \left(\frac{\underline{e}}{b + \underline{e}\,(c/k + s/q)} \right) \right].
\end{aligned}$$

Finally,

$$\begin{aligned}
\phi_0 &= r \frac{1}{\frac{1}{c/k + s/q} + \frac{\underline{e}}{b}} - r - \gamma_0 \\
&= r \left(\frac{c/k + s/q}{1 + (c/k + s/q)\, \underline{e}/b} \right) \left(1 + \frac{(c/k + s/q)\, \underline{e}/b}{1 + (s/q - 1 - \kappa')\, k/c} \right) - r \frac{c+k}{k}.
\end{aligned}$$

Thus, if $\underline{e} \in (0, \min\{\underline{e}_F, \underline{e}_A\})$, all these rates are positive, confirming an interior equilibrium. The lemma summarizes the findings. ■