Supplemental Information for "Participation, Process, & Policy: The Informational Value of Politicized Judicial Review"

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A Technical Assumptions and Derivations

Assumptions. We impose the following (related) restrictions liberally in the analysis. Collectively, they imply that various first order conditions are "well behaved," as we will note when the assumptions are invoked. The first ones relate to lower bounds on the Group's investigation cost parameter c. It might seem "cleaner" simply to invoke the greatest lower bound in one assumption rather than list multiple separate ones, but each restriction binds at a different point. To identify the role that each restriction plays in the analysis, we keep them separate.

Assumption 1 (Costly Group Investigative Efforts) $c > p$.

Assumption 2 (Interior Optimal Group Effort) $c > \beta p$.

Assumption 3 (Agency Choice of $x_\phi = 0$) $c > (1 + \beta)p^2$.

Assumption 4 (Interior Optimal Agency Effort) $k < \kappa$.

Assumption 4 means that the Agency does not fear reversal sufficiently to discover ω with certainty. This restriction not only obviates some algebraic difficulties with comparative statics analysis, it also ensures that there will always be a positive probability that the Group's investigative efforts might be dispositive—if the Agency always discovers ω, then in this setting, one *ex ante* optimal judicial review strategy will involve overturning the Agency's recommendation whenever it is accompanied by a thin agency-provided record and, accordingly, there will never be any decisions overturned on the equilibrium path.

A.1 Group Behavior

If the agency reveals a hard signal of $m_A = \omega$, the Group's dominant action is to set $e_G = 0$, as the Court's subsequent behavior is independent of the Group's message m_G.

Accordingly, we ignore these subgames when discussing the Group's incentives.[1] The only subgames in which the Group has a nontrivial choice about e_G are those in which the Agency has revealed no signal (*i.e.*, $m_A = \phi$).

Accordingly, conditional on $m_A = \phi$, $x \in \{0,1\}$, and ρ, the Group's (conditional) expected payoff from effort e_G is

$$U_G(x, e_G) = \begin{cases} (\rho_0 - 1)\left((1-p) + p(1-e_G)\right) - \frac{c}{2}e_G^2 & \text{if } x = 0, \\ e_G p\beta + \left((1-p) + (1-e_G)p\right)(1-\rho_1)\beta - \frac{c}{2}e_G^2 & \text{if } x = 1. \end{cases} \tag{1}$$

The first order conditions for the Group the imply the following effort levels, as described in (**??**) in the text:

$$e_G^*(x) = \begin{cases} \min[p(1-\rho_0)/c, 1] & \text{if } x = 0, \\ \min[p\beta\rho_1/c, 1] & \text{if } x = 1. \end{cases}$$

Note that Assumption 2 obviates the need to carry around the "min" operator.

A.2 Agency Behavior: Investigation

As discussed in the body of the article, the Agency's choice of policy is simple when it receives an informative signal (*i.e.*, $s_A \neq \phi$): set $x = s_A$ and reveal its signal. When the Agency is not informed, its incentives are more complicated and we defer detailed consideration of this until Section A.3. Thus, for the time being we simply denote the Agency's policy choice when uninformed by $x_\phi \in \{0,1\}$.[2] Given this, we can identify the Agency's optimal level of investigative effort.

The Agency's expected payoff from (x_ϕ, e_A) is given by the following:

$$U_A(x_\phi, e_A) = \begin{cases} (e_A - 1)(e_G^*(0)p + (1 - e_G^*(0) + e_G^*(0)(1-p))\rho_0)k - \frac{\kappa}{2}e_A^2 & \text{if } x_\phi = 0, \\ (e_A - 1)(1 - e_G^*(1) + e_G^*(1)(1-p))\rho_1 k - \frac{\kappa}{2}e_A^2 & \text{if } x_\phi = 1. \end{cases}$$

This yields the following equation for the equilibrium effort levels:

$$e_A^*(x_\phi) = \begin{cases} \min[0, \max[1, (e_G^*(0)p + (1 - pe_G^*(0))\rho_0)k/\kappa]] & \text{if } x_\phi = 0, \\ \min[0, \max[1, (1 - pe_G^*(1))\rho_1 k/\kappa]] & \text{if } x_\phi = 1. \end{cases}$$

Substituting equation (**??**) and imposing Assumptions 2 & 4 yields equation (**??**) in the text:[3]

$$e_A^*(x) = \begin{cases} (k(p^2(1-\rho_0)^2 + c\rho_0))/(c\kappa) & \text{if } x = 0, \\ (c - p^2\beta\rho_1)\rho_1 k/(c\kappa) & \text{if } x = 1. \end{cases}$$

For $x = 0$, equation (**??**) is strictly convex for $p \in (0,1)$. Accordingly, the value of ρ_0 that maximizes Agency effort is a corner solution, satisfying $\rho_0^{A*} \in \{0,1\}$. The first order conditions for minimization imply that Agency effort is minimized at $\rho_0 = 1 - \frac{c}{2p^2}$, so that, leveraging the symmetry of parabolas, it follows that

$$\rho_0^{A*} = \begin{cases} 1 & \text{if } p^2 < c, \\ 0 & \text{if } p^2 > c. \end{cases}$$

Since we have assumed that $0 < p < c$ (Assumption 1), it follows that $\rho_0^{A*} = 1$. When contrasted with the optimal review strategy in terms of maximizing the Group's efforts ($\rho_0^{G*} = 0$), this encapsulates the tension faced by the Court – the Agency will exert more effort conditional on promulgation of $x = 0$ when $s_A = \phi$ if the Court is more likely to *reverse* $x = 0$ in the absence of confirmatory information, but the Group's incentives are opposed to this, as it will exert more effort if the Court is more likely to *uphold* $x = 0$ in the absence of contradictory information.

For $x = 1$, equation (**??**) is strictly concave for $p \in (0,1)$. The value of ρ_1 that maximizes Agency effort is

$$\rho_1^{A*} = \frac{c}{2\beta p^2}.$$

In spite of this interior solution for maximizing Agency effort, we will see that maximizing social welfare generally involves a deterministic judicial review strategy, where the Court either upholds all policies in the absence of dispositive information or reverses all such policies.

A.3 Agency Behavior: Policy Choice

Thus far we have analyzed the choice of e_A and e_G induced by any judicial review doctrine (ρ_0, ρ_1) and agency policy x. We have also covered the Agency's incentives for determining x in case the Agency obtains any strong evidence, $s_A = \omega$. Before we can determine the optimal judicial review doctrine, we must also identify the equilibrium policy choice x_ϕ induced by a doctrine (ρ_0, ρ_1) in case $s_A = \phi$.

The Agency's optimal policy choice x_ϕ^* in this event is given by the equation (**??**) in the text:[4]

$$x_\phi^*(\rho_0, \rho_1) = \begin{cases} 0 & \text{if } (1 - pe_G^*(0,\rho_0))\,\rho_0 + pe_G^*(0,\rho_0) < (1 - pe_G^*(1,\rho_1))\,\rho_1, \\ 1 & \text{if } (1 - pe_G^*(0,\rho_0))\,\rho_0 + pe_G^*(0,\rho_0) > (1 - pe_G^*(1,\rho_1))\,\rho_1. \end{cases}$$

Equation (**??**) is the Agency's incentive compatibility constraint.

In analyzing optimal judicial review, we can restrict attention to triples (x, ρ_0, ρ_1) such that x satisfies equation (**??**), given (ρ_0, ρ_1). Other triples are strategically irrelevant in the sense that they include strategies that cannot occur together in any equilibrium. That is, a doctrine of judicial review cannot be socially optimal unless it is incentive compatible.

Proposition ??. *If the Court is deferential to pro-Group policies (*i.e., $\rho_1 = 0$*), then the Agency will always promulgate the pro-Group policy when it is uninformed (*i.e., $x_\phi = 1$*).*

Proof: The proposition follows by substituting e_G^* from equation (**??**) into equation (**??**). If $\rho_1 = 0$, the right hand side of equation (**??**) is 0. The left hand side is strictly positive for $\rho_0 \in \{0, 1\}$. Intuitively, $\rho_1 = 0$ means that the Court will uphold a pro-group policy even when the Agency lacks good justification for it. ∎

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The non-trivial arrangement ruled out by this proposition[5] is $x = 0$ with $\rho_0 = 1$ and $\rho_1 = 0$. It is impossible to simultaneously induce the Agency to promulgate the anti-Group policy while adopting a stance of extreme skepticism toward that policy. In such a situation, $x_\phi = 0$ will be overturned with probability 1 (either the group will learn nothing, will uncover supporting evidence that it conceals, or will uncover contradictory evidence that it presents), whereas there is positive probability that the Agency will be upheld if it chooses $x_\phi = 1$.

Proposition ??. *If the Court confronts all thin records with extreme skepticism (*i.e., $\rho_0 = \rho_1 = 1$*), then the Agency will always promulgate the pro-Group policy when it is* *uninformed* (i.e., $x_\phi = 1$).

Proof: The proposition follows by evaluating the left and right hand sides of equation (??). When $\rho_0 = \rho_1 = 1$, $x_\phi = 1$ is strictly optimal if $1 > 1 - \frac{p^2\beta}{c}$, which is always true given Assumption 1. ∎

While technically simple, proposition **??** captures an important idea. When the Court rejects all rules lacking convincing justifications, the Agency's only chance to be upheld in court comes from choosing the pro-group policy $x = 1$ when $s_A = \phi$. It is at least possible in this case that the Group adduces evidence that saves the Agency's rule from judicial nullification. Indeed, when $x = 1$ and $\rho_1 = 1$, the Group has strong incentives to investigate — because it knows the only way to preserve the beneficial rule promulgated by the Agency is to present evidence justifying it. On the other hand, if $x_\phi = 0$, there is no chance for the Agency to be upheld in court. Either the Group will present hard evidence that $\omega = 1$, contraindicating $x = 0$; or the Group will conceal hard evidence that $\omega = 1$; or the Group will obtain no information. In all cases, the Court overturns the Agency's regulation.

Even more striking, this judicial review posture is a clear case satisfying a standard of "legal rationality." The court decides the fate of regulations based solely on the depth of evidence supporting them. If a regulation is supported by hard evidence, it is upheld. If a regulation is contradicted by hard evidence — a "clear error" by the agency in light of the facts — it is nullified. If there is no conclusive evidence about the social value of the agency's action, again it fails to pass judicial scrutiny.

Yet, this clear case of legal rationality, where court judgment is based solely on evidence and reasoning, induces an equally obvious political bias in the agency. Under this judicial review doctrine, the agency is biased in favor of prominent interest groups, in the sense that it regulates in such a group's favor when it lacks strong evidence to the contrary.

Proposition ??. *The Agency will strictly prefer forwarding the anti-Group policy, $x = 0$, when confronted by a thin record only if the Court is strictly more deferential to this policy than the pro-Group policy (*i.e., $\rho_0 < \rho_1$*).*

Proof: Applying equation (**??**) and imposing Assumptions 1-4, the Agency will strictly prefer promulgating $x_\phi = 0$ only if:

$$\begin{aligned}
(1 - pe^*_G(0,\rho_0))\,\rho_0 + pe^*_G(0,\rho_0) &< (1 - pe^*_G(1,\rho_1))\,\rho_1 \\
(1 - p\min[p(1-\rho_0)/c, 1])\,\rho_0 + p\min[p(1-\rho_0)/c, 1] &< (1 - p\min[p\beta\rho_1/c, 1])\,\rho_1 \\
\left(1 - p^2(1-\rho_0)/c\right)\rho_0 + p^2(1-\rho_0)/c &< \left(1 - p^2\beta\rho_1/c\right)\rho_1 \\
\rho_1 - \rho_0 &> \rho_1^2 p^2 \beta/c + (1-\rho_0)^2 p^2/c
\end{aligned}$$

The righthand side of inequality (2) is nonnegative for $\beta \geq 0$, $c > 0$, and $(\rho_0, \rho_1 \in [0,1]^2$. Thus, the Agency strictly prefers choosing $x_\phi = 0$ only if $\rho_1 - \rho_0 > 0$, as was to be shown.

∎

B *Ex Ante* Optimal Doctrines of Judicial Review

Expected social welfare[6] is calculated as follows:

$$W(\rho) = \begin{cases} e^*_A(0) + (1-p)(1-e^*_A(0))(1-\rho_0) & \text{if } x_\phi = 0, \\ e^*_A(1) + p(1-e^*_A(1))(e^*_G(1) + (1-e^*_G(1))(1-\rho_1)) & \text{if } x_\phi = 1, \end{cases}$$

where

$$x^*_\phi(\rho_0,\rho_1) = \begin{cases} 0 & \text{if } \rho_0 + p^2(1-\rho_0)^2/c < (1-p^2\beta\rho_1/c)\,\rho_1, \\ 1 & \text{if } \left(1-pe^*_G(0,\rho_0)\right)\rho_0 + pe^*_G(0,\rho_0) > \left(1-pe^*_G(1,\rho_1)\right)\rho_1. \end{cases} \tag{2}$$

The following are the *ex ante* equilibrium social welfares flowing from each of the three (non-trivial) incentive compatible judicial review doctrines:

$$\begin{aligned} W(\rho_0=0,\rho_1=1|x_\phi=0) &= 1-p+\frac{kp^3}{c\kappa}, \\ W(\rho_0=1,\rho_1=0|x_\phi=1) &= p, \\ W(\rho_0=1,\rho_1=1|x_\phi=1) &= \frac{p^2\beta}{c}+\left(1-\frac{p^2\beta}{c}\right)\frac{k\,(c-p^2\beta)}{c\kappa}. \end{aligned} \tag{3}$$

First, considering the use of deferential treatment to obtain the anti-Group policy, $x_\phi = 0$ ($\rho_0 = 0,\ \rho_1 = 1$) with the use of a deferential treatment to obtain the pro-Group policy, $x_\phi = 1$ ($\rho_0 = 1,\ \rho_1 = 0$), eliciting $x_\phi = 0$ is optimal only if

$$1-p+\frac{kp^3}{c\kappa} > p. \tag{4}$$

Given our assumptions, inequality (4) is satisfied for sufficiently small p and not satisfied for sufficiently large values of p.[7] Substantively (and intuitively), social welfare is maximized by deferential treatment of the anti-Group policy *only if* the Group's interests are not sufficiently well-aligned with those of society at large.

Similarly, comparing the use of deferential treatment to obtain $x_\phi = 0$ with the use of a skeptical review strategy to obtain $x_\phi = 1$ ($\rho_0 = \rho_1 = 1$), deferential elicitation of the anti-Group policy is optimal only if the following inequality holds:

$$1-p+\frac{kp^3}{c\kappa} > \frac{p^2\beta}{c}+\left(\frac{c-p^2\beta}{c}\right)^2\frac{k}{\kappa}.$$

This inequality holds for

- sufficiently small values of $\frac{k}{\kappa}$,
- sufficiently small values of p,
- sufficiently small values of β, and
- sufficiently large values of c.

Deference to pro-Group policies is socially preferred to skeptical treatment of such policies if

$$p \;>\; \frac{p^2\beta}{c} + \left(\frac{c - p^2\beta}{c}\right)^2 \frac{k}{\kappa}.$$

This inequality holds for sufficiently small values of p—the unilateral effects of the other parameters are strongly dependent on p in the sense that none of these parameters can on their own (*i.e.*, independent of the value of p) determine the optimality of judicial deference to a pro-Group policy promulgated with a thin record. Putting these three comparisons together, we can summarize the effects of the various parameters as follows.

Proposition 1 *Deference to, and elicitation of, the anti-Group policy is socially optimal only if*

- *the Agency is not particularly reversal-averse ($\frac{k}{\kappa}$ sufficiently small),*
- *the interests of the Group diverge sufficiently from Society's (p sufficiently small),*
- *the Group's bias for its favored policy is not too great (β sufficiently small), and*
- *the Group's marginal costs of information grows quickly (c sufficiently large).*

Furthermore, skeptical treatment of pro-Group policies is optimal only if the interests of the Group diverge sufficiently from Society's (again, only if p is sufficiently small).

One of the main conclusions to be drawn from Proposition 1 is that deference to pro-Group policies ($\rho_1 = 0$) is optimal whenever p is large enough and β is sufficiently large to require (or, in the case of β, allow) judicial review to motivate the Group to collect information. This is an extreme version of court-induced agency capture: under this mechanism, equilibrium play involves the Agency *always* defers to the Group in the absence of hard information to the contrary, the Court always sanctions this stance, and *no information is collected by either the Agency or the Group.*[8]

Notes

[1]Of course, these subgames are relevant and given full consideration when we turn our attention to the incentives of the Agency and the Court.

[2]the Agency's choice of x_ϕ is crucial to both the Agency —in spite of our assumption that the Agency is indifferent about the match between the policy chosen and the underlying state of nature—and the society. This is because of the Group's bias: the Group will not submit evidence to overturn $x = 1$ and will not submit evidence to uphold $x = 0$. Thus, x_ϕ will have welfare effects above and beyond that captured by the distribution of ω (*i.e.*, p).

[3]Assumptions 2 and 4 imply that the max and min operators are unnecessary.

[4]For reasons of space, we do not consider the possibility of setting a judicial review strategy so as to make the Agency indifferent between $x_\phi = 0$ and $x_\phi = 1$. However, note that *ex ante* expected social welfare can not be strictly improved by such a review strategy. This conclusion might fail to hold, of course, if there were *ex ante* incomplete information about the Agency's policy preferences.

[5]The proposition also rules out $x = 0$ with $\rho_0 = \rho_1 = 0$, which is trivial in that it requires the Court to uphold all regulations that are unsupported by any evidence. Obviously, this cannot maximize social welfare in our model, and (relatedly) is substantively absurd.

[6]The term "expected" is key, as when the Court is interested in interim social welfare it will never reverse the Agency's decision.

[7]To see this, evaluation of (4) at $p = 0$ and $p = 1$ straightforward, it is simple to confirm that the first partial derivative of the left hand side of (4) is strictly negative for $p \in [0, 1]$, and that of the right hand side is positive, given Assumptions 1 and 4.

[8]As above with deferential elicitation of $x_\phi = 0$, there are multiple payoff equivalent review strategies that elicit $x_\phi = 1$ and involve $\rho_1 = 0$. This extreme version is most clear to consider.