A Model of the Zone-of-Interests Test

Yoon-Ho Alex Lee[1]

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This Article offers the first comprehensive economic analysis of the zone-of-interests test from administrative law. Applying concepts from polar coordinates and inner products, we construct a model of the zone-of-interests test that suggests answers to many of the difficult questions stemming from the doctrine. The results of the model suggest that the zone-of-interests test can be understood as Congress's attempt to cabin judicial review to ensure that litigation based on administrative rule challenges would lead to efficient, effective, and timely outcomes that are consistent with Congress's intent behind the subject statute. Our model also illustrates a relationship between the zone-of-interests doctrine and the standing doctrine. In an extension, we also consider how the doctrine can be rationalized as safeguarding against substantive court errors and how the zone-of-interests doctrine should be understood when the substantive statute does not direct an agency toward a particular rule outcome.

[1] Professor of Law, Northwestern Pritzker School of Law. [Acknowledgments to be included]. The author thanks Danny Damitio, Lawrence Liu, and Nanzhu Wang for their excellent research assistance. This research has been supported by the Northwestern University Pritzker School of Law Faculty Research Program. All errors are mine.

INTRODUCTION

Consider the following. You own a business. A federal government agency adopts a sweeping rule that will have detrimental effects on your business. You believe the agency exceeded its statutory authority. You have a strong argument for establishing an injury-in-fact: the imminent harm to your business is undeniable. Nothing in the organic statute specifically precludes judicial review of this action. Feeling confident, you sue the agency. What happens? The court says, "Sorry, you don't belong to the zone of interests!"

What does this mean? The court is effectively saying that, regardless of how significant your economic harm and how reasonable your substantive legal arguments, it will not even review your claim because you are not a "suitable" plaintiff. To make matters more aggravating, the court acknowledges that you otherwise have constitutional standing to bring this challenge. It's a head-scratcher. But this is essentially how the zone-of-interests test works (*see, e.g.*, *Dismas Charities, Inc. v. U.S. Dep't of Justice, Fed. Bureau of Prisons*, 401 F.3d 666 (6th Cir. 2005)). Starting with only a vague phrase from Section 702 of the Administrative Procedure Act (APA), the court draws a seemingly arbitrary contour of the set of individuals who may (or may not) sue the agency for its action.

Introduced over fifty years ago in the Supreme Court's landmark case *Association of Data Processing Serv. Orgs., Inc. v. Camp*, 397 U.S. 150 (1970), the zone-of-interests test remains one of the most puzzling doctrines in administrative law. It was thought to be structured as a standing requirement for federal administrative cases, but many questions remain unanswered. To begin with, what purpose is served by the doctrine? Should it be viewed as a broadening doctrine or a narrowing one? The Supreme Court has repeatedly affirmed its language from *Clarke v. Sec. Indus. Ass'n*, 479 U.S. 388, 400 (1987), that "the test is not meant to be especially demanding." Why should it not be? And just how demanding is it supposed to be? More importantly, what characteristics should separate those who "arguably" belong to the zone from those who "do not even arguably" belong to the zone, and why? How does or should this test interact with the constitutional standing doctrine? Why does Congress sometimes include citizen-suit provisions in certain statutes (thereby permitting anyone to belong to the zone) but not in others? What policy goals are served by including such provisions?

Cases applying the test offer some clues to these questions, but the Supreme Court has given only limited guidance. The contours of the zone have not frequently been litigated at the Supreme Court level. Between 1970 and 2021, there were only twenty cases in which the Court applied the zone-of-interests test.[2] Lower courts have wrestled with the doctrine far more frequently—and in greater depths—and have offered their own justifications for the doctrine. The purpose of this Article is to provide an economic analysis of the zone-of-interests test in an effort to shed light on some of these varied questions.

In the model, an agency adopts a rule pursuant to its organic statute, which the agency interprets with some error. Potential plaintiffs come with divergent interests, and one plaintiff is chosen randomly to challenge the rule. The plaintiff seeks to modify the rule through litigation in a direction that advances her own interest. Before the court reviews the rule's statutory validity, however, it must ensure the plaintiff has constitutional standing and passes the zone-of-interests test. If the plaintiff fails either, another plaintiff is chosen to challenge the rule the following

[2] Certainly, the Court has mentioned the doctrine in more than twenty cases. A Westlaw search shows that forty-six Supreme Court cases mention the phrase "zone of interests" during this period. These include instances where the phrase was mentioned in parenthetical remarks to cited cases. Only twenty of them squarely address the issue.

year, and the game continues until the court ensure the rule is statutorily valid—either because the agency's original rule is declared valid upon review or because the court modifies the rule to ensure its validity. In the base model, we assume that Congress cares about the regulatory outcome and is invested in the welfare of the statute's intended beneficiaries (or a particular interest otherwise specified by the statute). We will call this the "Statutory Interest Model."

The model leads to the following main points, which are largely consistent with the doctrine's jurisprudence. First, the court intent on promoting the specified statutory interest should set the zone sufficiently narrowly in the following sense: groups whose interests are negatively correlated with beneficiary welfare should not be included as potential plaintiffs, but neither should those groups whose interests are positively but only marginally correlated with beneficiary welfare. The intuition behind this result is straightforward. The narrower the zone is set (i.e., requiring greater correlation with beneficiary welfare), the less likely that a randomly-drawn plaintiff will survive the test, but the more aligned a qualified plaintiff's interest will be to beneficiary welfare. Thus, conditional on the plaintiff passing the test, she can litigate more effectively to promote beneficiary welfare. Likewise, the broader the zone is set, the more likely that a potential plaintiff will survive the test initially, but the less efficiently the statutory interest will be promoted. The consideration of these tradeoffs results in an interior optimal solution for defining the zone. This finding justifies, for example, the D.C. Circuit's "suitable challenger" doctrine as well as other case law that limit suits by plaintiffs (other than directly regulated entities) that have antithetical or orthogonal interests.

The optimal range of the zone will also vary according to the difficulty of establishing constitutional standing. In particular, the harder it is for a potential plaintiff to establish constitutional standing, the broader the zone of interests should be set. From this perspective, the zone-of-interests test can be seen as a safeguard against a highly restrictive standing requirement. The court's rational response to its tightening of the constitutional standing doctrine should be to broaden the zone of interests to include more potential plaintiffs. This is consistent with what we observe post-*Data Processing*, when the court began imposing greater burdens on plaintiffs to establish constitutional standing.

We then consider two extensions. In one extension, we consider the possibility of court errors. We find that imposing the zone-of-interests requirement is *efficient* (i.e., leads to a better outcome as compared to not imposing it) as long the probability of erroneous application is reasonably small. But when the court can also err in its substantive judgment, the zone-of-interests test becomes more efficient as the court tends to err more in its substantive judgment. Thus, the zone-of-interests test can be seen as a safeguard against the possibility of the court's substantive errors.

In another extension, we consider a variation in which Congress cares only whether the agency is properly complying with its statutory requirement. Indeed, there are statutes which suggest that Congress may not be committed to a particular regulatory outcome but cares a great deal about having the agency comply with the statutory mandates. Examples include certain procedural requirements, such as those required under the APA. We will call this the "Statutory Compliance Model." Under this model, we find that the optimal zone should include all groups whose interests are positively correlated with the beneficiaries' interests (and only those groups). This result can be interpreted, for example, to explain why we see citizen-suit provisions in certain statutes but not in others. More specifically, citizen-suit provisions make sense when all citizens' interests are largely aligned or when Congress is not biased toward any particular outcome.

Overall, the results of the model and its variations suggest that the zone-of-interests test can be understood as Congress's attempt to cabin judicial review to ensure that litigation based on rule challenges would lead to efficient, effective, and timely outcomes that are consistent with Congress's intent behind the subject statute. We qualify these results by noting that the model at best represents what courts *claim* to do in administering or justifying the test. We can make no claims about whether the test, as applied, in fact promotes efficiency

This Article makes several contributions. First, to the best of the author's knowledge, this is the first economic model of the zone-of-interests test, and accordingly, it is the first analysis that offers normative justifications for the test. Second, the model introduces an original framework for conceptualizing various competing constituent groups' interests as vectors in polar coordinates. The framework may very well be applied to analyze other rulemaking institutions in the future. Finally, this Article includes an analysis of the comprehensive hand-coded data set of all zone-of-interests test cases at the Circuit Court level between 1971 and 2022. One surprising result is how difficult it is for the plaintiff to satisfy the zone-of-interests test at the Circuit Court level (as compared to the Supreme Court level): we observe that nearly 30% of cases applying the zone-of-interests test are ruled against the plaintiffs at the Circuit Court level.

The rest of this Article is organized as follows. Part I provides a brief overview of the relevant caselaw and its statistics. Part II describes the set-up for the base model. Part III lists the model's main findings and extensions. Part IV discusses justifications for key institutional assumptions behind the model as well as the implications and limitations of the model's findings. Part V concludes, and Appendix includes all proofs.

I. THE ZONE-OF-INTERESTS TEST

A. Overview

This Part gives a brief overview of the zone-of-interests test. The purpose here is to sketch out the aspects of the doctrine that are relevant for modeling purposes only. Part II and Part IV include further case law discussions as they relate to the model's assumptions and findings. For an excellent survey on the doctrine's development, see Siegel (2004).

The Supreme Court introduced the zone-of-interests test in 1970 in *Data Processing*, 397 U.S. 150, in which sellers of data processing services challenged a ruling by the Comptroller of the Currency that allowed national banks to offer similar services. The plaintiffs argued the ruling was contrary to a statute barring bank service corporations from engaging in "any activity other than the performance of bank services for banks" (*Id.* at 155). In considering whether they can bring this claim, the Court explained that the question of standing "concerns, *apart from the 'case' or 'controversy' test*, the question whether the interest sought to be protected by the complainant is arguably within the zone of interests to be protected or regulated by the statute or constitutional guarantee in question" (*Id.* at 153).

The Court's basis for this inquiry was APA Section 702, 5 U.S.C. §702, which explicitly grants (hence limits) a right of review to a person "aggrieved by agency action . . . *within the meaning of a relevant statute*." In other words, a plaintiff must be aggrieved *in a particular manner*. APA Section 702 thus represents Congress's deliberate effort to limit the plaintiffs who can seek judicial review (by requiring more than Article III). Despite the statutory reference, the Court referred to the doctrine as a "rule of self-restraint," and clarified that "Congress can . . . resolve the question one way or another, save as the requirements of Article III dictate

otherwise" (*Data Processing*, 397 U.S. at 154). Finally, the Court noted a general trend: "Where statutes are concerned, the trend is toward *enlargement* of the class of people who may protest administrative action. The whole drive for enlarging the category of aggrieved 'persons' is symptomatic of that trend" (*Id.* at 154).

The Court provided further guidance in *Clarke*, 479 U.S. 388 (1987), which specifically addressed whether a would-be plaintiff must belong to the statute's intended beneficiaries. Answering in the negative, the Court explained that "[t]he essential inquiry is whether Congress intended for [a particular] class [of plaintiffs] to be relied upon to challenge agency disregard of the law" (*Id.* at 399). The Court clarified that although it will deny a right to review when "the plaintiff's interests are so marginally related to or inconsistent with the purposes implicit in the statute that it cannot reasonably be assumed that Congress intended to permit the suit," the inquiry is "not meant to be especially demanding" (*Id.* at 399-400). In a similar vein, in *Hazardous Waste Treatment Council v. Thomas*, 885 F.2d 918, 922-23 (D.C. Cir. 1985), the D.C. Circuit explained its own "suitable challenger" doctrine, according to which, a plaintiff would belong to the zone if she could show "less than a congressional intent to benefit but more than a marginal relationship to the statutory purpose."

Air Courier Conf. v. Am. Postal Workers Union, 498 U.S. 517 (1991), was the first Supreme Court case in which the plaintiffs failed the zone-of-interests test. In that case, the Court inquired "whether postal employees are within the 'zone of interests' of the group of statutes known as the Private Express Statutes (PES), so that they may challenge the action of the United States Postal Service in suspending the operation of the PES with respect to a practice of private courier services called 'international remailing'" (*Id.* at 519). In holding that they are not, the Court reasoned that "[t]he postal monopoly . . . exists to ensure that postal services will be provided to the citizenry at large, and not to secure employment for postal workers" (*Id.* at 5228).

The last significant development came from *Lexmark Int'l, Inc. v. Static Control Components, Inc.*, 134 S. Ct. 1377 (2014). In *Lexmark*, the Supreme Court clarified that although the zone-of-interests test began life under APA Section 702, it in fact applies to all statutorily-created causes of action (*Id.* at 1388). Thus, even when a claim is brought under an organic statute (rather than under the APA), the Court must apply the zone-of-interests test. Justice Scalia then went on to state that the zone-of-interests test should not be considered "prudential."[3] Instead, "whether a plaintiff comes within "the 'zone of interests'" is an issue that requires us to determine, using traditional tools of statutory interpretation, whether a legislatively conferred cause of action encompasses a particular plaintiff's claim . . . ." (*Id.* at 1387). Thus characterized, the doctrine can no longer be viewed as a "rule of self-restraint." Likewise, after *Lexmark*, the zone-of-interests test should be understood as a non-jurisdictional inquiry which asks whether the plaintiff has a cause of action under the relevant statute (*Id.*).

Given the sparse caselaw at the Supreme Court level and the low frequency with which the Court found a plaintiff to fall outside the zone, the contours of the zone can be grasped more clearly when we review Circuit Court cases in which the plaintiffs' interests have failed to belong to the zone. Two cases are particularly instructive. First, in *Am. Fed'n of Gov. Emps., Local 1668 v. Dunn*, 561 F.2d 1310 (9th Cir. 1977), the Ninth Circuit held that former Air Force

[3] Lower courts have not always followed this directive, however, as some judges have continued to refer to the zone-of-interests test as an element of "prudential standing" (*See Bank of New York Mellon v. Enchantment at Sunset Bay Condominium Ass'n*, 2 F.4th 1229 (9th Cir. 2021); *Sundel v. United States*, 985 F.3d 1029 (D.C. Cir. 2021); *Tenth Street Residential Ass'n v. City of Dallas*, 968 F.3d 492 (5th Cir. 2020)).

employees may not challenge the determination of the minimum wage that could be paid to the food service employees under a private contract under the Service Contract Act, 41 U.S.C. § 351, et seq. because the Act "was passed for the benefit and protection of employees of contractors and subcontractors performing services for the government" and the plaintiffs' interests are "antithetical" to the rights of private employees (*Dunn*, 561 F.2d at 1313). Specifically, the court further explained that "if the wage rate is determined to be erroneous, then appellants will retain their jobs at the expense of the private employees" (*Id.*).

Second, in *Grand Council of the Crees (of Quebec) v.* FERC, 198 F.3d 950 (D.C. Cir. 2000), the D.C. Circuit held that environmental plaintiffs could challenge the Federal Energy Regulatory Commission's authorization allowing an electric utility to sell their services as market-based rates because "ratemaking is . . . an effort to balance the interests of power consumers and producers" and the plaintiff's "environmental interests appear 'orthogonal' to both" (*Id.*). The court further explained that "litigation by persons whose interests are such is 'more likely to frustrate than to further ... statutory objectives.'" Accordingly, "they are not the appropriate parties to "police the interests that the statute protects" (*Id.*).

The D.C. Circuit's conclusion raises a question worth pondering: if a plaintiff is merely requesting the court to review whether an agency's action is statutorily valid, why exactly would such litigation "frustrate" rather than "further" statutory objectives just because the plaintiff has a private interest? Wouldn't the court in any case be reviewing the agency action to *ensure* that it is consistent with the statute? We will return to this idea in the exposition of the model.

B. Caselaw Statistics

According to a Westlaw database search, between 1970 and 2021, there were only twenty Supreme Court cases that squarely addressed the doctrine—including one case dealing with the constitutional zone-of-interests test and one grant of an application for stay. Of those cases, the Court found that the plaintiff failed the test in only three cases (15 percent).

The numbers look different, however, when we look at Circuit Court cases. From 1971 to 2021, the Circuit Courts had a total of 805 distinct cases that considered a zone-of-interests inquiry. Of those, 14 cases considered two distinct interests, and thus, there were a total of 819 instances in which a Circuit Court considered whether a particular interest belongs to the relevant statute's zone of interests. Collectively, the courts found the plaintiffs' interests failed the zone-of-interests test in 247 instances (about 30 percent). Table 1 lists the number of cases from each Circuit between 1971 and 2021 in which the court applied the zone-of-interests test. The D.C. Circuit had the highest number of cases, which is to be expected given the high number of administrative law cases the D.C. Circuit reviews each year. The Seventh Circuit seems to apply the test most rigorously (with nearly 47 percent of cases failing the test), while the First Circuit seems to apply the test most leniently (with only 12 percent failing the test).

>> Insert Table 1 <<

The statistics do not seem to vary in any predictable manner based on the intervening Supreme Court pronouncements. For example, the zone-of-interests test seems to have gotten *harder* to clear after *Clarke* clarified that the zone is broader than the intended beneficiaries (30 percent to 40 percent), while the test seems to have gotten *easier* to clear after *Air Courier*, which was thought to signal a tightening of the test by the Supreme Court (40 percent to 29 percent). The raw statistics, of course, cannot tell the whole story. For example, the data does not

reveal how parties' settlement behavior may have changed as the result of the changing jurisprudence.[4] The statistics also do not allow us to conclude whether Circuit Courts tend to apply the test more restrictively—i.e., by delineating the contour of the zone more narrowly. When we restrict the analysis to the twenty Supreme Court cases, eight of those cases had Circuit Court rulings that explicitly addressed the zone-of-interests test. Among those eight cases, three cases had a Circuit Court ruling that held the plaintiff failed the zone-of-interests test, while only one of those cases at the Supreme Court held as such. At a minimum, the raw statistics at the circuit court level (30 percent) suggest that the zone-of-interests test can be a significant hurdle for the plaintiff in a nontrivial number of cases.

II. THE MODEL

A. Motivation

Although the caselaw is far from rendering the zone-of-interests test a bright-line test, some patterns do emerge: courts analyze the degree to which a plaintiff's private interest is aligned with the interest of the intended beneficiaries or the overall purpose of the statute. To model these ideas, we note the following.

First, the court's conception of competing interests suggests fixing a particular interest as the "Statutory Interest" and envisioning how other interests can conflict with it. A plausible way to model this idea is to assume that each interest can be represented as a unit vector in a two-dimensional space. Second, the doctrine limits suitable plaintiffs to those whose interests are sufficiently well-aligned with the Statutory Interest. Given a particular interest vector, it is natural to consider another interest to be "antithetical" if it runs in the opposite direction and "orthogonal" if it is perpendicular. Courts have stated that such interests do not belong to the zone of interests (and presumably everything in between), and neither do the plaintiffs whose interests are only "marginally" related to the Statutory Interest. Thus, the zone is limited to those interests that are (sufficiently) positively correlated with the Statutory Interest. Third, the D.C. Circuit's rhetoric that litigation by certain interest groups may end up frustrating statutory objectives indicate one of two things. In one sense, it suggests that litigation can be used by rule challengers to modify the agency rule in a direction *away* from the Statutory Interest. We may reasonably assume that challengers will attempt to modify the rule in the direction that furthers their own interests. Alternatively, the court may be insinuating at the possibility of court errors (i.e., erroneously striking down a statutorily valid rule). We consider this possibility separately in an extension.

B. The Set-Up

In the Statutory Interest model, the court is tasked with reviewing a rule adopted by an administrative agency ("Agency") pursuant to Congress's statutory directive. The substantive statute is assumed to be constitutionally valid. The rule is challenged by a randomly drawn plaintiff who has a particular stake in the rule outcome. In this multi-period game, Congress's statute and Agency's rule are taken as a given, and each plaintiff has a fixed strategy that is

[4] Theory predicts, however, that when the law is relatively clear, settlement behavior should not completely invalidate inferences regarding the legal standard that can be made from gleaning the raw data. *See* Klerman & Lee (2014).

attached to her interest. The only strategic behavior analyzed is that of the court, which administers the zone-of-interests test to maximize the expected Statutory Interest through judicial review. Justifications for certain technical assumptions are included in the body or in the footnotes. Justifications for various institutional assumptions are discussed in greater detail in Section IV.A.

Congress and Agency. Congress passes an organic statute and directs Agency to adopt a regulation to protect the Statutory Interest. For example, if the statute is designed to protect consumers, the Statutory Interest would be consumer welfare; if it is designed to protect investors, the statutory interest would be investor welfare, and so on. Agency's choice of regulation is represented as a point $\boldsymbol{\omega} = (u, v) \in W \equiv [0,1] \times \boldsymbol{R}$.[5] Given rule $\boldsymbol{\omega} = (u, v)$, the expected level of Statutory Interest is simply u. The second coordinate, v, has no inherent value, but its availability allows for the possibility that there can be multiple forms of regulation that could have been adopted, all of which achieve the same level of statutory interest.[6] Agency may have its own reason for choosing a particular $\boldsymbol{\omega}$. For example, Agency may be subject to an independent requirement to balance the costs and benefits of its regulation, in which case Agency's choice of u may be internally constrained. We take Agency's rationale behind its rule choice to be partly exogenous.

Statutory Interpretation. In an ideal world, Congress can send a clear directive through its statute, Agency acts each time within the statutory bounds, and there are no legal challenges to Agency's rule. For example, Congress might specify clearly through statute S_α that u must be greater than some $\alpha \in (0,1)$, and it would be up to Agency to specify any $\boldsymbol{\omega} = (u, v)$ such that $u \geq \alpha$. But when the directive is clear, Agency will find it hard to deviate from the law, and there will be no litigation (*see* Priest and Klein 1984). Since this model is concerned with challenged regulations, we assume that Congress is unable to transmit its message clearly. This can be due to the usual problem of ambiguity in statutory language or statutory silence. Therefore, given S_α, Agency and the court will each have its own interpretation of α. The court's interpretation may or may not be affected by Agency's interpretation. It may, for example, depend on whether Agency's interpretation deserves *Chevron* or *Skidmore* deference as well the court's use of various canons of statutory interpretation. More specifically, given Congress's choice of α, conveyed through the language of S_α, Agency will observe $\alpha_A \equiv \alpha + \epsilon_A$ and the court will observe $\alpha_C \equiv \alpha + \epsilon_C$, where ϵ_A and ϵ_C are (possibly correlated) errors,[7] which are uniformly distributed across an interval with mean zero. Thus, $E[\alpha_A] = E[\alpha_C] = \alpha$. Similarly, we assume that from the court's perspective, $E[\alpha] = \alpha_C$. Because Agency will not knowingly violate the statutory directive, it will choose (u, v) such that $u \geq \alpha_A$. But it may read α differently from Congress or the court. While the model assumes that Agency will not go against its own interpretation, the model can also allow unreasonable interpretations on Agency's part; in other words, ϵ_A can have a large standard deviation. At the end of the day, the court will invalidate the agency's regulation if $u < \alpha_C$.

[5] The fact that u is bounded above by 1 can be interpreted as some limitation on the regulator's choice of u.
[6] It is not strictly necessary to assume that the domain of v spans the entire $\boldsymbol{R}$, but this design allows us to not worry about end points. One can also work with a bounded range if the model further assumes the agency's original rule choice is sufficiently interior.
[7] The errors may be correlated because the court may defer to Agency's interpretation.

Congress's Objective Function. The model takes the substantive statute as a given. With respect to APA Section 702, the model assumes that Congress intended to limit the set of plaintiffs to protect or promote the Statutory Interest (as specified in each substantive statute). In other words, Congress cares about the efficacy of judicial review—how efficiently the court can promote the specified Statutory Interest when a rule is challenged. If Agency's rule $\boldsymbol{\omega} = (u, v)$ is modified to $\boldsymbol{\omega}' = (u', v')$ through litigation, we assume that Congress cares about maximizing the expected value of $u' - u$.[8] The court's job then is to apply the zone-of-interests test—while staying within its judicial duty of reviewing the rule according to the argument raised by each plaintiff—so as to maximize the expected value of $u' - u$.

Interest Groups as Potential Plaintiffs. There is a continuum of interest groups, represented by $\theta \in (-\pi, \pi]$. For the Statutory Interest model, we assume θ is distributed uniformly over $(-\pi, \pi]$ according to $f(\cdot)$. The Statutory Interest is set at $\theta = 0$. Each constituent group θ comes with its own single-dimensional measure of utility. We can also denote each interest group as $\vec{\boldsymbol{e}}_\theta$, a unit vector in the direction of θ. Group θ's welfare under rule $\boldsymbol{\omega}$ can be measured with an unspecified function $U_\theta(\cdot)$,which is strictly increasing in $\boldsymbol{\omega} \cdot \vec{\boldsymbol{e}}_\theta = u\cos(\theta) + v\sin(\theta)$ but bounded above by 1 and below by -1. Note that the Statutory Interest given rule $\boldsymbol{\omega}$ is simply $\boldsymbol{\omega} \cdot \vec{\boldsymbol{e}}_0 = u$. Intuitively, each group's welfare under rule (u, v) can be thought of as a function of the vector (u, v) projected along the line passing through the origin at angle θ. These vector representations of interest groups illustrate how different groups have different agendas and goals when it comes to what they want to achieve through Agency's rule.[9] We define the relationships between two interests as follows.

> **Definition.** Two interests θ_i and θ_j are *positively correlated* if $\vec{\boldsymbol{e}}_{\theta_i} \cdot \vec{\boldsymbol{e}}_{\theta_j} > 0$ and *negatively correlated* if $\vec{\boldsymbol{e}}_{\theta_i} \cdot \vec{\boldsymbol{e}}_{\theta_j} < 0$. They are *antithetical* if $\vec{\boldsymbol{e}}_{\theta_i} \cdot \vec{\boldsymbol{e}}_{\theta_j} = -1$ and *orthogonal* if $\vec{\boldsymbol{e}}_{\theta_i} \cdot \vec{\boldsymbol{e}}_{\theta_j} = 0$. For $\rho > 0$, we will say θ_i and θ_j are *ρ-marginally correlated* for $\rho \in (0,1)$ if they are positive correlated but $\vec{\boldsymbol{e}}_{\theta_i} \cdot \vec{\boldsymbol{e}}_{\theta_j} < \rho$.

Given that the Statutory Interest is defined as $\vec{\boldsymbol{e}}_0$, $\vec{\boldsymbol{e}}_\pi$ is *antithetical* to the Statutory Interest, while $\vec{\boldsymbol{e}}_{\pi/2}$ and $\vec{\boldsymbol{e}}_{\pi/2}$ are *orthogonal* to it. $\vec{\boldsymbol{e}}_\theta$ is positively correlated with the Statutory Interest if $\theta \in (-\pi/2, \pi/2)$ and negatively correlated if $\theta \in (\pi/2\ , \pi] \cup (-\pi, \pi/2)$. For ρ close to 0, ρ-marginally correlated interests include those that are smaller than but sufficiently close to $\theta = \pi/2$.

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[8] It makes sense to normalize based on Agency's initial rule choice, u, because unless the court chooses to vacate the rule, there is only so much the court can do to improve the rule through judicial review. The court is, for example, limited in the direction in which the challenged rule can be modified because it can only entertain the arguments raised by the plaintiff and cannot make its own policy from scratch. One way to understand Congress's objective function here is to realize that the statute is determined through an independent process that is the result of a compromise among political actors. This is why Congress cannot simply specify $\alpha = 1$ as the statutory mandate and maximize the Statutory Interest. But neither would it make sense for Congress to set $\alpha = 0$ and give unfettered discretion to Agency while hoping to end up with a high value of u. Congress works together to pass the statute, and given the statute that passes, Congress thereafter cares about whether judicial review, whose scope is determined by APA Section 702, can efficiently promote the Statutory Interest.

[9] These welfare functions are not intended to be aggregated in this model. They are used for the purpose of illustrating divergent interests among various interest groups and how each group would try to exert pressure to change the rule.

A convenient feature of this space and interest group representation is that regardless of where Agency's rule $\boldsymbol{\omega}$ is located, it is in group θ's interest to move the rule in the direction θ. From this perspective,[10] we may assume that the initial rule has $v = 0$.

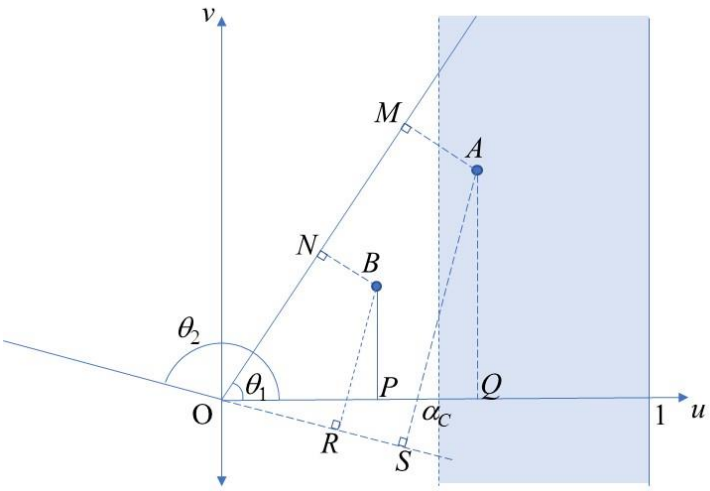

Figure 1. Agency Rules and Interest Group Welfare.

Figure 1 illustrates the set-up of interest groups. Consider Rule A. For Rule A, its u-coordinate is to the right of α_C, and thus it is a statutorily valid rule. If Rule A were challenged, plaintiffs will lose and Rule A will be undisturbed. Consider now Rule B. Because its u-coordinate is to the left of α_C, the court will deem it statutorily invalid. Plaintiffs with standing can seek to invalidate the rule and modify it. Meanwhile, consider the various interest groups. With Rule A, consumer welfare is Q, or the length of $|OQ|$, while with Rule B, the Statutory Interest is $|OP|$. Now consider group θ_1, which is roughly $\pi/3$ in Figure 1. Group θ_1's welfare under Rule A is $U_{\theta_1}(|OM|)$ and under Rule B is $U_{\theta_1}(|ON|)$. So Rule A is superior for group θ_1. Meanwhile, consider group θ_2, which is roughly $8\pi/9$ in Figure 1. Because θ_2 is sufficiently obtuse, $u\cos(\theta) + v\sin(\theta)$ will be a negative number for Rule A and Rule B. This is depicted in Figure 1 by seeing that R and S lie on the opposite side of the ray defined by θ_2. Thus, group θ_2's welfare under Rule A is $U_{\theta_2}(-|OS|)$ and under Rule B is $U_{\theta_2}(-|OR|)$.

Judicial Review and Rule Outcome. If an interest group challenges Agency's rule and the court were to review the rule's statutory validity, then the court does the following. The court first determines $\alpha_C \in (0,1)$ using the tools of statutory construction. If $u \geq \alpha_C$, the rule is preserved. If u is sufficiently below α_C (i.e., $\alpha_C - u \geq \eta$ for some $\eta > 0$), then the court vacates the rule wholesale. In this case, Agency must issue a new rule. If $u < \alpha_C$ and u is sufficiently close to α_C ($\alpha_C - u < \eta$), the rule is modified. In this case, $\boldsymbol{\omega} = (u, v)$ is replaced by another rule, $\boldsymbol{\omega}' = (u', v') \in W$, and $\boldsymbol{\omega}'$ will be determined by adding $\eta\vec{\boldsymbol{e}}_{\boldsymbol{\theta}}$. And thus, $\boldsymbol{\omega}' = \boldsymbol{\omega} + \eta\vec{\boldsymbol{e}}_{\boldsymbol{\theta}}$. But there are caveats. First, that depending on η and θ, it is possible that $\boldsymbol{\omega} + \eta\vec{\boldsymbol{e}}_{\boldsymbol{\theta}}$ might not be statutorily

[10] Whether or not this assumption is general depends on the objective of this model. Given u, fixing $v = 0$ will have the effect of specifying the welfare of each interest group to a particular value, which does result in a loss of generality. Nevertheless, the crux of the model is how a rule can change through litigation. Because we assume that the available rule movement, for each θ, is invariant to u or v, we can assume $v = 0$.

compliant ($u' < \alpha_C$). If this happens when $\theta \in (-\pi/2, \pi/2)$, we assume the court will instead add a factor of $\eta\vec{e}_{\theta}$ as to ensure that $u' = \alpha_C$. In other words, the court will not modify a rule in a way that is statutorily non-compliant; instead, it will move the rule until it achieves $u' = \alpha_C$. But note that if θ lies outside this window, the court can never achieve $u' = \alpha_C$ regardless of how far it moves in direction θ. In that case, we assume the rule is undisturbed and remains open for a future challenge. One implication of this set-up is that a statutorily valid rule cannot be further modified. We discuss this assumption in Section IV.A.

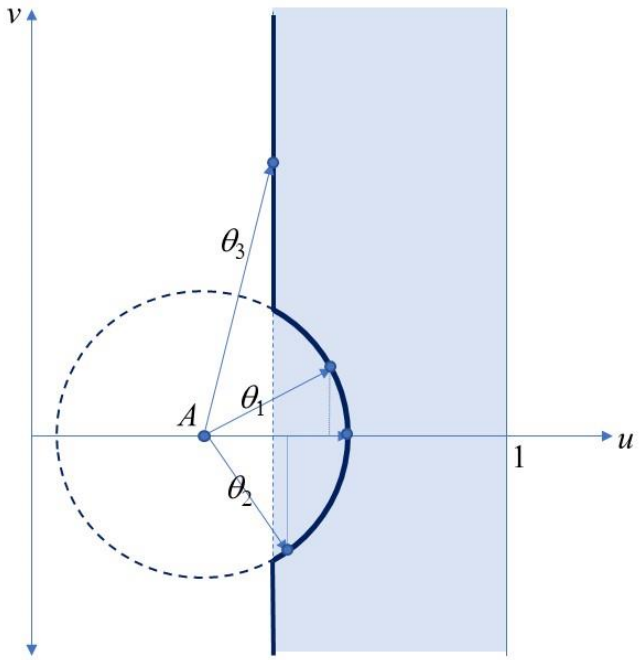

Figure 2. Agency Rules and Interest Groups' Strategic Litigation

Figure 2 illustrates possible litigation outcomes. When Rule A is challenged by $\theta = 0$, the court will move Rule A to the point at which the circle and the u-axis intersect. This is the best possible outcome given that we started with Rule A. If Rule A is challenged by $\theta = \theta_1$, then the court will move Rule A in the direction of θ_1 on the circle. From the perspective of the Statutory Interest, this is not as far along on the u-axis as when Rule A was challenged by $\theta = 0$. The consumer welfare outcome is even worse when the rule is challenged by $\theta = \theta_2$. Finally, if Rule A is challenged by $\theta = \theta_3$, whose interest is even less aligned with $\theta = 0$ than the other two, the court can only make sure that the new rule meets the minimum statutory compliance standard. Among the four options, this is the worst outcome from the perspective of the Statutory Interest.

Constitutional Standing. Before the case can reach the substantive review stage, however, the plaintiff must have standing. We introduce constitutional standing as a Bernoulli random variable with probability $p \in (0,1)$ that is independent of θ.[11] In addition, the set-up has already

[11] It is not necessary to assume θ and p are independent. Even if we were to assume a relationship between θ and p, there would be no qualitative changes in the results because the model is solved in expectation. For example, we could assume $p(\theta) = qg(\theta)$ where $q \in (0,1)$ in a constant and $g(\theta)$ is a symmetric function around zero. The

highlighted one important purpose served by the injury-in-fact requirement: by requiring the plaintiff to plead her concrete injury clearly, the court is able to discern the plaintiff's interest at stake (hence identify θ), which in turn will allow the court to apply the zone-of-interests test properly.

Zone of Interests. Let ZOI_{S_α} denote the set of interest groups, which the court deems as "arguably" belonging to the zone of interests to be protected by S_α. For simplicity, we the court will choose the zone of interests as $ZOI_{S_\alpha} = [-\theta_z, \theta_z]$, a symmetric region around $\theta = 0$.[12] Importantly, the court applies the zone-of-interests test *before* determining α_C and reviewing the rule's statutory validity. This is consistent with the court's current practice. Prior to having ascertained α_C, the court considers the potential rule movement in terms of $\eta\vec{e}_{\boldsymbol{\theta}}$ only (rather than possible $b_\theta\eta\vec{e}_{\boldsymbol{\theta}}$). Since Congress seeks to protect $u' - u = \eta\cos\theta$, the court seeks to specify θ_z so as to maximize the expected value of $\eta\cos\theta$.

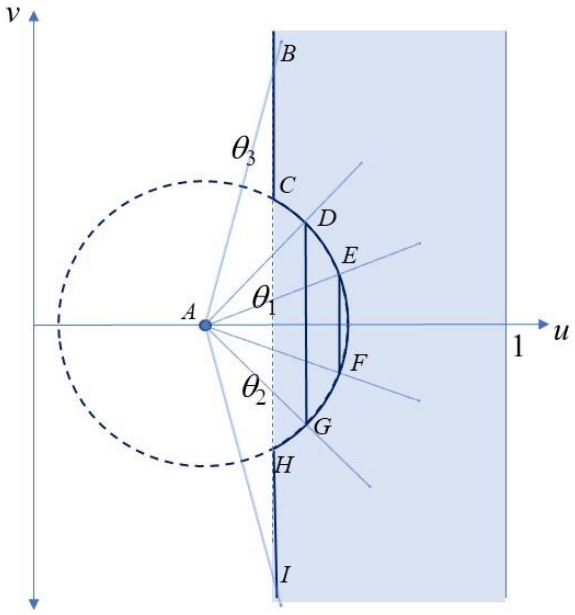

Figure 3. Zone of Interests and Rule Outcomes.

Figure 3 illustrates how ZOI_{S_α} operates. When $\theta_z = \theta_1$, the ZOI represented by the angle is arc $\widehat{EF}$. In this case, if these plaintiffs have constitutional standing, the rule (originally at A) will move to a point located somewhere on arc $\widehat{EF}$. The expected Statutory Interest will be on the u-axis somewhere between where line segment $\overline{EF}$ crosses the u-axis and where arc $\widehat{EF}$ crosses the u-axis. This will be a comparatively large increase in Statutory Interest. On the other hand, it is

maximization problem shown at the end of this Part would just be solved using the expected value of $p(\theta)$ over the zone of interests, and all results in Section IV.B would go through analogously (over q). More difficult, however, is the implicit assumption that $p(\theta)$ is independent of u. In practice, the more strongly a rule promotes the statutory interest, the greater the likely harm will be to those with interests antithetical to the statutory interest, and vice versa. Nevertheless, for the purposes of solving the *ex ante* maximization problem, it may be reasonable to assume that the court will work with the average p value across the space.

[12] The model could also assume that there is a non-zero measure of intended beneficiaries by assuming that the Statutory Interest is not just $\theta = 0$, but $\theta < \kappa$ for some $\kappa > 0$. Such an assumption, however, does not lead to any additional insight and thus, we do not include it.

also true that there is a relatively small fraction of interest groups who would belong to the zone—indicating that a high fraction of plaintiffs will be dropped. When $\theta_z = \theta_2$, the rule (originally at A) will move to a point on arc $\widehat{DG}$. There is thus a larger variation in terms of where the final rule may end up. The expected Statutory Interest will be lower than when the ZOI was defined by θ_1. At the same time, however, there is a larger probability of the plaintiff belonging to the zone. If $\theta_z = \theta_3$, the rule may end up anywhere on segment $\overline{BC}$, or arc $\widehat{CH}$, or segment $\overline{HI}$. Although the final rule (u', v') may not be expected to protect the Statutory Interest particularly well, in all cases the final rule will comply with the statute according to the court's interpretation, and there is an even higher probability (than when $\theta_z = \theta_2$) that the court will proceed to review the rule's statutory validity. Thus, in any given stage, there is a tradeoff between increasing the probability that potential plaintiffs may belong to ZOI and maximizing Statutory Interest conditional on getting to the rule review.

The parties proceed as follows.

- *Period 1*. Congress adopts Statute S_α in year 1 and specifies that $u \geq \alpha$.

- *Period 2*. Agency interprets α as α_A and adopts rule (u, v) such that $u \geq \alpha_A$.

- *Period 3*. Nature chooses a plaintiff $\theta \in [-\pi, \pi)$ who will challenge the rule. The plaintiff is drawn according to the probability distribution $f(\theta)$.

- *Period 4*. The court[13] specifies $\theta_z \in [0, \pi)$ for the relevant statutory provision (unless it has already specified θ_z in a previous iteration). Constitutional standing is found with probability $p \in (0,1)$ and the plaintiff survives the ZOI test if $\theta \in [-\theta_z, \theta_z]$. The court proceeds on to Period 5 only if the plaintiff has constitutional standing and her interest belongs to ZOI. If either condition is not met, then the game returns to Period 3 the following year but θ_z is determined once and for all. $\delta \in (0,1)$ is the discount factor for each iteration.

- *Period 5*. The court determines α_C and reviews the plaintiff's claim. If $u \geq \alpha_C$, the rule is upheld and the game ends. If $u < \alpha_C - \eta$, the rule is vacated and the game returns to Period 2 the following year. If $\alpha_C - \eta \leq u < \alpha_C$ but $\theta \in [\pi/2, \pi] \cup [-\pi, -\pi/2]$, the rule is unaffected and the game returns to Period 3 the following year. If $\alpha_C - \eta \leq u < \alpha_C$ and $\theta \in (-\pi/2, \pi/2)$, the rule will be modified and the game ends.

Under the set-up, in each iteration, the court reaches Period 5 with probability $p \int_{-\theta_z}^{\theta_z} f(\theta) d\theta = p\theta_z/\pi$. The expected value of Congress's objective function conditional on arriving at Period 5

[13] In the base model, it's the court that specifies θ_z. In practice, there are three possibilities: (i) Congress includes a citizen-suit provision to dispense with the zone-of-interests test altogether, (ii) Congress specifies particular, well-defined groups of plaintiffs, or (iii) Congress specifies the statute's intended beneficiaries only and the court carries out the zone-of-interests analysis based on each specific provision that is at issue, together with various interests that are correlated with the beneficiaries' interests. The base model concerns the third instance. The first two instances are better suited for the Statutory Compliance model.

is $\int_{-\theta_z}^{\theta_z} \eta \cos\theta\, f(\theta)d\theta \,/\, \int_{-\theta_z}^{\theta_z} f(\theta)d\theta = (\eta \sin\theta_z)/\theta_z$. The court's objective in specifying the ZOI is to solve the following maximization problem:

$$\max_{\theta_z\in[0,\pi)} (p\theta_z/\pi)(\eta \sin\theta_z/\theta_z) + \big((1-p\theta_z/\pi)\delta\big)(p\theta_z/\pi)(\eta \sin\theta_z/\theta_z) + \big((1-p\theta_z/\pi)\delta\big)^2(p\theta_z/\pi)(\eta \sin\theta_z/\theta_z) + \cdots = \max_{\theta_z\in[0,\pi)} \frac{(p\theta_z/\pi)(\eta \sin\theta_z/\theta_z)}{1-(1-p\theta_z/\pi)\delta}$$
$$= p\eta\left(\max_{\theta_z\in[0,\pi)} \frac{\sin\theta_z}{p\delta\theta_z + \pi(1-\delta)}\right).$$

Thus, the optimal zone of interests is then defined as follows:

$$\hat{\theta}_z(p,\delta) \equiv \operatorname*{argmax}_{\theta_z\in[0,\pi)} \frac{\sin\theta_z}{p\delta\theta_z + \pi(1-\delta)}.$$

Before we state the results regarding the optimal design of ZOI_{S_α}, we review some institutional assumptions that will end up driving the result.

III. Results and Extensions

A. Intended Beneficiaries, Marginal Interests, and Suitable Challenger

There are several immediate observations we can make about $\hat{\theta}_z(p,\delta)$. First, it is clear that $\hat{\theta}_z(p,\delta) \in [0,\pi/2\,]$ because the numerator peaks at $\pi/2$, and going beyond $\pi/2$ will only increase the denominator. Second, although we are assuming $\delta \in (0,1)$, if we plug in $\delta = 1$, then $\hat{\theta}_z(p,1) = \operatorname*{argmax}_{\theta_z\in[0,\pi)} \frac{\sin\theta_z}{p\delta\theta_z} = 0$ since $\frac{\sin\theta_z}{\theta_z}$ peaks at $\theta_z = 0$. This makes sense: if the future is not discounted at all, the court should wait for the best possible plaintiff to arrive and litigate the rule. Third, if we plug in $\delta = 0$, then $\hat{\theta}_z(p,0) = \operatorname*{argmax}_{\theta_z\in[0,\pi)} \frac{\sin\theta_z}{\pi(1-\delta)} = \pi/2$. In other words, if the future is discounted completely and the court effectively gets one shot, then the court should be willing to admit *any* plaintiff who is positively correlated with the Statutory Interest. For interior values of δ, in turn, we will end up with a unique interior value of $\hat{\theta}_z(p,\delta) \in (0,\pi/2)$. We arrive at the following result.

> Proposition 1 (Zone of Interests and Protection of Statutory Interest). *Under the Statutory Interest model, the court should set ZOI_{S_α} narrowly in the following sense: groups whose interests are negatively correlated or positively-but-only-ρ-marginally correlated with the statutory interest should not be included where $\rho = \cos\hat{\theta}_z(p,\delta)$. Specifically, ZOI_{S_α} will always exclude $\theta \in [\pi/2,\pi] \cup [-\pi,-\pi/2]$. Furthermore, if δ approaches 1, $\hat{\theta}_z$ will approach 0. As δ approaches 0, $\hat{\theta}_z$ will increase to approach $\pi/2$. At all times, $\partial\hat{\theta}_z(p,\delta)/\partial\delta < 0$. In other words, the more heavily the future is discounted, the broader the zone of interests should be set.*

Given how $\hat{\theta}_z(p, \delta)$ is defined, Proposition 1 offers an economic justification for the zone-of-interests doctrine. Congress cares about having an *effective* plaintiff challenge the agency's regulation so that the final rule outcome will serve the interests of the statute's intended beneficiaries. The court has good reason to wait around for a plaintiff whose interest is sufficiently well-aligned with beneficiary welfare. But all of this is subject to discounting. The optimal ZOI should exclude those plaintiffs whose interests are "antithetical" or "orthogonal" to beneficiary welfare. Proposition 1 is also consistent with the Supreme Court's characterization of the zone in *Clarke* (excluding those whose interests are only "marginally related to or inconsistent with the purposes implicit in the statute") and with the D.C. Circuit's "suitable challenger" doctrine.

B. The Zone-of-Interests Doctrine as a Safeguard Against a Restrictive Constitutional Standing Doctrine

What is the relationship between constitutional standing and the zone-of-interests test doctrine? To be sure, there is no structural relationship between the two: constitutional standing is based on Article III and the zone-of-interests test is a purely statutory concept. But there is a practical relationship between the two. Consider the following.

> PROPOSITION 2 (ZONE OF INTERESTS AND CONSTITUTIONAL STANDING). *Under the Statutory Interest model, then the optimal range of ZOI_{S_α} will depend on the plaintiff's difficulty of establishing constitutional standing. In particular, $\partial\hat{\theta}_z(p, \delta)/\partial p < 0$. Thus, the harder it is for the plaintiff to establish constitutional standing, the broader the zone of interests should be. Thus, the court's rational response to its tightening of the constitutional standing doctrine is to broaden the zone of interests.*

Proposition 2 illustrates that the zone-of-interests doctrine can be seen as a safeguard if constitutional standing becomes too difficult to meet. Given the possibility that the *most* efficient litigants can still be found to lack standing—for example, due to her failure to establish injury-in-fact, causation, or redressability—the court would do well to cast the net more widely. Although the court may more readily satisfy the expected utility level achieved from successful litigation by a plaintiff whose interests are closely aligned with those of the intended beneficiaries, the court gains from saving on the time value of litigation, similar to Proposition 1. Importantly, note also that Congress cannot manipulate Article III standing but it has authority to set the zone of interests to be broad.

Incidentally, this pattern is consistent with what we observe since *Data Processing*. The *Data Processing* Court formulated the injury-in-fact doctrine, and since then, it has become progressively more difficult for plaintiffs to establish standing to challenge agency actions. Meanwhile, the *Data Processing* Court also noted that "[w]here statutes are concerned, the trend is toward *enlargement* of the class of people who may protest administrative action. The whole drive for enlarging the category of aggrieved 'persons' is symptomatic of that trend" (*Data Processing*, 397 U.S. at 154).

C. The Zone-of-Interests Doctrine as a Safeguard Against Court Errors

In this Section, we consider a simple extension to allow for court errors. Indeed, a legitimate concern that one may have regarding the zone-of-interests test is that it is too confusing for the court to apply. The court must analyze the extent to which a plaintiff's alleged interest is aligned with the interest being promoted by the statute. Given the difficulty of this exercise, it is expected that courts can err in either direction as to whether a plaintiff belongs in the zone of interests. At the same time, it is also true that the court may err in its substantive judgment concerning the statutory validity of an agency action, and a substantive error can also be costly from Congress's perspective. For this reason, it makes sense to consider both types of errors.

Court Errors. We introduce judicial error in the following manner. First, the court can err on the substance (if the case gets that far). Instead of deciding on the merits as described above, we assume there is a probability $\varepsilon_s \geq 0$ such that the court simply decides in favor of the plaintiff and moves the final rule in her desired direction by η (whichever direction that may be). Second, the court can err in its determination of ZOI. Suppose $\hat{\theta}_z \in (0, \pi)$ defines the optimal ZOI under the setup. Suppose, however, that there is a probability $\varepsilon_z \in [0,1/2)$ such that a plaintiff who genuinely belongs to the ZOI ($\theta \in [-\hat{\theta}_z, \hat{\theta}_z]$) is found to not belong to the ZOI, and likewise, a plaintiff who belongs outside the ZOI ($\theta \notin [-\hat{\theta}_z, \hat{\theta}_z]$) is found to belong to the ZOI. We assume $\varepsilon_z < 1/2$ so that the ZOI test would have some meaning.[14] For this model, we assume the game continues until the court reaches its first substantive judgment and then ends.[15]

Before considering the results, we make some preliminary observations. First, when $\varepsilon_s = 0$, we know from Proposition 1 that having the ZOI requirement is superior to not having it. In other words, the ZOI test is *efficient*. The inequality here should be strict since not having the ZOI requirement can also result in potential plaintiffs whose interests are negatively correlated with consumer welfare, such as when $\theta \in (\pi/2, \pi)$. This means that for $\varepsilon_z > 0$ that is sufficiently small, the ZOI test will continue to be efficient. Meanwhile, it is also true that if ε_z is really high (about ½), then the ZOI test serves no value except reduce the docket load randomly by half. This cannot be efficient—it would be equivalent to simply reducing the constitutional standing probability by half. Thus, there exists $\bar{\varepsilon_z} > 0$ such that the ZOI test is only efficient if $\varepsilon_z < \bar{\varepsilon_z}$. Meanwhile, if $\varepsilon_s > 0$ and the court can err substantively, then the ZOI test provides an additional benefit—not just of moving the final rule outcome in the right direction but also of preventing a potential court error where the court moves the rule to the left. So when $\varepsilon_s > 0$, there will likely be greater benefits to having a ZOI test, even with some error.

So we define $\bar{\varepsilon_z}(\varepsilon_s)$ as the maximum probability of error[16] with respect to the ZOI test, given $\varepsilon_s \geq 0$, such that the ZOI test is efficient. Our reasoning has shown that $\bar{\varepsilon_z}(0) > 0$. We

[14] Alternatively, one can assume that the court erroneously determines the ZOI to be defined by $\tilde{\theta}_z = \hat{\theta}_z + \varepsilon_\theta$, where ε_θ is uniformly distributed between $[-\theta_e, \theta_e]$ where $\theta_e > 0$ is relatively small. The results are qualitatively similar.

[15] The set-up here does imply that, with the possibility of the court's substantive error, a rule may be modified and left in a state of statutory non-compliance. This, of course, can happen in practice, and would be a costly outcome from Congress's perspective. Although such a rule would eventually be re-litigated, we do not consider that future possibility in this version.

[16] Although we are referring to ε_z as the probability of error, it would be more accurate to call it as the probability that the court absent-mindedly decides in favor of the plaintiff. Since the plaintiff is correct in some cases, the actual probability of error will be smaller than ε_z. But the probability of error will be proportional to ε_z.

also reasoned that, as ε_z increases, the ZOI test will become less efficient (and possibly inefficient) since the court in applying the ZOI test may admit plaintiffs whose interests are negatively correlated with consumer welfare. Finally, we explained that the ZOI test may be comparatively more efficient the more likely it is for the court to make a substantive error in judgment. Thus, whether the ZOI test is efficient can be a function of both ε_z and ε_s, and we may predict that $\bar{\varepsilon_z}(\varepsilon_s)$ may be increasing in ε_s. Note also that not imposing the ZOI test may be especially costly when we begin with a rule that is already statutorily valid ($u \geq \alpha_C$). In that case, there is no loss from a delay in litigation, but allowing an unsuitable plaintiff to persuade the court to move the rule in her favor (leading to $u < \alpha_C$) is a real danger. The results of the Beneficiary Welfare Model indeed track these intuitive explanations.

> PROPOSITION 3 (ZONE OF INTERESTS AND COURT ERRORS). *Under the Statutory Interest model, imposing ZOI is efficient if and only if ε_z is sufficiently small ($i.e., \varepsilon_z < \bar{\varepsilon_z}(\varepsilon_s)$). The permissible threshold for the court's error, $\bar{\varepsilon_z}(\varepsilon_s)$, in applying the ZOI test increases in ε_s. Thus, $d\bar{\varepsilon_z}(\varepsilon_s)/d\varepsilon_s > 0$. The more likely the court can err on its substantive judgment, the more error is permissible for the ZOI test's efficiency. In this case, $\bar{\varepsilon_z}(\varepsilon_s)$ also increases in δ and in p.*

Proposition 3 points to another important benefit of the ZOI test. Because the zone-of-interest test, even with its imperfection, at the threshold limits the group of plaintiffs who can raise substantive claims for review, the court will have fewer opportunities to make substantive errors and modify the rule in the direction contrary to the statute's intent. This may in fact be one of the main purposes of the ZOI test. It may also be what the *Grand Council* court meant when it said that litigation by persons with contrary interests is "more likely to frustrate than to further . . . statutory objectives'" (*Grand Council*, 198 F.3d at 958). If a plaintiff with an adverse interest were permitted to make an argument, the court is giving her a foothold to push the rule in her direction and may risk rendering an erroneous decision. To this extent, the zone-of-interests test can be seen as a safeguard against substantive judicial errors: it prevents the court from even entertaining disqualifying arguments against the rule at the threshold.

Proposition 3 also addresses a common criticism raised against the doctrine—that it is too confusing for the court to apply the doctrine consistently. *See, e.g.*, Siegel (2004). It is certainly true that a highly erroneous test ($\varepsilon_s \sim 1/2$) would render the zone-of-interests test inefficient. However, the model's result also implies that the court can apply the zone-of-interests test somewhat imperfectly and still lead to a better outcome given the probability of the court's substantive error.

D. Resource Considerations: Litigation and Judicial Review

Up to this point, the model has assumed that litigation and judicial review are costless. Once we factor in resource considerations—such as lawyer fees and the time and resources spent by the court—the zone-of-interests test becomes even more defensible. For example, suppose the zone is *ex ante* fairly well-defined and interest groups would spend lawyer fees only if they had standing and belonged to the zone. Let c be the total resources spent (lawyer fees and judicial resources) conditional on the plaintiff being qualified to proceed to the statutory review. (c will be normalized to be compared to the unit of Statutory Interest.)

Under this set-up, the maximization problem would be translated as follows:

$$\max_{\theta_z\in[0,\pi)}(p\theta_z/\pi)(\eta\sin\theta_z/\theta_z-c)+\big((1-p\theta_z/\pi)\delta\big)(p\theta_z/\pi)(\eta\sin\theta_z/\theta_z-c)$$
$$+\big((1-p\theta_z/\pi)\delta\big)^2(p\theta_z/\pi)(\eta\sin\theta_z/\theta_z)+\cdots$$
$$=\max_{\theta_z\in[0,\pi)}\frac{(p\theta_z/\pi)(\eta\sin\theta_z/\theta_z-c)}{1-(1-p\theta_z/\pi)\delta}=p\left(\max_{\theta_z\in[0,\pi)}\frac{\eta\sin\theta_z-\theta_z c}{p\delta\theta_z+\pi(1-\delta)}\right).$$

Thus, the optimal zone of interests with resource considerations is defined as follows:

$$\hat{\theta}_z(p,\delta)\equiv\operatorname*{argmax}_{\theta_z\in[0,\pi)}\frac{\eta\sin\theta_z-\theta_z c}{p\delta\theta_z+\pi(1-\delta)}.$$

PROPOSITION 4 (ZONE OF INTERESTS AND RESOURCE CONSIDERATIONS). *Under the Statutory Interest model, the zone of interests is smaller with resource considerations than without such considerations. In addition, optimal zone is smaller c increases. In other words,* $\partial\hat{\theta}_z(p,\delta)/\partial c<0$.

Proposition 4 suggests that the zone-of-interests test can also be rationalized as a means to conserve judicial resources and litigation costs. If the zone is supposed to be specified sufficiently narrow, it should be even narrower once we take resource considerations into account. Put differently, the doctrine is *a fortiori* defensible in consideration of these costs.

E. Statutory Compliance and Citizen-Suit Provision

We now consider an alternative model, the Statutory Compliance Model. Under this model, Congress cares only whether a (modified) rule complies with the statute and is indifferent to any particular regulatory outcome. Thus, Congress's utility can be set as 1 when the rule is statutorily compliant and 0 when it is not. Recall that when a rule is challenged and is in violation of the statute, it can be moved to comply with the statute if and only if $\theta\in(-\pi/2,\pi/2)$. A rule cannot be modified to comply the statute if the plaintiff does not belong to $(-\pi/2,\pi/2)$. Congress's objective function will thus work with the indicator function, $I(\cdot)$, which evaluates only whether $\theta\in(-\pi/2,\pi/2)$, rather than the welfare of any particular intended beneficiaries. $I(\theta\in M)$ takes on 1 when $\theta\in M$ and 0 otherwise. Congress's objective function can be written as follows:

$$\max_{\theta_z\in[0,\pi]}\left(p\int_{-\theta_z}^{\theta_z}I\big(\theta\in(\pi/2,-\pi/2)\big)f(\theta)d\theta\right)$$
$$+\big((1-p\theta_z/\pi)\delta\big)\left(p\int_{-\theta_z}^{\theta_z}I\big(\theta\in(\pi/2,-\pi/2)\big)f(\theta)d\theta\right)$$
$$+\big((1-p\theta_z/\pi)\delta\big)^2\left(p\int_{-\theta_z}^{\theta_z}I\big(\theta\in(\pi/2,-\pi/2)\big)f(\theta)d\theta\right)+\cdots$$
$$=\max_{\theta_z\in[0,\pi]}\left(\frac{p\int_{-\theta_z}^{\theta_z}I\big(\theta\in(\pi/2,-\pi/2)\big)f(\theta)d\theta}{1-\delta(1-p\theta_z/\pi)}\right).$$

It's clear that $\hat{\theta}_z < \pi/2$ since any larger $\hat{\theta}_z$ value will only increase the denominator while the numerator remains fixed. Thus, the maximization problem can be rewritten by plugging in $I\big(\theta \in (\pi/2, -\pi/2)\big) = 1$:

$$\max_{\theta_Z \in [0, \frac{\pi}{2})} \frac{p\int_{-\theta_Z}^{\theta_z} f(\theta)d\theta}{1-\delta(1-p\theta_z/\pi)} = \max_{\theta_z \in [0, \frac{\pi}{2})} \frac{p\theta_z}{p\delta\theta_Z + \pi(1-\delta)} = \max_{\theta_Z \in [0, \frac{\pi}{2})} \frac{1}{p\delta + \pi(1-\delta)/\theta_z}.$$

The maximum is achieved when $\hat{\theta}_z$ approaches $\pi/2$. Thus, the optimal ZOI should include all groups whose interests are positively correlated with consumer welfare and only those groups. Hence, we have the following result.

> PROPOSITION 5 (ZONE OF INTERESTS AND STATUTORY COMPLIANCE). *If Congress's objective behind a particular statute is limited to making sure Agency complies with the statute, then the optimal ZOI should include all groups whose interests are positively correlated with the Statutory Interest (and only those groups).*

The intuition behind Proposition 5 is that Congress should be less selective or discriminating if it is less concerned with the welfare level achieved through the agency action. In our case, this is an artifact of the model. Recall that Figure 2 illustrates how a rule challenge can move the rule outcome. Since a challenge by any interest group $\theta \in (-\pi/2, \pi/2)$ will lead to statutory compliance (which is all that Congress cares about) while a challenge by any other plaintiff will leave the rule undisturbed, Congress should set the ZOI as $\theta \in (-\pi/2, \pi/2)$. Alternatively, Proposition 5 would imply that in cases involving statutes where compliance should matter more than any particular rule outcome, even in the absence of any citizen-suit language, the court should set the ZOI to include every interest group.

IV. DISCUSSION

In Section A, we consider the institutional assumption behind the model. In Section B, we discuss further implications of the model's findings.

A. Institutional Assumptions

The key assumptions in the base model are the following. First, Congress passes a statute to protect a particular interest above other interests. Second, an interest group can seek to modify Agency's rule through judicial review in a specific direction that benefits the group. Third, once the court modifies Agency's rule to comply with the statute, it cannot be further modified through litigation. This Part considers these assumptions in greater detail. Readers comfortable with them can move on to Section IV.A for the implications of the model's results.

1. Statutory Interest versus Social Welfare

The model assumes that Congress has specified a statutory interest to be protected through its organic statute. From an economic perspective, it may seem odd that Congress is modeled as protecting any particular interest above others. For example, why does Congress not maximize the overall social welfare, as a well-intentioned social planner might do? One response is that, regardless of whether Congress *should* maximize social welfare, many organic statutes

prioritize the welfare of a specific group above others. *See* Lee (2015); Lee (2016). Accordingly, each administrative agency tends to come with a core mission and often plays the role of an advocate for a particular group of citizens. The Federal Trade Commission, for example, is concerned with consumer welfare; the Securities and Exchange Commission is concerned with investor welfare; the Occupational Safety and Health Administration is concerned with worker safety, and so on. Importantly, it is not at all clear if any of these agencies views its mission as simply doing its own part merely to increase the total surplus. This is one of the reasons why it is important to hold administrative agencies accountable in their rulemaking, and to have them consider the costs and benefits of their rules—i.e., to force them to take into considerations the effects of their rules on parties that are not the rule's intended beneficiaries. These considerations of costs and benefits can in turn explain why Agency's rule choice in the model isn't necessarily going to have $u = 1$.

2. Rule Modification

The model assumes that a plaintiff can attempt to modify Agency's rule through judicial review. Such an assumption would be commonplace in the context of common law litigation. *See* Gennaioli & Shleifer (2007); Hylton (2006); Parameswaran (2018); Baker & Mezzetti (2012). In the context of administrative rule challenges, however, this assumption demands some explanation. While it is unremarkable to think of interest groups as seeking to affect rule outcomes through various lobbying activities *during the notice-and-comment rulemaking stage*, when a rule is challenged in court, it is more natural to view the outcome as binary: the rule will be either upheld or struck down. Thus, to some extent, a plaintiff is limited in her ability to manipulate the final rule outcome beyond having the court strike it down.

Nevertheless, this assumption—that a plaintiff can attempt a *directional* modification to the rule through litigation—appears to be one that courts are making each time they apply the zone-of-interests test. Consider again the D.C. Circuit's conclusion in *Grand Council of the Crees*. Noting that the plaintiff's environmental interests are "orthogonal" to the two interests that the statute intended to promote, the court concluded that "litigation by persons whose interests are such is 'more likely to frustrate than to further . . . statutory objectives'" (*Grand Council of the Crees*, 198 F.3d at 958 (D.C. Cir. 2000)). The court's conclusion certain suggests that plaintiffs with different interests can and will try to move the final rule outcome in different directions—including in directions that are not consistent with the statutory objectives.

One way to rationalize this assumption is to consider the fact that judicial review of an agency rule can be more nuanced than a simple vacatur. First, a rule often has multiple provisions that operate together to achieve a regulatory purpose. But a plaintiff challenging a rule need not necessarily challenge the rule in entirety. She can choose which provisions to challenge and invalidate, and the rest of the surviving provisions together will then have different combined effects than the original rule. In this sense, the final rule outcome can be seen as having moved from its original outcome. Alternatively, one can imagine an agency rule that mandates certain thresholds, such as toxin levels. One threshold may be expedient for the industry, another threshold may be for workers, and an intermediate threshold may be the most advantageous for a third-party. A third-party plaintiff bringing a statutory claim against the agency rule would likely make an argument to push for the intermediate threshold rather than a level that favors workers or the industry—e.g., challenge only the arguments that the agency used to justify going beyond the intermediate threshold. Second, the plaintiff also has freedom in terms of the types of legal arguments she can raise against the agency's rule, the cases she

chooses to cite, and the remedies sought. To the extent the court has discretion in fashioning the proper remedy according to the plaintiff's petition, the final rule may be at least *incrementally* modified in the manner the plaintiff wishes. Third, there are opportunities for settlements in rulemaking. In instances where the court remands the rule and the agency returns with a revised rule, the new rule may reflect the concerns raised by the plaintiff group.[17] Relatedly, to the extent a rule is vacated, the agency will adopt another rule. At this point, the agency knows that the newly adopted rule may also be challenged by the same plaintiff group. Thus, it will adopt its final rule in the shadow of another potential rule challenge, and thus the newly adopted rule will likely cater to the agenda of the plaintiff group that successfully vacated the first rule.

3. One-Time Modification

The model assumes that when a rule is statutorily invalid and the court modifies it to comply with the statute, it cannot be modified again through litigation. This assumption follows in the model because (i) the court will not modify a rule and let it remain statutorily invalid and (ii) statutory compliance is a single-dimensional concept. In practice, just because a (modified) rule is made statutorily compliant with respect to one legal challenge does not necessarily mean that challenges grounded on *other* arguments are foreclosed.

One practical consideration is that if an interest group were to modify Agency's rule in a direction that is sufficiently positively correlated with the Statutory Interest (although not perfectly aligned), the modified rule may be such that—as compared to the original rule—those intended beneficiaries will then have a comparatively more difficult time establishing constitutional standing. In other words, once a rule is modified, a future plaintiff's harm in the direction of the Statutory Interest may be less concrete. As for instances in which the court remands the rule and the agency returns with a revised rule, the court may also be less likely to consider Agency's modified rule as violating the statute. These are some reasons why the court may be unlikely to make any further changes in the future.

As with the Rule Modification assumption, courts appear to make this assumption in administering the test: for example, if a rule modified through litigation in one direction can easily be modified again, it is curious why the court should ever have to wait for a "suitable" challenger rather than facilitating incremental changes at every turn.

B. Implications

1. Competitor Interests versus Other Interests

One of the more established maxims concerning the zone-of-interests test is that competitors will be granted standing, while other constituents (e.g., employers, contractors, or vendors or suppliers) will not be. For example, in *Data Processing*, *Clarke*, and *National Credit Union Administration*, the Supreme Court repeatedly found that competitors of regulated entities (not competitors of intended beneficiaries) belong to the zone of interests to challenge the relevant agency actions. By contrast, in *Air Courier* and *Dismas Charities* (as well as in the

[17] An instructive example discussed by Rossi (2001) is the Occupational Safety and Health Administration's (OSHA) rule from 1987 regulating workplace formaldehyde exposure. When unions challenged the OSHA's set limit (1 part per million (ppm)) and argued it should be lower (0.5 ppm), the court remanded the OSHA to elaborate on its scientific reasoning, and the OSHA came back with a compromise (0.75 ppm).

hypothetical example provided in *National Wildlife Federation*), courts found that vendor interests and employee interests failed to satisfy the zone-of-interests test.

On what grounds can we justify this distinction? There are potentially two rationales according to our model. First, according to Proposition 1, the zone should be set sufficiently narrowly to maximize the expected regulatory outcome. From this perspective one can understand how competitor interests may differ from vendor interests or employee interests. For example, with a statute like the one in *Data Processing*, 397 U.S. at 154—one that seeks to protect consumer welfare by regulating entities with market power—it is plausible that competitor interests are closely aligned with consumer welfare. As competitors seek to protect their profits, the more robust will the competition be in this market, and the greater will be the resulting consumer welfare. Meanwhile, for vendors or employees, their interests will primarily be in securing greater profits for themselves, which would align better with the interests of the entities wielding market power. For example, vendors of a regulated entity may prefer their client company to be highly profitable so that they can continue to earn business from it. Likewise, employees of the regulated entity have an interest in ensuring that their employer continues to succeed and earn profits. From this perspective, vendor interests and employee interests are likely to diverge more from consumer welfare than competitor interests.[18] Proposition 1 may suggest that the contour of the zone should be set narrowly enough to exclude employee interests and vendor interests.

Second, according to Proposition 2, the zone should be sufficiently broad to ensure that constitutional standing does not end up frustrating the purpose of the statute. From this perspective, it may be easier for competitors to establish demonstrated economic harms than consumers. Competitors will likely have empirical evidence that can predict their loss in sales figures and revenues. Consumers, meanwhile, may be less well-positioned to challenge a regulation (at the time of adoption) until the entity with market power raises price or lowers quality. It is also possible that consumers may initially reap some benefits from the entity's branching out activities. In other words, at the time of the agency's rule adoption, the harm to consumer welfare may be more speculative and less imminent that the economic harms that competitors may be able to establish. According to Proposition 2, this argument may explain why competitor interests are generously included in the zone of interests.

These two rationales are in fact echoed by the *Dismas Charities* court's explanation on this matter:

> Two aspects of competitor suits may form the basis for treating them with particular generosity. First, when the government enters the market by chartering specially favored or subsidized market actors, any limit on the activity of such institutions may arguably have, as an implicit purpose, the goal of not distorting the market more than necessary. Competitors would arguably be within the zone of such an interest. Second, although not formally relevant, the absence of competitor standing may render some agency actions effectively immune from judicial review. When a regulatory agency permits a regulated party to do something previously prohibited, the only party with Article III standing to challenge the government action may be the competitor (*Dismas Charities*, 401 F.3d at 677-78).

[18] This is a short-term assessment only. In the long run, of course, employees as well as vendors may benefit from having consumers who continue to enjoy the entity's services or products at the offered price.

2. Multiple Statutory Interests

What happens when a statute seeks to protect not one statutory interest but multiple? Many statutes indeed come with two or more interests that are not perfectly aligned and the agency must balance them. For example, in *Grand Council of the Crees (of Quebec) v. FERC,* 198 F.3d 950 (D.C. Cir. 2000), the D.C. Circuit acknowledged that the FERC's ratemaking under the Federal Power Act is inherently "an effort to balance the interests of power consumers and producers" and denied the plaintiff's challenge because their "environmental interests appear 'orthogonal' to both" (*Id.*).[19]

How would the Statutory Interest model be applied to analyze such statutes and the zone-of-interests test? One tempting approach is to work with the *average* of the two interests. For example, if the two statutory interests can be represented as θ_1 and θ_2, where $\theta_1, \theta_2 \in [-\pi/2, \pi/2]$. Then one could argue that $\theta_3 \equiv (\theta_1 + \theta_2)/2$ can serve as a fair metric for gauging how the two interests are simultaneously being promoted and protected. It may then be reasonable to ask whether the zone-of-interests test should designed around θ_3—in other words, potential plaintiffs must demonstrate interests that are more than marginally (and positively) correlated with θ_3.

This might be one possible approach, but it is important to consider the implications. First, note that an interest that is more than marginally correlated with θ_3 may well be orthogonal or negatively correlated with either θ_1 or θ_2. This is likely the case when θ_1 and θ_2 are sufficiently far apart. For example, consider $\theta_1 = \pi/3$ and $\theta_2 = -\pi/3$. The average interest would then be $\theta_3 = 0$, and the zone of interests for $\theta_3 = 0$ will be those θ with $\cos\theta$ is sufficiently positive. Depending on p and δ values, $\theta = 5\pi/12$ could belong to the ZOI. However, $\theta = 5\pi/12$ would be negatively correlated with $\theta_2 = -\pi/3$, and modifying the rule in response to a rule challenge by $\theta = 5\pi/12$ will impair θ_2's interest, which Congress task the agency to protect. Thus, if the court were to take this combined-vector approach, it must be open to the idea that a plaintiff group whose interest is orthogonal to one of the specified interests could potentially be allowed to proceed.

Alternatively, the court could instead analyze the zone of interests for θ_1 and θ_2, separately, and consider the *intersection* of the two zones of the proper zone of interests for the statute. One advantage of this approach is that it would ensure that a plaintiff permitted to raise a rule challenge will end up promoting both interests, θ_1 and θ_2. On the other hand, there is a different problem with this approach: the intersection could potentially be empty. Again, this will be possible when θ_1 and θ_2 are sufficiently far apart and if δ and p are fairly large (implying a narrow zone of interests). By contrast, when θ_1 and θ_2 are sufficiently close to each other, neither approach may end up presenting serious problems in practice.

One takeaway from the model is that both agencies and courts will have a difficult time when a statute demands a balancing of multiple interests that may not be closely aligned.

[19] The court's conclusion that the plaintiffs' interests are orthogonal to both producers' and consumers' interests simultaneously may be difficult to satisfy in the uv-space unless producers' interests and consumers' interests are antithetical.

3. Statutory Compliance Model

One question that arises from Figure 2 is why Congress should ever be concerned exclusively or primarily with Agency's statutory compliance, rather than the welfare of the intended beneficiaries. There may be a few reasons.

First, for some statutes, there may just be very few plaintiffs (if any) who belong outside $\theta \in (-\pi/2, \pi/2)$.[20] In such cases, inserting a citizen-suit provision is equivalent to setting the ZOI optimally. This may be the case with certain environmental regulations or regulations designed to protect animal species, such as the Endangered Species Act. In *Bennett v. Spear*, 520 U.S. 154 (1997), decided a year before *First National Bank*, the Court specifically held that the Endangered Species Act's citizen-suit provision, which specifies that any person may commence a civil suit, "negated the zone-of-interests test (or, perhaps more accurately, expands the zone of interests)" (*Id.* at 164). The Court justified its reading as follows:

> Our readiness to take the term "any person" at face value is greatly augmented by two interrelated considerations: that the overall subject matter of this legislation is the environment (a matter in which it is common to think all persons have an interest) and that the obvious purpose of the particular provision in question is to encourage enforcement by so-called "private attorneys general" (*Id.* at 165).

In so reasoning, the *Bennett* Court also listed examples of statutes in which Congress specified particular groups of plaintiffs who can sue the government (to contrast from provisions that allow "any person" to sue). In other words, in special cases where furthering the purpose of the statute is positively correlated with nearly everyone's interest, a citizen-suit provision makes sense.

Second, there may be statutes for which Congress has no specific preference about the substantive outcome. This may be the case with statutes that are intended to promote *procedural* compliance. In this case, in terms of the model's coordinates, any rule enacted in compliance with the procedural requirement would be situated on or to the right of α_C, and any rule—however substantively beneficial—enacted in violation of the requirement would be situated to the left of α_C. Consider, for example, Section 553 of the APA. The overall purpose of notice-and-comment rulemaking is to promote regulatory dialogues and information gathering. In enacting the APA, Congress was less concerned with having either more or less regulation; it was more concerned with making sure agencies comply with the procedural requirements that would promote informed rulemaking. Proposition 5 would suggest that in the case of an alleged Section 553 violation, even though the APA does not itself include a citizen-suit provision, the court should set the ZOI to allow every interested individual.

This may explain part of the holding in *Dismas Charities, Inc. v. DOJ*, 401 F.3d 666 (6th Cir. 2005). In that case, the relevant statute allowed the Bureau of Prisons (BOP) to "designate the place of the prisoner's imprisonment" including "any available penal or correctional facility that meets minimum standards of health and habitability" (18 U.S.C. § 3621(b)). In so doing, the statute instructed the BOP to consider factors that bear on appropriateness, nature of offense, etc. In that case, the BOP had issued its interpretation without going through notice-and-comment rulemaking, and the plaintiff claimed that the agency violated §553 of the APA. On this point,

[20] Note that for this scenario, we would be modifying the assumption from our model that θ is uniformly distributed across $[-\pi, \pi]$.

the Sixth Circuit noted that the plaintiff had both constitutional standing and prudential standing to challenge the agency for its (possible) APA violation. The court reasoned that "[t]he notice and comment rulemaking requirements were intended to 'assure fairness and mature consideration of rules of general application'" (*Id.* at 679). Thus, the Sixth Circuit held that when it comes to the zone of interests with respect to an agency's procedural violation under Section 553, everyone belongs to the zone, including those who would otherwise fail to belong to the zone of interests for the substantive statutory violation.

4. Plaintiff Types versus Argument Types

The set-up of the model also points to a conundrum regarding the doctrine: the court seems to make up its mind as to whether a plaintiff's argument would be helpful to the Statutory Interest or not by examining her interest vector, rather than the actual legal argument she raises. Because the zone-of-interests test is applied before getting to the statutory review of the rule's validity, this is how the court applies the test in practice.

But if Congress and the court are concerned about inefficient litigants, why should the zone-of-interests test be applied to screen out based on the plaintiff's interest only, rather than based on her legal argument? It is certainly not inconceivable that a plaintiff whose interest is only marginally related to the Statutory Interest would still choose to raise an effective legal argument against a statutorily invalid rule because, all else equal, she is better off if the rule were to move in the direction of the Statutory Interest. By the same token, it is also possible that a plaintiff who is the statute's intended beneficiary may raise an inefficient argument and end up moving the rule away from the direction of the Statutory Interest.[21] But perhaps such occurrences are in practice rare.

From this perspective, one way to rationalize the zone-of-interests test is to see it as a *rule of presumption*: the court will presume that a plaintiff with a particular interest will raise the line of arguments that would best support her own interest, and the court applies the zone-of-interests test as a way to economize on the cost of conducting a substantive review of the agency rule.

5. Biased Courts

One criticism of this model is that it is very formalistic. The model takes what courts say they are doing on its face value. To this extent, one can ask whether the zone-of-interests test is subject to manipulation by biased courts. Indeed, it would be rather surprising if it weren't. For instance, some people criticize the constitutional standing doctrine as being so complicated that it is subject to manipulation by liberal and conservative justices a like. A well-known example is *Massachusetts v. EPA*, in which the Supreme Court had to consider whether the EPA denial of petition for rulemaking to regulate greenhouse gases from new motor vehicles caused owners of coastal property an injury-in-fact due to the rising sea level. The court was divided on the question of standing along the party line: liberal Justices thought an injury-in-fact was clearly established; conservative Justices did not. If constitutional standing is politicized, it is quite likely that the zone-of-interests test—which has never been well-defined to begin with—would be subject to politicization. There are potentially two solutions, though neither is perfect. First,

[21] Note that the argument raised often in support of the constitutional standing doctrine—that a plaintiff with a concrete interest at stake is more likely to raise the best type of argument—is subject to the same criticism.

Congress can try to prevent this problem by *ex ante* delineating the zone clearly, as it does with some statutes. Such a solution, however, may be underinclusive, as it may be difficult for Congress to capture ahead all potential interests that are well-aligned with the Statutory Interest. Second, the court can develop more commonly observed principles in terms of *groups* of interests, as it has with competitors, vendors, and suppliers. In such cases, the court would be specifying clear "ins" as well as clear "outs" without exhaustively covering all interests. This approach offers the benefit of flexibility (since the line defining the zone can and should vary from one statute to another) but it can also indicate ambiguity, which a biased court can abuse for its own agenda.

V. CONCLUSION

This Article introduced a model to analyze the dynamics of the zone-of-interests test. The results of the model offer preliminary normative responses to some of the difficult questions that have plagued the doctrine. Although the zone-of-interests test can be challenging for the court to apply consistently, the doctrine can nevertheless be rationalized on several grounds according to the model. The test can be understood as a judicial mechanism to promote the welfare of a statute's intended beneficiaries. It can also be seen as a safeguard against a restrictive constitutional standing doctrine and a safeguard against substantive court errors. The model also highlights a relationship between the injury-in-fact doctrine and the zone-of-interests test: the former can ensure the latter is applied correctly. Finally, the model can also be used to explain certain observed patterns, including why the court may draw a line between competitor standing and vendor standing and why certain statutes tend to include citizen-suit provisions. Overall, the results of the model suggest that the zone-of-interests test can be understood as Congress's attempt to ensure that judicial review of agency rules leads to efficient, effective, and timely outcomes that are consistent with Congress's intent. Future research could undertake a more thorough examination of various statutes (and whether and how they specify zones) as well as how and why the court may deviate from the predictions of this model.

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Circuits	DC	1	2	3	4	5	6	7	8	9	10	11	Fed	Total	%
1970	*Data Processing* formalizes the ZOI doctrine under APA §702.														
1971-1987	17/80	1/7	2/12	5/29	4/8	8/26	6/18	9/22	5/14	21/53	5/13	4/8	2/6	89/296	30%
1987	*Clarke* clarifies that ZOI is broader than the intended beneficiaries.														
1988-1991	7/24	0/0	3/5	0/1	0/1	3/6	2/4	6/9	0/4	2/11	0/2	4/5	3/3	30/75	40%
1991	*Air Courier* holds that postal employees' interests are outside the ZOI of the Postal statutes.														
1992-1998	5/33	1/7	1/5	2/12	1/2	1/7	4/8	2/8	4/7	14/39	4/7	1/3	1/1	41/139	29%
1998	*NCUA* further confirms competitor interests generally belong to ZOI.														
1999-2014	15/48	1/11	2/9	4/12	1/5	3/12	4/20	6/13	3/10	9/51	3/15	2/11	1/3	54/220	25%
2014	*Lexmark International* extends the ZOI test beyond APA claims.														
2015-2022	3/6	0/0	2/7	2/5	1/6	5/11	1/1	4/6	5/5	5/29	2/2	2/8	1/3	33/89	37%
Total	47/191	3/25	10/38	13/59	7/22	20/62	17/51	27/58	17/40	51/183	14/39	13/35	8/16	247/819	30%
Percent	25%	12%	26%	22%	30%	32%	33%	47%	43%	28%	36%	37%	44%	30%	

Table 1. Frequency of Plaintiff Interests Falling Outside the Zone of Interests (1971-2021). This table includes data on all federal circuit court cases between 1971 and 2022 that considered a zone-of-interests inquiry. If a case considered two or more distinct interests, then they were counted separately. There were a total of 817 distinct cases, but 819 distinct interests were considered by the courts. The numerator includes the frequency with which the court found that the plaintiff's interest did not belong to the zone of interests. The denominator includes the total number of instances in which the court considered a zone-of-interests inquiry.

APPENDIX

Proof of Proposition 1. As explained in the text, $\hat{\theta}_z(p,\delta) \equiv \underset{\theta_z \in [0,\pi)}{\operatorname{argmax}} \frac{\sin\theta_z}{p\delta\theta_z + \pi(1-\delta)}$, and we must have $\hat{\theta}_z(p,\delta) \leq \pi/2$. The first-order condition (for an interior solution) requires that $G\big(\hat{\theta}_z(p,\delta), p, \delta\big) = 0$ where

$$G(\theta_z, p, \delta) \equiv (p\delta\theta_z + (1-\delta)\pi)\cos\theta_z - p\delta\sin\theta_z.$$

It is easy to check that, for $\delta, p \in (0,1)$, $G(\theta_z, p, \delta) \neq 0$ at $\theta_z = 0$ or at $\theta_z = \frac{\pi}{2}$. Thus, the condition $G\big(\hat{\theta}_z(p,\delta), p, \delta\big) = 0$ will become equivalent to $H\big(\hat{\theta}_z(p,\delta), p, \delta\big) = 0$ where

$$H(\theta_z, p, \delta) \equiv \frac{(1-\delta)\pi}{p\delta} - (\tan\theta_z - \theta_z) = 0.$$

Since $(\tan\theta_z - \theta_z)$ is a constantly increasing function over $\theta \in [0, \frac{\pi}{2})$ with the range $[0, \infty)$, there is a unique $\hat{\theta}_z(p,\delta) \in (0, \frac{\pi}{2})$ at which the condition holds. The second derivative test (omitted) confirms that this is indeed a unique maximum.

Now we consider the comparative dynamics based on δ. If we differentiate the condition $G\big(\hat{\theta}_z(p,\delta), p, \delta\big) = 0$ with respect to δ, we have the following condition:

$$\Big(p\hat{\theta}_z(p,\delta) - \pi + \delta p\big(\partial\hat{\theta}_z(p,\delta)/\partial\delta\big)\Big)\cos\hat{\theta}_z + \big(p\delta\cos\hat{\theta}_z + (1-\delta)\pi\big)\big(-\sin\cos\hat{\theta}_z\big)\big(\partial\cos\hat{\theta}_z\,(p,\delta)/\partial\delta\big) - \big(p\sin\cos\hat{\theta}_z\big) - \delta\big(p\cos\cos\hat{\theta}_z\big)\big(\partial\cos\hat{\theta}_z\,(p,\delta)/\partial\delta\big) = 0.$$

Rearranging the terms, we get

$$\frac{\partial\hat{\theta}_z(p,\delta)}{\partial\delta} = \frac{p\big(\hat{\theta}_z\cos\hat{\theta}_z - \sin\hat{\theta}_z\big) - \pi\cos\hat{\theta}_z}{\sin\hat{\theta}_z\big(p\delta\hat{\theta}_z + (1-\delta)\pi\big)}.$$

The denominator is always positive for $\hat{\theta}_z \in (0,\beta)$. The numerator is negative since $\hat{\theta}_z\cos\hat{\theta}_z - \sin\hat{\theta}_z = -\cos\hat{\theta}_z\,(\tan\hat{\theta}_z - \hat{\theta}_z) < 0$ and $-\pi\cos\hat{\theta}_z$<0 in this range. Finally, the condition $H(\theta_z, p, \delta) = 0$ makes clear that $\lim_{\delta\to 1}\hat{\theta}_z(p,\delta) = 0$ and $\lim_{\delta\to 0}\hat{\theta}_z(p,\delta) = \pi/2$.□

Proof of Proposition 2. If we differentiate the condition $G\big(\hat{\theta}_z(p,\delta), p, \delta\big) = 0$ with respect to p, we get the following condition:

$$\Big(\delta\hat{\theta}_z + p\delta\big(\partial\hat{\theta}_z(p,\delta)/\partial p\big)\Big)\cos\hat{\theta}_z - \big(p\delta\hat{\theta}_z + (1-\delta)\pi\big)\sin\hat{\theta}_z\big(\partial\hat{\theta}_z(p,\delta)/\partial p\big) - \delta\sin\hat{\theta}_z - p\delta\cos\hat{\theta}_z\big(\partial\hat{\theta}_z(p,\delta)/\partial p\big) = \delta\big(\hat{\theta}_z\cos\hat{\theta}_z - \sin\hat{\theta}_z\big) - \sin\hat{\theta}_z\big(p\delta\hat{\theta}_z + (1-\delta)\pi\big)\big(\partial\hat{\theta}_z(p,\delta)/\partial p\big) = 0.$$

Rearranging the terms, we get

$$\partial\hat{\theta}_z(p,\delta)/\partial p = \frac{\delta\big(\hat{\theta}_z\cos\hat{\theta}_z - \sin\hat{\theta}_z\big)}{\sin\hat{\theta}_z\big(\delta p\hat{\theta}_z + (1-\delta)\pi\big)}.$$

By an analogous reasoning as above, $\partial\hat{\theta}_z(p,\delta)/\partial p < 0$ for $\hat{\theta}_z \in (0,\pi/2)$. □

Proof of Proposition 3. Suppose $(-\hat{\theta}_z, \hat{\theta}_z)$ is the optimal range. Let A be the expected utility under the ZOI test with both types of errors. Then $A = A_1 + A_1R_1 + A_1R_1^2 + \ldots = A_1/(1-R_1)$ where

$$A_1 = p(1-\varepsilon_z)\left(\int_{-\hat{\theta}_z}^{\hat{\theta}_z} f(\theta)d\theta\right)\left(\frac{(1-\varepsilon_s)\int_{-\hat{\theta}_z}^{\hat{\theta}_z}\eta\cos\theta\, f(\theta)d\theta + \varepsilon_s\int_{-\hat{\theta}_z}^{\hat{\theta}_z}\eta\cos\theta\, f(\theta)d\theta}{\int_{-\hat{\theta}_z}^{\hat{\theta}_z} f(\theta)d\theta}\right) + p\varepsilon_z\left(1 - \int_{-\hat{\theta}_z}^{\hat{\theta}_z} f(\theta)d\theta\right)\left(\frac{2(1-\varepsilon_s)\int_{\hat{\theta}_z}^{\pi/2}\eta\cos\theta\, f(\theta)d\theta + 2\varepsilon_s\int_{\hat{\theta}_z}^{\pi}\eta\cos\theta\, f(\theta)d\theta}{1 - \int_{-\hat{\theta}_z}^{\hat{\theta}_z} f(\theta)d\theta}\right).$$

As the term indicates, the utility in the first period will depend on the following possibilities (after overcoming constitutional standing): the plaintiff is properly found to belong to the zone ($\theta \in [-\hat{\theta}_z, \hat{\theta}_z]$) and the court then issues a judgment (subject to error) or the plaintiff doesn't belong to the zone ($\theta \in \big(\hat{\theta}_z, \pi\big) \cup (-\pi, -\hat{\theta}_z)$) but the court erroneously concludes she does and issues a judgment (subject to error). Note, however, that in the first

instance, there can be no substantive error on the court's part because the zone has sufficiently constrained the directions. The real error only appears in the second term. In the second term on the numerator of the last fraction, the upper limit is π because the court just modifies the rule per the plaintiff's demand. If neither happens, then the game moves onto the next period. The discounting thus happens for all such cases, and is given by

$$R_1 = \left((1-p) + p\left(1 - \int_{-\hat{\theta}_z}^{\hat{\theta}_z} f(\theta)d\theta\right)(1-\varepsilon_z) + \left(p\int_{-\hat{\theta}_z}^{\hat{\theta}_z} f(\theta)d\theta\right)\varepsilon_z\right)\delta$$
$$= \delta\left((1-p) + (p/\pi)\left(\left(\pi - \hat{\theta}_z\right)(1-\varepsilon_z) + \varepsilon_z\hat{\theta}_z\right)\right).$$

Since we have an interior $\hat{\theta}_z \in (0, \pi/2)$, A_1 can be simplified as $p\eta/\pi$ times the following:

$$(1-\varepsilon_z)\int_0^{\hat{\theta}_z}\cos\theta\, d\theta + \varepsilon_z\left((1-\varepsilon_s)\int_{\hat{\theta}_z}^{\frac{\pi}{2}}\cos\theta\, d\theta + \varepsilon_s\int_{\hat{\theta}_z}^{\pi}\cos\theta\, d\theta\right)$$
$$= (1-\varepsilon_z)\sin\hat{\theta}_z + \varepsilon_z\left[(1-\varepsilon_s)\left(1-\sin\hat{\theta}_z\right) + \varepsilon_s\left(-\sin\hat{\theta}_z\right)\right] = (1-2\varepsilon_z)\sin\hat{\theta}_z + \varepsilon_z(1-\varepsilon_s).$$

Let B be the expected utility without the ZOI test. Here, the court can err substantively, but there is no restriction on plaintiffs by ZOI. Then $B = B_1 + B_1T_1 + B_1T_1^2 + \ldots = B_1/(1-T_1)$ where

$$B_1 = p\left(2(1-\varepsilon_s)\int_0^{\frac{\pi}{2}}\eta\cos\theta\, f(\theta)d\theta + 2\varepsilon_s\int_0^{\pi}\eta\cos\theta\, f(\theta)d\theta\right)$$

and

$$T_1 = (1-p)\delta.$$

B_1 can be simplified as $\frac{p\eta}{\pi}$ times the following:

$$(1-\varepsilon_s)\int_0^{\frac{\pi}{2}}\cos\theta\, d\theta = (1-\varepsilon_s).$$

The ZOI requirement is efficient as long as $\frac{A_1}{1-R_1} > \frac{B_1}{1-T_1}$ or $A_1(1-T_1) > B_1(1-R_1)$, which is expressed as

$$\left[(1-2\varepsilon_z)\sin\hat{\theta}_z + \varepsilon_z(1-\varepsilon_s)\right](1-(1-p)\delta)$$
$$> (1-\varepsilon_s)\left((1-(1-p)\delta) - \delta\left(p\left(\left(\pi-\hat{\theta}_z\right)(1-\varepsilon_z) + \varepsilon_z\hat{\theta}_z\right)/\pi\right)\right),$$

or

$$(1-2\varepsilon_z)\sin\hat{\theta}_z\,(1-(1-p)\delta) > (1-\varepsilon_s)\left(1-\delta+p\delta\left(\hat{\theta}_z/\pi\right)\right)(1-\Delta\varepsilon_z),$$

where $\Delta = \frac{1-\delta+2\frac{p\delta}{\pi}\hat{\theta}_z}{1-\delta+\frac{p\delta}{\pi}\hat{\theta}_z} = 1 + \frac{\frac{p\delta}{\pi}\hat{\theta}_z}{1-\delta+\frac{p\delta}{\pi}\hat{\theta}_z} \in (1,2)$. Since $1-\delta+p\delta\left(\frac{\hat{\theta}_z}{\pi}\right) > 0$ and $1-2\varepsilon_z > 0$, we can rewrite the condition as

$$\pi\left(\frac{\sin\hat{\theta}_z}{p\delta\hat{\theta}_z + (1-\delta)\pi}\right)\left((1-\delta)+p\delta\right) > (1-\varepsilon_s)\left(\frac{1-\Delta\varepsilon_z}{1-2\varepsilon_z}\right).$$

Since $\hat{\theta}_z \equiv \underset{\theta_z\in[0,\pi)}{\operatorname{argmax}}\ \frac{\sin\theta_z}{p\delta\theta_z+\pi(1-\delta)}$, we know

$$\frac{\sin\hat{\theta}_z}{p\delta\hat{\theta}_z + (1-\delta)\pi} \geq \frac{\sin\frac{\pi}{2}}{p\delta\pi/2\ + (1-\delta)\pi} = \frac{1}{p\delta\pi/2\ + (1-\delta)\pi}.$$

It follows that

$$\pi\left(\frac{\sin\hat{\theta}_z}{p\delta\hat{\theta}_z + (1-\delta)\pi}\right)\left((1-\delta)+p\delta\right) \geq \pi\left(\frac{1}{\frac{p\delta\pi}{2} + (1-\delta)\pi}\right)\left((1-\delta)+p\delta\right) = \left(\frac{(1-\delta)+p\delta}{(1-\delta)+\frac{p\delta}{2}}\right) > 1.$$

Thus, the left-hand side of the inequality is greater than 1. Meanwhile, the right-hand side term will depend on $(1-\varepsilon_s)$ and $\left(\frac{1-\Delta\varepsilon_z}{1-2\varepsilon_z}\right)$. The first term will get smaller as ε_s increases. Since $\Delta \in (1,2)$, the second term can go down to 1 if $\varepsilon_z = 0$ or can get arbitrarily large as ε_z approaches $\frac{1}{2}$. Thus, the inequality is more likely met the greater ε_s and the smaller ε_z. If we define $\bar{\varepsilon_z}(\varepsilon_s)$ as the maximum value of ε_z that would render the ZOI efficient, given ε_s, then for interior values, this is determined implicitly by

$$\pi\left(\frac{\sin\hat{\theta}_z}{p\delta\hat{\theta}_z + (1-\delta)\pi}\right)\left((1-\delta)+p\delta\right) = (1-\varepsilon_s)\left(\frac{1-\Delta\bar{\varepsilon_z}(\varepsilon_s)}{1-2\bar{\varepsilon_z}(\varepsilon_s)}\right).$$

Differentiating both sides by ε_s, we get

$$0 = -\left(\frac{1-\Delta\bar{\varepsilon_z}(\varepsilon_s)}{1-2\bar{\varepsilon_z}(\varepsilon_s)}\right) + (1-\varepsilon_s)\left(\frac{\big(1-2\bar{\varepsilon_z}(\varepsilon_s)\big)(-\Delta) + 2\big(1-\Delta\bar{\varepsilon_z}(\varepsilon_s)\big)}{\big(1-2\bar{\varepsilon_z}(\varepsilon_s)\big)^2}\right)\left(\frac{d\bar{\varepsilon_z}(\varepsilon_s)}{d\varepsilon_s}\right)$$
$$= -\left(\frac{1-\Delta\bar{\varepsilon_z}(\varepsilon_s)}{1-2\bar{\varepsilon_z}(\varepsilon_s)}\right) + (1-\varepsilon_s)\left(\frac{2-\Delta}{\big(1-2\bar{\varepsilon_z}(\varepsilon_s)\big)^2}\right)\left(\frac{d\bar{\varepsilon_z}(\varepsilon_s)}{d\varepsilon_s}\right),$$

from which we can conclude $d\bar{\varepsilon_z}(\varepsilon_s)/d\varepsilon_s > 0$. Thus, the higher the probability of a substantive error, the higher is the permissible threshold of error for applying the ZOI test and still have the outcome be superior under the ZOI test. Finally, we can check that $\left(\frac{1-\delta+p\delta}{1-\delta+p\delta(\hat{\theta}_z/\pi)}\right)$ increases in δ and in p. □

Proof of Proposition 4. The first-order condition requires the following:

$$\big[\big(p\delta\theta_z + \pi(1-\delta)\big)(\eta\cos\theta_z) - p\delta(\eta\sin\theta_z)\big] - \big(\pi(1-\delta)\big)c = 0$$

Since the expression inside the large bracket is constantly decreasing in θ_z for $\theta_z \in [0, \pi/2\,]$ and since the expression itself reaches 0 (from Proposition 1), it follows that the first-order condition is reached at an earlier $\hat{\theta}_z$ than when the costs were not considered. In addition, differentiating the first-order condition in c, we get

$$\frac{\partial\hat{\theta}_z(p,\delta)}{\partial c} = -\frac{\pi(1-\delta)}{\eta\sin\theta_z\big(p\delta\theta_z + \pi(1-\delta)\big)} < 0.$$

□

Proof of Proposition 5. As before, we assume $\alpha_C - \eta < u < \alpha_C$. Let $I(\theta \in M)$ be the indicator function that takes on 1 when $\theta \in M$ and 0 otherwise. Congress's objective function can be written as follows:

$$\max_{\theta\in[0,\pi]}\left(p\int_{-\theta}^{\theta} I\big(\theta\in(-\pi/2,\pi/2)\big)f(\theta)d\theta\right) + \left(1-p\int_{-\theta}^{\theta} f(\theta)d\theta\right)\delta\left(p\left(\int_{-\theta}^{\theta} I\big(\theta\in(-\pi/2,\pi/2)\big)f(\theta)d\theta\right)\right.$$
$$\left. + \left(1-p\int_{-\theta}^{\theta} f(\theta)d\theta\right)\delta\left(p\left(\int_{-\theta}^{\theta} I\big(\theta\in(-\pi/2,\pi/2)\big)f(\theta)d\theta\right) + \cdots\right)\right)$$
$$= \max_{\theta\in[0,\pi]} p\left(\frac{\int_{-\theta}^{\theta} I\big(\theta\in(-\pi/2,\pi/2)\big)f(\theta)d\theta}{1-\delta\left(1-p\int_{-\theta}^{\theta} f(\theta)d\theta\right)}\right) = \max_{\theta\in[0,\pi]}\left(\frac{\left(p\int_{-\theta}^{\theta} I\big(\theta\in(-\pi/2,\pi/2)\big)f(\theta)d\theta\right)}{p\delta\int_{-\theta}^{\theta} f(\theta)d\theta + (1-\delta)}\right).$$

It's clear that $\hat{\theta} \le \frac{\pi}{2}$ since any larger $\hat{\theta}$ value will only increase the denominator while the numerator remains fixed. Thus, the maximization problem can be rewritten as

$$\max_{\theta\in[0,\frac{\pi}{2}]}\left(\frac{p\int_{-\theta}^{\theta} f(\theta)d\theta}{p\delta\int_{-\theta}^{\theta} f(\theta)d\theta + (1-\delta)}\right) = \max_{\theta\in[0,\frac{\pi}{2}]}\left(\frac{p\theta}{p\delta\theta + \pi(1-\delta)}\right) = \max_{\theta\in[0,\frac{\pi}{2}]}\left(\frac{p}{p\delta + \pi(1-\delta)/\theta}\right),$$

when we plug in $f(\theta) = 1/(2\pi)$. The maximand is increasing in θ and is achieved as θ approaches $\pi/2$. Thus, the optimal ZOI should include all groups whose interests are positively correlated with consumer welfare and only those groups. □