

Title: Does Disclosure Matter? Coupling Information to Performance in Texas

Abstract: Policy scholars have explored various policy instruments to understand how states work towards multiple goals. However, little attention has been given to the enforcement of these policies, especially as it relates to how changes relative to the disclosure of information impact policy enforcement and performance. Enforcement, like rule formulation and adoption, involves complex regulatory processes, political dimensions, and potential place-based disputes. Even within one state, enforcement varies significantly over time and across regions due to differences in exigency, staffing, and resources. Addressing this gap, our study focuses on a 2019 policy change in Texas that increased the disclosure of information via public access to information on the locations, frequencies, and results of oil and gas related inspections, violations, and administrative enforcement actions. In short, we ask, does information disclosure matter? Our data reveal a nuanced set of results: while greater disclosure appears to have contributed to a decrease in average monthly violations identified by inspectors, there was a notable increase in the number of enforcement actions taken by state regulators. In short, results highlight the complex relationship among information, transparency, firm behavior, and state enforcement agencies.

Introduction

The shale oil and gas era has raised significant questions about how policymakers design and implement policies that involve multiple goals. For oil and gas, the federal government's footprint is small and is largely concerned managing extraction on federal lands, overseeing some, but certainly a limited portion of funding, and responding to global energy dynamics such as liquefied natural gas exports and trade (Fisk 2017). By comparison, state governments are at the center. They pass and enforce most rules and standards relative to oil and gas production (Fisk, Jordan, and Good 2022; Pautz and Rinfret 2013). For state oil and gas agencies, administrators are tasked with facilitating extraction and securing the associated economic benefits, especially in areas with historical and active development (Amin et al. 2025). However, legislation often mandates that agencies must also minimize environmental and public safety externalities (Fisk 2017; Fisk, Jordan, and Good 2022). Performance, as measured through enforcement outputs, lies at the nexus of these potentially conflicting goals. Excessive enforcement may create an adversarial and inefficient relationship between regulators and regulated entities (i.e., Edwards, O'Grady, and Jenkins 2019) and harm economic growth. Yet, insufficient performance can sow public distrust and contribute to public health and environmental harms (Fisk, Jordan, and Good 2022).

Administrative performance in subnational oil and gas enforcement generally involves a standard process: inspections, identification of violations (if any), deployment of administrative remedies (if necessary) to address the violations, and follow-up inspections to ensure firm compliance. Scholars have consistently found that state-level political actors and goals, well types, fields, and economic priorities have shaped the behaviors of firms as well as state regulators and compliance (Fisk, Jordan, and Good 2022). Moreover, these impacts are often

place-based and most acutely felt in areas with active development (Amin et al. 2025). However, less attention has been paid to the role of information that is inherently part of the compliance process. As such, we examine whether increased information disclosure via the creation of a publicly available, online, and searchable database enhances agency performance relative to conducting inspections, identifying violations, and taking corrective administrative actions or what we describe as the regulatory pipeline.

To address the question does disclosure matter in terms of performance, we built and evaluated a novel dataset of nearly 70,000 (reduced via aggregation from a dataset of 350,000 inspections) administrative actions related to oil and gas enforcement carried out by the Railroad Commission of Texas (RRC) between August 2015 and December 2023. Importantly, in January 2019, state lawmakers promulgated a policy change that enabled citizens to access a portal that allowed users to view inspection results by entering a street address. Prior to this change, state policy required that the public have access to aggregated enforcement data per county per year (Fisk, Jordan, and Good 2022).

Disclosure Theory and Performance

Policy scholars have long recognized the limitations of adversarial enforcement regimes ranging from inability to comprehensively address emerging environmental challenges to the presence of intense and often costly conflict (Fiorino 2006). The vexing nature of many of these challenges has contributed to calls for alternative regulatory approaches including information disclosure, third-party certifications, and voluntary programs. Alternatives often target information asymmetries between regulated entities and regulators/members of the public by offering the public or consumer access to additional information (Li 2023; Crow, Albright, and Koebele 2020; Young 2020; Klyza and Sousa 2013; Fiorino 2006). As with other environmental

issues, oil and gas enforcement data has strategic value, meaning that the availability of such information may generate changes in performance.

Information disclosure has a clear logic (Li 2023; Fisk, Jordan, and Good 2022) At its core, disclosure impacts performance by evening the playing field between polluters and impacted stakeholders/communities via access to previously hidden or unknown information. This newly available information can then be used to push for preferred policies or to shame the regulated entity or agency into improving its performance (Niles and Lubell 2012; Hamilton 2005). Regardless of the how the information is ultimately used, disclosure explicitly relies on the idea that access to information is asymmetric and that it holds strategic value to stakeholders (Cherone 2023; see also: Moody 2023; Newsome 2021).

The literature, however, notes that mere access to information is often insufficient to induce behavioral change. As such, effective disclosure strategies often have mechanisms for discovering, comparing, disseminating, and evaluating information through media outlets or trusted third parties. In general, scholars have found that the information has direct implications for stakeholders, or is shameful to the impacted entity, it is more likely to contribute to behavioral change (Prakash and Potoski 2007). Noonan (2014), for example, found evidence that the public does respond to information disclosure regarding environmental impacts, especially when the information relates to personal risk exposure. This particular study examined a municipal-level alert system in Atlanta that condenses the information in the form of a easy to understand forecast alert rather than place-based data (Noonan 2014, 122–23).

Researchers have also focused on the dynamics between disclosure and firm-level outputs. Extant studies suggest that disclosure programs have enjoyed mixed and, in some cases, confounding results (Mason 2020; Lim and Prakash 2014). An example often studied in the

literature has been the Environmental Protection Agency's (or EPA) Toxic Release Inventory (or TRI) (Tietenberg 1998; Abel, Stephan, and Kraft 2007). In the decade following the program's enactment, the EPA reported a 44% reduction in toxic emissions by firms using or processing TRI-listed chemicals (Tietenberg 1998, 593). More recently, the EPA reported a 21% decrease in TRI chemicals from 2013 to 2022, which the agency accredits to the public release of TRI data (Rodriguez 2024). We should note that TRI data is not without criticism or limitations. Critics, for example, have questioned both the validity and accuracy of the data and have called into doubt the degree of cooperation of firms participating in the TRI program (Abel, Stephan, and Kraft 2007). Finally, Li (2023) observed a positive relationship between firm disclosure and inspections as part of the Clean Air Act, especially among TRI facilities with poorer performance. However, common indicators of environmental support, such as increased citizen activism, greater population density, and higher educational attainment, were not related to performance.

In one of the earlier models that unpacked the dynamics between disclosure and state-level characteristics, Abel, Stephen, and Kraft (2007), assessed the impacts of affluence, educational attainment, elected officials, the role of interest groups on firm performance. Their results highlighted two noteworthy state-level characteristics. First, liberal policies were found to significantly and positively impact risk reduction (Abel, Stephan, and Kraft 2007, 161). Second, states with higher "economic value added by manufacturing" were associated with higher levels of risk reduction (Abel, Stephan, and Kraft 2007, 162). In subsequent work, Kraft, Stephen, and Abel (2011) found that variables approximating community and individual attributes, market reactions, federal and state environmental capacity, and corporate commitment and decision-making mechanism, impacted firm decisions vis-a-vie TRI disclosures.

Other studies have similarly modeled the impacts of disclosure on firm environmental decision-making. Delmas et al. (2013) for example, found that disclosure requirements impacted energy consumption level (*See also* Delmas, Montes-Sancho, and Shimshack 2010). However, they noted several caveats to this finding. First, the impacts were observed in mostly smaller and in organizations that were already supportive of sustainability efforts. Benneer and Olmstead (2008) also reported mixed results relative to the impact of disclosure on drinking water outputs. Like Delmas et al. (2010), they too found that disclosure improved performance within some firms but not others.

In general, agency performance is likely to be impacted when perceptions or beliefs are challenged or do not match the expected information. Helland (1998), for example, noted that agencies tend to engage in stricter enforcement in contexts where regulated entities report or exhibit poorer levels of compliance or fail to meet performance standards. Anderson et al. (2022) also found performance improvements when the disclosed information revealed that regulated entities' failed to meet performance expectations of agency personnel. In other studies, information disclosure did not alter performance with cited reasons including regulated entities surpassed expectations and meeting performance standards (Tremblay-Boire and Prakash 2015; Marquis, Toffel, and Zhou 2016).

Disclosure and Agency Performance

Scholars have also assessed the impact of information disclosure on performance within administrative agencies (Konisky and Reenock 2013; Grimmelikhuijsen et al. 2013; Grimmelikhuijsen and Welch 2012; Moynihan and Pandey 2010; Scholz and Wei 1986). For public administrators, greater transparency of performance-related information may shape behaviors by altering (1) the perceived vs. the actual environmental performance of regulated

entities and (2) the political calculus made by overseers including elected officials. Extant research has found evidence of both mechanisms (Hansen and Nielsen 2022).

The information environment may also influence regulators' performance level by altering the political calculus of stakeholders, including the applicable administrative agencies and relevant elected officials (Lee 2022; Meier et al. 2022; Bustos 2021; Etienne 2015; Moynihan and Soss 2014). Here, the disclosure of information that challenges how stakeholders assess and/or view the agency's performance is more likely to contribute to changes in the political calculus of stakeholders, and thus is more likely to affect the agency's future performance (Carpenter and Krause 2012; Moynihan and Hawes 2012). To date, research has unearthed a variety of mechanisms contributing to this dynamic. Carpenter and Krause (2012) and Moynihan and Hawes (2012), for example, concluded that information that threatens the reputation of agencies influences performance (Bustos 2021; Etienne 2015; Lee 2022). Here, as noted by Li (2023), "when their reputation is at risk, government agencies tend to heighten their scrutiny of entities with poor reputations to distance themselves from criticized actors and shield against external backlash" (Hiatt and Park 2013; Maor and Sulitzeanu-Kenan 2013).

Following the logic above we offer the following hypotheses and expectations:

Hypothesis 1a: The enactment of the RRC's 2019 information disclosure policy will be associated with an increase in oil and gas well inspections.

Hypothesis 1b: The enactment of the RRC's 2019 information disclosure policy will be associated with an increase in the identification of oil and gas violations.

Hypothesis 2: The enactment of the 2019 information disclosure policy will be associated with an increase in administrative actions.

We should note that we anticipate that administrative actions, i.e., actions taken following the identification of a violation, will not be uniform across action type (i.e., notification of violation, referral to Austin, etc.).

Disclosure and State Oil and Gas Policies

A subset of the disclosure literature examines oil and gas policies (Fisk 2013; Rabe and Borick 2013; Fisk and Good 2019; Weible, Heikkila, and Carter 2017). Heikkila et al. (2014) in found that the adoption of more rigorous public disclosure (of the chemicals used in the fracturing process) policies was linked to political/policy related learning by the industry as well as the presence of a policy entrepreneur. A year prior, Fisk (2013) observed an association among state political characteristics and the willingness to enact more demanding disclosure laws. In short, more liberal states were associated with stronger disclosure policies. Similarly, Fisk and Good (2019) evaluated state-level factors related to the promulgation of policies governing pre-drilling disclosure notification to citizens, the scope of chemical disclosure to applicable state agencies, and the allowance of industry trade secrets. They noted that pre-drilling notification policies were associated with state-levels socio-economic characteristics (education and state GDP) whereas chemical disclosure policies were linked to variables approximating industry's economic footprint within the state. They did not find any significant relationships for policies governing the availability of trade secrets. Considering these findings, we offer a third hypothesis:

Hypothesis 3a: In wealthier areas, the enactment of the RRC's 2019 information disclosure policy will be associated with an increase in oil and gas well inspections.

Hypothesis 3b: In wealthier areas, the enactment of the RRC's 2019 information disclosure policy will be associated with an increase in the identification of oil and gas violations.

Hypothesis 3c: In wealthier areas, the enactment of the 2019 information disclosure policy will be associated with an increase in administrative actions.

However, these effects will not be uniform across various administrative actions.

A Period of Policy Change

In January 2019, the Railroad Commission (RRC) of Texas announced its Online Inspection Lookup (OIL) would be changed to enable greater disclosure of state oil and gas records. Under the change, users could search the RRC's oil and gas inspection and enforcement database for disaggregated and well-specific enforcement outputs, including inspections, the detection of violations, and administrative responses to violations. In other words, the change permitted users to search for individual violations or records rather than records that were previously aggregated to the county level. Within the new disclosure system, users would also be able to search by operator name, lease, the API number (which includes GIS location information), county, specific rule or operating standard, applicable RRC district, and specified date periods. Commissioner Wayne Christian described the tool's purpose as: "this tool will be helpful to our agency, the industry, and, most importantly, the public in ensuring individuals have easy, transparent access to data regarding the regulation of our natural resources. I applaud our hardworking staff and the commitment of funding from the Texas Legislature in making this long-desired tool a reality" (RRC 2019).

Methodology

To test our hypotheses and analyze the impact of the 2019 policy change on the regulatory pipeline, we used a combination of PostgreSQL and Python. PostgreSQL, a database management system equipped with the PostGIS extension, allowed us to store and manage spatial data, while Python facilitated econometric analyses. Based on our research question, we

analyzed nearly 350,000 individual enforcement actions spanning from 2015 to 2023. The initial dataset often contained multiple entries – a violation record – per well. These were aggregated to ensure unique entries per well. After this aggregation, the number of rows in the primary dataset was reduced to a final count of 69,873 wells with one or more violation records. Figure 1 shows a map of these wells across the state of Texas.

[FIGURE 1 ABOUT HERE]

In addition to the violation data, we use a geographic shape file of all oil and gas wells in Texas to account for spatial dependence, or spatial autocorrelation, where observations located near each other in space tend to have similar values or exhibit similar patterns. In the context of our study, spatial dependence implies that the count at neighboring wells influences the count of violations at a given well. Spatial dependence violates the independence assumption in traditional regression models, leading to biased and inefficient estimates (Ward and Gleditsch 2019). In this study, we constructed a spatial weight matrix using the Queen contiguity method of defining neighbors – horizontally, vertically, or diagonally adjacent wells (Arbia and Baltagi 2009). No disconnected components were found in the spatial weights matrix.

Multivariate Analysis

A baseline ordinary least squares (OLS) model was employed initially to test our first hypothesis and analyze the number of violations without considering spatial effects. Table 1 presents the results from the OLS model. The OLS model reveals a significant positive effect of

the 2019 policy change on the number of violations ($\beta = 0.4575$, $p < 0.0001$), indicating increased violations post-policy.

To address the limitations of the OLS model, we employed two primary spatial econometric models: Spatial Two-Stage Least Squares (S2SLS) and GM Spatially Weighted Least Squares (SWLS) (or HET model). The S2SLS method addresses potential endogeneity in the spatially lagged total violations dependent variable ($\beta = -0.1684$, $p < 0.001$) and demonstrates a significant positive effect of the post-2019 policy ($\beta = 0.47842$, $p < 0.001$). This suggests that while violations at nearby wells decrease the likelihood of violations at a given well, the policy change itself increases the number of violations. The SWLS model, used to correct for heteroskedasticity, provides robust standard errors and confirms the significance of the policy change with similar coefficients (Post 2019 Policy $\beta = 0.47918$, $p < 0.001$). Both models highlight the importance of accounting for spatial dependencies and heteroskedasticity, which the OLS model does not capture. Additionally, the spatial error parameter lambda ($\lambda = 0.58182$, $p < 0.001$) in the SWLS model indicates significant spatial autocorrelation, justifying spatial econometric techniques. In sum, the results from both spatial models indicate a significant and positive effect of the policy change on the number of violations (one aspect of administrative performance), as evidenced by the significant coefficients of the post 2019 policy variable.

[TABLE 1 ABOUT HERE]

Moving to a more fine-grained analysis of the impact of the policy change, we also present results for the specific types of enforcement actions as dependent variables. This allows

for a more detailed view of how different types of enforcement actions available to regulators were influenced by the 2019 policy change. Table 2 shows the total count for 2016 through 2023, the average monthly violations before and after 2019, and the percent change of these actions.¹ While the direct issues of orders and notices decrease over the period, referrals to state agencies increase. Continuing this approach enables us to distinguish between different regulatory responses, such as notices of violation, referrals for possible legal enforcement, and state-managed cleanup or plugging actions.

[TABLE 2 ABOUT HERE]

We employed Poisson and Negative Binomial regression models for this analysis as the dependent variable is the number of times a discrete event (enforcement action) occurs (King 1989). These models allow us to understand the rate at which these enforcement actions occur and how the 2019 policy change influences them. Poisson regression assumes that the mean and variance of the count data are equal, making it a robust choice for our initial analysis. However, given the potential for overdispersion, we also employed Negative Binomial regression, which introduces a dispersion parameter to handle overdispersion effectively (King 1989).

Table 3 presents the Poisson and Negative Binomial regression results without and with spatial effects for the disaggregated violation enforcement action taken by regulators. For the Poisson model without spatial effects, the constant term is positive and statistically significant (β

¹ The data presented in Table 2 consists of the full data frame generated from the RRC violations delimitated data from 2016–2023 before processing for analysis.

= 0.3631, $p < 0.001$), indicating a baseline level of violations. The variable for Notice of Violation has a negative and significant effect ($\beta = -0.1665$, $p < 0.001$), suggesting that issuing a notice reduces the number of violations. When violations are referred to Austin Field Operations for possible legal enforcement, the number of violations increases significantly ($\beta = 0.2514$, $p < 0.001$). Similarly, referrals to the State-Managed Cleanup Program and State-Managed Plugging also show significant positive effects on violations ($\beta = 0.2899$, $p < 0.001$ and $\beta = 0.1967$, $p < 0.001$, respectively). While the correction of a violation is positively associated with the number of violations, this effect is only marginally significant ($\beta = 0.1278$, $p < 0.01$). The period following the 2019 policy change shows a significant increase in violations ($\beta = 0.2864$, $p < 0.001$), indicating the policy's impact on disclosure and enforcement practices.

[TABLE 3 ABOUT HERE]

When spatial effects are considered, the constant term becomes negative and significant ($\beta = -0.1095$, $p < 0.001$), likely adjusting for spatial dependencies. The negative effect of Notice of Violation remains significant ($\beta = -0.1322$, $p < 0.001$), consistent with the non-spatial model. The positive effect of referrals to Austin Field Ops for possible legal enforcement decreases but remains significant ($\beta = 0.1108$, $p < 0.001$). Similarly, the positive effect of referrals to the State-Managed Cleanup Program is slightly reduced ($\beta = 0.1460$, $p < 0.01$). Still, it remains significant, as does the effect of State-Managed Plugging ($\beta = 0.0875$, $p < 0.001$), although it is diminished. The effect of violation correction becomes statistically insignificant ($\beta = 0.0608$), indicating that

spatial factors may explain this variation. The impact of the 2019 policy change remains significant and positive ($\beta = 0.2438$, $p < 0.001$), reinforcing the findings of increased violations post-policy. Additionally, including a spatial lag term ($\beta = 0.2885$, $p < 0.001$) underscores the importance of spatial dependencies in violation counts.

We also turned to count models to test Hypothesis 2. We first aggregated the data to create monthly counts of each enforcement action per well, distinguishing between periods before and after the 2019 policy change. We then checked for overdispersion by comparing the mean and variance of the counts for each action. If overdispersion was present, we used a Negative Binomial model; otherwise, we used a Poisson model. Table 4 summarizes these results.

[TABLE 4 ABOUT HERE]

These results from the Negative Binomial regression models provide further insight into the impact of the 2019 policy change on specific enforcement actions. The significant negative coefficient for Issuing a Severance/Seal Order ($\beta = -0.9015$, $p < 0.001$) indicates a decrease in such orders post-2019. The significant negative coefficient for Notice of Violation ($\beta = -0.0365$, $p < 0.001$) suggests a slight reduction in these notices. In contrast, significant positive coefficients for Referred to Austin Field Ops for Legal Enforcement ($\beta = 0.4453$, $p < 0.001$) and Referred to State-Managed Plugging ($\beta = 0.1347$, $p < 0.001$) indicate increases in these enforcement actions post-policy. The non-significant results for Violation Corrected ($\beta =$

-26.6349, $p = 0.998$) and Referred to State-Managed Cleanup Program ($\beta = 0.0233$, $p = 0.824$) suggest that the policy change did not significantly affect these actions. These results from the Poisson and Negative Binomial regression models, particularly with spatial effects, provide further evidence of the significant influence of the 2019 policy change on the number of violations and use of specific enforcement actions.

To understand the potential spatial factors that impact different types of actions, we then utilized the Generalized Method of Moments (GM_Lag) and Poisson regression models in a similar fashion as above. Table 4 summarizes these results, including coefficients for both spatial lag and policy change variables while using monthly averages of the action. For enforcement actions where the models could not be fitted due to insufficient data (Referred to State-Managed Plugging and Referred to State-Managed Cleanup Program), we denote the results with a “-” as shown in Table 5. For the issuance of severance/seal orders following the 2019 policy change, the GM_Lag model results show a significant negative coefficient for the policy change variable ($\beta = -0.00719$, $p < 0.001$), indicating a decrease in the issuance of orders. While extremely small and negative, the spatial lag coefficient highlights the potential influence of neighboring enforcement actions, though its practical significance may be limited.

[TABLE 5 ABOUT HERE]

The Poisson regression model results for Notice of Violation indicate a significant positive coefficient for the spatial lag variable ($\beta = 0.357$, $p < 0.001$) and the policy change variable ($\beta = 0.218$, $p < 0.001$). This suggests that the 2019 policy change and the actions in neighboring locations both contributed to an increase in the number of notices of violation issued. The GM_Lag model for referrals to Austin Field Ops for possible legal enforcement shows a significant positive coefficient for the policy change variable ($\beta = 0.0713$, $p < 0.001$) and a positive spatial lag coefficient ($\beta = 0.0277$). This indicates that the policy change led to an increase in these referrals, and actions in neighboring locations also influenced this enforcement action. Finally, the GM_Lag model for referrals to Austin Field Ops for possible legal enforcement shows a significant positive coefficient for the policy change variable ($\beta = 0.0713$, $p < 0.001$) and a positive spatial lag coefficient ($\beta = 0.0277$). This indicates that the policy change led to an increase in these referrals, and actions in neighboring locations also influenced this enforcement action.

The Regulatory Pipeline in Practice

Our primary analysis concerns the impact of the 2019 disclosure policy change with an eye toward its impact on the full regulatory pipeline, i.e., from inspection through violation to enforcement. This pipeline represents the implementation of Texas' regulatory regime and reveals important patterns in administrative performance. The pipeline begins with inspections. Between 2016 and 2023, the RRC conducted 1.89 million inspections across 476,150 wells, representing approximately 40% of Texas's 1.18 million wells. This baseline coverage helps contextualize both the scope of regulatory oversight and the potential impact of increased disclosure. The inspection process identified 1.09 million violations (57.8% of inspections), though these violations were concentrated among 91,701 wells (19.3% of inspected wells).

Results suggest that while violations are common when discovered, they tend to occur repeatedly at sites rather than being evenly distributed across all inspected wells.

The enforcement stage of the pipeline also reveals distinct patterns in administrative performance. The RRC employs a range of enforcement mechanisms, from simple notices to more coercive actions and provides insight into the agency's overall enforcement strategy:

1. Notices of Violation (72.2% of actions): These represent the primary enforcement tool, serving as formal documentation of non-compliance.
2. Legal Enforcement Referrals (12.7%): Cases deemed serious enough to warrant potential legal action.
3. State-Managed Plugging Referrals (11.2%): Cases where well abandonment requires state intervention.
4. Severance/Seal Orders (3.2%): The most severe administrative action, prohibiting further operations.
5. Other Actions (0.7%): Including violation corrections and state-managed cleanup programs.

The effectiveness of these enforcement mechanisms varies considerably. When examining compliance rates (whether violations were resolved) following different enforcement actions, a clear hierarchy emerges. Referrals for legal enforcement achieved the highest compliance rate at 88.9%, suggesting that the threat of legal action serves as a strong motivator for operators. Severance/seal orders and notices of violation showed moderate effectiveness, with compliance rates of 56.8% and 56.3%, respectively. In contrast, referrals to state-managed programs showed notably lower compliance rates: state-managed cleanup at 7.5% and state-managed plugging at just 1.4%. This stark difference in effectiveness may reflect the nature of

these cases—wells referred to state management often represent abandoned or financially distressed operations where traditional enforcement mechanisms have already failed. Despite the higher effectiveness of legal referrals, the RRC predominantly issues notices of violation (72.2% of all actions), suggesting a regulatory strategy that prioritizes education and awareness over most costly or coercive options. This preference for notices may also reflect an administrative preference and a graduated enforcement approach where more intensive mechanisms are reserved for repeated or severe violations.

Figure 2 shows the temporal dimension of enforcement gives additional insight into administrative efficiency. The median time from violation to enforcement action is 16 days, though the mean of 130.5 days indicates significant right-skew in the distribution. This gap between mean and median suggests that while most violations receive prompt attention, a subset of cases experience substantial delays. However, the trend shows consistent improvement in response time, decreasing from a mean of 140 days in 2016 to 27 days in 2024. This improvement coincides with the implementation of the disclosure policy, though other factors like technological improvements and organizational learning likely contribute.

[FIGURE 2 ABOUT HERE]

We found clear patterns in how the 2019 disclosure policy impacted different stages of the regulatory pipeline. For inspections more generally, we observed a significant shift in

intensity and coverage after 2019. While pre-2019 monthly inspections averaged around 12,000-15,000, post-2019 shows both higher volumes (reaching 20,000-25,000 monthly inspections) and more consistent coverage, particularly from 2022-2024. This supports Hypothesis 1a that disclosure would enhance inspection activities, possibly due to increased public visibility of regulatory performance. However, the relative affluence of an area appeared to be unrelated to changes in inspections, violations, and administrative actions, leaving Hypothesis 3a, 3b, and 3c, along with our expectation for H3c, without support. Contrary to Hypothesis 1b, violation identification patterns show an inverse relationship with increased inspections. Despite more frequent inspections post-2019, the violation rate decreased from 74% of inspections in 2015 to 33.4% in 2024. This unexpected finding suggests either improved operator compliance in response to disclosure or shifts in inspection strategies toward prevention rather than violation detection and is ripe for future research.

The impact on administrative actions (Hypothesis 2 and Expectation for H2) shows notable variation across enforcement types. After 2019, we observe a 54.54% increase in legal enforcement referrals and a 13.27% increase in state-managed plugging actions, while routine notices of violation decreased by 4.55% and severance orders declined by 59.81%. This redistribution toward more serious enforcement mechanisms, coupled with improved response times, suggests that disclosure may have prompted a more targeted and efficient enforcement approach. The shift appears particularly effective given the increase in compliance rates for wells receiving legal referrals (88.9%) compared to other enforcement actions.

These findings complement our core analysis of the disclosure policy's impact by shedding light on the mechanisms through which regulatory oversight operates. The concentration of violations among a relatively small subset of wells, the varying effectiveness of

different enforcement tools, and the temporal improvements in response time all suggest an evolving regulatory approach that balances oversight with resource constraints. This context helps explain both the opportunities and limitations that increased disclosure presents for improving regulatory performance.

Implications and Explanations

This study asked a cornerstone question about the relationship between information disclosure and performance—does greater transparency and disclosure improve bureaucratic performance? The answer, at least regarding compliance outputs in Texas, is yes, but with caveats.

Violations

Results from the spatial models indicate a significant and positive effect of the policy change on the number of recorded violations (one aspect of administrative performance). This observation supports our hypothesis but leaves open the question of why. Regarding oil and gas enforcement, greater disclosure of performance data may contribute to heightened stakeholder awareness, greater accountability, and knowledge of risks, especially among citizens living in and around Texas' oil and gas fields. Armed with this information, affected parties may work within the RRC, seek to shame the RRC, or push the Agency to utilize the data strategically to identify violations including operator type or well type.

The increases in RRC performance could also be due to several factors that impacted the agency's real and/or perceived political calculus. For example, by making violation data publicly available, the RRC may be seeking to hold itself accountable, establish baselines or base expectations, avoid future oversight, or increase pressure to improve performance. This is particularly relevant since in 2017 the Texas legislature ordered the RRC to develop and publish

an annual plan to assess the most effective use of its resources to ensure public safety and to minimize environmental damage (RRC 2025). Another possibility is that by making violation data public, the RRC is seeking to enhance its reputation among the public and/or state lawmakers (RRC commissioners are elected) and/or avoid adverse publicity (Li 2023; Moynihan and Hawes 2012). We also consider the possibility that, by making violation data public, the RRC aims to promote transparency and improve public trust in its enforcement of applicable rules and performance standards (Abel, Stephan, and Kraft 2007; Li 2023). A final possibility is that RRC performance improvements were designed to suppress support for more meaningful changes in how Texas enforces its oil and gas laws. As Fisk and Good (2019) noted, disclosure does not change the rules but can be used strategically to preclude calls for stricter oversight.

Administrative Actions

We also assessed the impact of the 2019 change on RRC's use of specific administrative actions. Not all regulatory responses are equal, with some requiring the RRC to compel operator action and others merely notifying the operator of a violation. Consistent with our hypotheses, results are mixed. For example, while the number of 'Notices of Violation' and the number of referrals to Austin Field Operations for possible legal action decreased, the number of referrals to the State-Managed Cleanup Program and the number of referrals to State-Managed Plugging increased. Other administrative actions showed no significant change pre- or post-2019 policy change.

Our next critical question asks why some performance elements increased while others decreased. Several possibilities exist. First, we recognize that the decrease in notices of violation (NOVs) is surprising, as this option serves to notify operators of violations and provides the operator time to resolve the violation – but perhaps these actions are not as salient to the public

or lawmakers as others. Second, the RRC may focus more on broader or easier to understand performance measures, like the number of inspections or violations, rather than specific actions. Additionally, RRC personnel might have shifted from issuing NOVs to resolving violations informally. The agency's 2024 annual report noted that some violations could be resolved quickly via phone rather than through formal notifications (RRC 2022, 12). Finally, changes in administrative performance for state-managed plugging programs may be influenced by federal funding. In August 2022, Texas received \$25 million in grants from the Infrastructure Investment and Jobs Act (IIJA) to reclaim orphaned wells on private or state-owned lands (RRC 2025), with more funding received in 2024.

We also conducted a supplementary spatial analysis to examine whether enforcement patterns varied along the Texas–Mexico border, where regulatory capacity and oversight may be shaped by unique administrative dynamics (Woods 2006). Using well-level spatial data, we identified all wells located within 50 kilometers of the border and compared inspection frequency, violation rates, and enforcement outcomes to those for non-border wells. We found that border wells experienced significantly fewer inspections per well, lower compliance upon reinspection, and lower overall violation rates, with all differences statistically significant ($p < 0.001$). While some of this variation may reflect recent development patterns—such as increased activity in the Eagle Ford shale play, which overlaps much of the border region—these findings suggest that regional disparities in regulatory intensity persist despite statewide mandates.

Conclusions and Future Directions

Our results show the promise and peril of information disclosure. The 2019 policy change, providing greater data access and transparency, contributed to an overall increase in recorded violations. Yet, for specific actions, performance results varied. Recognizing this

complexity without a clear-cut theoretical explanation, we envision a long line of future research to better understand the dynamic among disclosure, traditional regulation, and administrative performance. In this effort, future studies should explore a range of topics. Certainly, the second Trump administration's emphasis on 'energy dominance' has the potential to prioritize extraction over environmental protection and impact performance. That said, many oil and gas firms are likely to be uninterested in increasing supply via extraction without requisite demand.

Additionally, the spatial dimensions of violations and how oil and gas stakeholders and citizens and/or interest groups engage with state agencies or regional officials, especially via complaints and annual performance goal setting. Our data captures four years after the 2019 change, and many technological factors, including data availability, AI, and drones, can influence performance. Additionally, future studies could focus on the specific impacts of regulatory behaviors and performance vis-a-vie disadvantaged communities, especially in border areas and in rural communities (Amin et al. 2025). This is especially important as previous studies have found that Hispanic communities in particular have been given less attention by state regulatory agencies than other populations (Konisky and Reenock 2018). Finally, unpacking the roles of environmental interest groups and networks within communities or the state that are supporting or opposing development and/or how such groups are utilizing the newly available data. Here, disclosure laws may enable these organizations to more effectively publicize data, mobilize around disclosed information, and thus increase public awareness and data literacy to apply pressure on regulators.

Citations

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