More Constraints, More Consensus? How Regulation Shapes Investor Information Asymmetry*

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Abstract

We examine how firms' aggregate regulatory exposure affects investor information asymmetry. Using a novel text-based measure capturing firm-specific exposure to the complete set of federal regulations, we find that greater regulatory exposure significantly reduces information asymmetry, as evidenced by narrower bid-ask spreads and decreased insider trading. This reduction arises primarily because regulations constrain managerial discretion, stabilizing firms' operations and decreasing earnings volatility. However, the beneficial informational effects of regulation weaken during periods of elevated policy uncertainty, under less stringent regulatory enforcement, and among politically active firms positioned to influence regulators. Additionally, greater regulatory exposure diminishes firms' incentives to provide voluntary disclosures, suggesting regulatory constraints substitute for managerial transparency. Overall, our findings highlight regulation's dual role in capital markets: while regulations impose operational costs, they also enhance liquidity by reducing investor disagreement.

Keywords: Regulation, Corporate Disclosure, Information Asymmetry, Liquidity

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1. Introduction

Regulations play a significant role in shaping firm behavior and investors' perceptions in capital markets. While the empirical accounting literature has extensively examined the consequences of disclosure regulations (e.g., Gomez, 2024; Jayaraman and Wu, 2019; Steffen, 2022), less is known about the broader capital market implications of firms' aggregate exposure to the full body of federal regulations that govern their operations. These include not only reporting mandates but also product market standards, environmental rules, labor and safety regulations, and other operating constraints. Importantly, the scope and stringency of these rules evolve over time in response to changing political priorities, macroeconomic conditions, social demands, and firm-level lobbying activity. Despite their potential to shape firm conduct and investor expectations, the capital market effects of this wider regulatory environment, particularly those unrelated to disclosure, remain theoretically ambiguous and empirically underexplored. Taking a comprehensive and time-varying view of regulatory exposure, this paper examines whether and how the total set of federal rules applicable to firms influences investor information asymmetry.

To address this gap in the literature, we examine how firms' total exposure to federal regulation affects investor information asymmetry. We employ a text-based measure of regulatory exposure from Kalmenovitz (2023), which identifies regulatory exposure using the similarity between a firm's business description in its 10-K filings and the language used in active federal regulations. By employing this time-varying, firm-level measure, we assess how changes in regulatory exposure impact information asymmetry and voluntary disclosure choices.

The relationship between regulatory exposure, investor information asymmetry, and firms' information environments is theoretically ambiguous. On the one hand, regulatory exposure may reduce investor information asymmetry either by directly mandating the disclosure of firms'

information or by constraining firms' operation choices. While the economic consequences of reporting regulation have been well documented,[1] we emphasize that operations regulations reduce investor information asymmetry by constraining the range of strategic choices available to managers and consequently, lowering uncertainty for investors. Managers often make strategic business decisions based on private information (Greenwald, Stiglitz, and Weiss, 1984), leading investors to form diverse and heterogeneous beliefs about these choices (Holthausen and Verrecchia, 1990). Regulations can limit firms' flexibility in pursuing new business opportunities and reinvesting in their own operations (Averch and Johnson, 1962; Benmelech and Moskowitz, 2010; Billett, Garfinkel, and O'Neal, 1998). Thus, by reducing managerial discretion, these regulations can diminish the range of potential future outcomes for the firm, thereby narrowing the scope of investor disagreement and reducing uncertainty about the firm's performance. We term this reduction in investor disagreement due to constrained managerial options as the "*operation-uncertainty-smoothing*" effect of regulatory exposure.

On the other hand, regulatory exposure might amplify investors' information asymmetry due to the inherent unpredictability of regulatory interventions. Regulatory policy shifts, often driven by changing economic conditions or political influences, can generate uncertainty regarding future government actions and firms' responses to these changes (Shapiro, 1983; Hiriart and Martimort, 2012; Pastor and Veronesi, 2012, 2013). This uncertainty complicates investors' assessments, as they must account not only for firm decisions but also for potential regulatory changes, thereby increasing the disagreement among investors and information asymmetry. We term this phenomenon as the "*policy-uncertainty-inducing*" effect of regulatory exposure.

[1] E.g., Gao, Jiang, and Zhang, 2019; Lang and Maffett, 2011; Lang, Lins, and Maffett, 2012; Trebbi and Xiao, 2019

To empirically examine these competing predictions, we analyze a panel of publicly traded firms spanning 1994 to 2020. Using bid-ask spreads as our primary measure of investor information asymmetry, we regress spreads on our firm-specific regulatory exposure measure, controlling for a comprehensive set of firm characteristics and incorporating firm and time fixed effects. We find that a one-standard-deviation increase in regulatory exposure corresponds to a 0.056 percentage-point decline in bid-ask spreads, which amounts to (3.1%) relative to the mean.

To assess the robustness of our main findings, we conduct several additional analyses. First, we complement our findings on information asymmetry among investors by examining abnormal insider trading activity as an alternative proxy for information asymmetry between investors and insiders (Cohen et al., 2012). We find that higher regulatory exposure is associated with reduced opportunistic insider trading, consistent with the view that operational constraints diminish insiders' informational advantage. Given prior evidence linking insider trading to bid-ask spreads (Chung and Charoenwong, 1998; Huddart and Ke, 2007), this reduction in informed trading further supports our interpretation that regulatory exposure broadly mitigates investor information asymmetry. Second, we evaluate the robustness of our results to controlling for SEC regulation, a distinct construct from operational and product regulation. To account for variation in SEC regulation, we use two proxy measures: the first is constructed using the same algorithm applied in our main analysis, and the second is developed by Armstrong, Glaeser, and Hoopes (2025). Our results remain robust and statistically significant after controlling SEC regulations. Third, we verify that our results are not solely driven by the inclusion of fixed effects or firm-level controls (Breuer and DeHaan, 2024). Fourth, we confirm our findings using alternative proxies for information asymmetry: (i) TAQ-based realized spreads, which directly measure trading costs; (ii) CRSP-based bid-ask spreads derived from daily trading prices, reflecting the costs faced by large

traders (Abdi and Ranaldo, 2017); and (iii) trading volume-based illiquidity measures (Amihud, 2002). Fifth, while our primary regulatory exposure measure is constructed from the count of relevant regulations, we also test alternative proxies based the hours required for compliance and the number of mandatory regulatory responses. Across all these robustness checks, our main conclusions persist.

To investigate the underlying mechanism, we examine whether regulatory exposure reduces information asymmetry by improving the predictability of firm operations. If regulations constrain managerial discretion and limit strategic flexibility, then regulated firms should exhibit more stable and predictable financial outcomes, driving lower investor disagreement and information asymmetry (Kim and Verrecchia, 1994; Cao and Narayanamoorthy, 2012). We measure future operational volatility using the standard deviation of firms' net income, operating cash flow, and stock returns over the subsequent five-year period. Consistent with the operational smoothing mechanism, we find that a one-standard-deviation increase in regulatory exposure is associated with economically meaningful reductions in the volatility of future cash flows (3.77%), earnings (3.33%), and stock returns (1.15%), relative to their sample means. Additionally, we document that regulatory exposure is associated with increased earnings persistence, even after controlling for standard firm characteristics and accounting for the asymmetric persistence of losses documented in prior research (Basu, 1997; Ball and Shivakumar, 2006). Our findings of both reduced volatility and enhanced earnings persistence differs from what we would expect given prior evidence showing regulatory exposure increases operational costs and reduces profitability (Kalmenovitz, 2023). Given the conservative nature of financial reporting, lower profit should accelerate loss recognition and thus increase earnings volatility. Our evidence contrasting with this expectation implies that regulatory constraints appear to compress the

distribution of future outcomes, creating a more predictable earnings profile that ultimately reduces information asymmetry in capital markets.

While our main results suggest that regulatory exposure reduces information asymmetry by constraining managerial discretion and stabilizing firm operations, these effects depend critically on whether the underlying regulatory constraints are credible and expected to persist. If investors perceive the constraints to be uncertain, malleable, or easily circumvented, the operation-smoothing channel should weaken. We explore this idea by examining contexts in which regulatory constraints are likely to be relaxed—either due to elevated policy uncertainty or diminished enforcement.

First, we examine the role of economic policy uncertainty (EPU), focusing specifically on uncertainty surrounding regulatory policy. EPU reflects media-based indicators of unpredictability in government action (Baker et al., 2016; Nagar et al., 2019), and higher levels of EPU can make it difficult for investors to assess whether current regulations will remain binding. Consistent with this view, we find that the negative association between regulatory exposure and bid-ask spreads is significantly attenuated during periods of elevated regulatory EPU. These results suggest that the information-smoothing benefits of regulatory exposure are contingent on the perceived durability of the constraints it imposes. When the regulatory environment is unstable or politicized, investors may discount the constraining effect of regulation, undermining the reduction in information asymmetry.

The second source of uncertainty we examine is the variation in the expected enforcement of regulations. Even when regulations exist on paper, their capital market effects depend on whether they are credibly enforced. We proxy enforcement intensity in two ways. First, we exploit variation in political leadership: Republican administrations are generally associated with less

aggressive regulatory enforcement. Second, we use the industry-level frequency of federal enforcement actions to capture variation in observed enforcement activity. Across both proxies, we find that the impact of regulatory exposure on reducing information asymmetry is weaker when enforcement is likely to be lax, either because the federal government deprioritizes oversight or because the firm operates in a low-enforcement industry.

Next, we examine the role of firm-level political influence in shaping the tightness of regulatory constraints. Firms that actively engage in political lobbying or contribute to aligned policymakers may be better able to shape how regulations are applied to them (Stigler, 1971; Yackee and Yackee, 2006; Pandey, Shen, and Wu, 2025). If political engagement serves as a tool for relaxing regulatory constraints or shields the firm from enforcement, then the operation-smoothing effect of regulatory exposure should be weaker for politically active firms. Consistent with this prediction, we find that the association between regulatory exposure and reductions in bid-ask spreads is significantly attenuated for firms that contribute to political action committees or lobby the government. Among firms that make political contributions, those whose political ideology aligns with that of the White House also exhibit a diminished effect. Collectively, these results reinforce our interpretation of regulatory exposure as a constraint-based mechanism: its capital market effects depend not just on the presence of regulation, but on whether those regulations are expected to bind. When regulatory constraints are uncertain, weakly enforced, or subject to political influence, their ability to reduce information asymmetry through operational smoothing is diminished.

Finally, we examine how regulatory exposure influences managerial disclosure practices. Prior literature shows that voluntary disclosures, such as management forecasts, play a critical role in reducing investor uncertainty and information asymmetry, particularly when these asymmetries

are large (Hirst et al., 2008; Marshall and Skinner, 2022). While beneficial, these disclosures are costly and strategically chosen by managers: they are typically issued when the expected reduction in investor uncertainty outweighs the associated risks of committing to explicit performance targets. Such disclosures can narrow bid-ask spreads, reduce trading costs, and ultimately lower the cost of equity capital (Amihud and Mendelson, 1986; Leuz and Verrecchia, 2000; Balakrishnan et al., 2014). However, if regulatory exposure already limits operational uncertainty by constraining managerial discretion, the incremental benefit of voluntary disclosure may diminish.

Consistent with this reasoning, we find that greater regulatory exposure is associated with a statistically and economically significant reduction in management forecasts. Specifically, a one-standard-deviation increase in regulatory exposure decreases the likelihood of issuing a forecast by 0.8 percentage points (approximately 2.2% relative to the sample mean). This evidence suggests that external regulatory constraints can substitute for voluntary disclosures: when regulatory constraints sufficiently mitigate uncertainty, managers scale back their reliance on voluntary disclosure channels.

Our study makes several contributions to the literature. First, we advance our understanding of how regulation shapes firms' capital market information environments. While prior accounting research extensively examines the direct effects of specific disclosure mandates on investor information asymmetry and market outcomes (e.g., Gomez, 2024; Gao, Jiang, and Zhang, 2019; Jayaraman and Wu, 2019; Lang and Maffett, 2011; Lang, Lins, and Maffett, 2012; Steffen, 2022; Trebbi and Xiao, 2019), we emphasize the broader and less-explored role of operational regulations. Although Leuz and Wysocki (2016) highlight potential spillover effects of regulation on voluntary disclosure, no prior work explicitly examines whether and how operational regulations affect information asymmetry and disclosure choices. By employing a

novel measure of firm-level regulatory exposure that spans multiple regulatory domains, we document significant spillover effects. Our evidence indicates that these broader regulatory constraints reduce investor disagreement and enhance the predictability of firm outcomes. This finding provides timely insights into the debate around the unintended consequences of deregulation.

Second, we contribute to the literature examining interactions among regulatory institutions, political dynamics, and capital market outcomes. The existing literature mainly emphasizes that regulation imposes of additional costs and constraints on firms' profits and valuation. In contrast, our findings suggest a nuanced capital-market benefit: regulatory constraints, particularly when perceived as credible and consistently enforced, reduce investor uncertainty and improve market liquidity. However, we further show that this beneficial impact critically depends on institutional credibility. Specifically, we find that uncertainty surrounding regulatory enforcement either stemming from policy instability, political alignment, or lax enforcement, attenuates or even reverses the informational benefits of regulation. Thus, our study identifies political institutions and firm-level political activities as essential determinants in shaping the effectiveness of regulatory constraints.

Third, our findings contribute to the literature on corporate transparency by clarifying the interplay between regulatory environments and voluntary disclosure decisions. We document that higher regulatory exposure reduces investor disagreement and diminishes managers' incentives to issue voluntary disclosures such as earnings forecasts. This insight highlights an important substitution effect, when external regulatory constraints mitigate uncertainty, the marginal benefit of costly voluntary disclosures declines. Thus, we extend prior research by emphasizing that firms'

information environments depend not only on internal disclosure choices but also on external regulatory conditions.

2. Related Literature and Hypothesis Development

We leverage a novel measure of regulatory exposure, capturing both cross-sectional and inter-temporal variation, to examine how regulation influences information asymmetry and how firms adjust their voluntary disclosure strategies in response. Our research question bridges two key streams of literature: the determinants of information asymmetry and firms' responses to mitigate it through disclosure, and the regulation of firms' operations. Below, we briefly review these literatures and develop our hypotheses.

2.1 Related Literature

Economic theories of regulation traditionally justify intervention based on the need to address market failures, such as natural monopolies (e.g., utilities or railroads) or externalities (e.g., pollution, financial contagion). In these contexts, the regulatory framework aims to correct inefficiencies by limiting firms' market power or internalizing negative externalities (Pigou, 1920). As the regulatory infrastructure has expanded, additional justifications have emerged, such as reducing information processing costs, which has been used to justify safety and consumer protection regulations. While regulation typically aims to address specific outcomes—such as internalizing externalities—they also often produce unintended consequences. As a result, the question of whether a regulation's benefits outweigh its costs remains an empirical one and comparing costs and benefits requires evaluating a diverse set of outcomes.

The two dominant economic theories of regulation provide contrasting perspectives on the effects of regulation. The public interest theory posits that regulation is designed to serve the public

good, enhancing social welfare by addressing market imperfections (Demsetz, 1974; Joskow and Rose, 1989). In this view, regulatory interventions should yield net benefits, including potential reductions in information asymmetry as regulatory constraints provide a clearer operating framework for firms.

In contrast, regulatory capture theory argues that regulators may act in their own self-interest or be influenced by powerful industry players, leading to regulations that primarily benefit incumbents or political actors rather than the public (Tullock, 1967; Stigler, 1971; Krueger, 1974; Posner, 1974; Peltzman, 1976; Becker, 1983). This theory implies that regulations could increase costs for firms without necessarily delivering public benefits, potentially exacerbating information asymmetry by introducing new layers of complexity and unpredictability in firm operations (Benmelech and Moskowitz, 2010).

Both theories acknowledge that regulation can impose significant costs on firms. For example, Kalmenovitz (2023) documents that greater regulatory exposure leads to higher operational expenses and reduced profitability. Similarly, Barrios, Gallemore, and Lin (2023) find that regulatory fragmentation constrains firms' tax planning capabilities, further increasing their operational costs. Building on this evidence, we examine an unintended and overlooked consequence of regulatory exposure: its impact on information asymmetry—specifically, the asymmetry driven by private information among investors—which can influence firms' information production and their broader information environment. A decrease in bid-ask spreads would support the public interest theory, suggesting a previously unexamined benefit of regulation in reducing information asymmetry. Conversely, an increase in spreads would align with the regulatory capture theory, indicating added complexity and investor uncertainty.

Our study contributes to the literature by exploring the effect of operating regulations on information asymmetry. Previous studies analyzing the economic consequences of operating regulations have examined product market outcomes (e.g., price and quantity), input markets (e.g., labor and raw materials), or firm-level metrics such as profitability and investment (see Joskow and Rose (1989) for a review). The potential implications for capital market outcomes—specifically information asymmetry and liquidity—remain largely unexplored. In contrast, research on securities and reporting regulations often focuses on capital market measures like bid-ask spreads and voluntary disclosure as indicators of regulatory impact (e.g., Greenstein and Sami, 1994; Daske et al., 2008). In these settings, the primary users of disclosed information are market participants, and the bid-ask spread serves as a key metric reflecting the extent to which information reduces or heightens investor disagreement (e.g., Kim and Verrecchia, 1991, 1994).

However, operating regulations can have an impact on spreads because empirical evidence consistently shows that disclosures which alleviate uncertainty about firm value are linked to narrower bid-ask spreads and a lower cost of capital (e.g., Amihud, 2002; Lambert, Leuz and Verrecchia, 2007; Lambert et al., 2011; Armstrong et al., 2016). This suggests that if operating regulations improve the transparency and predictability of a firm's operations, they can enhance market liquidity by reducing information asymmetry. Our study addresses this gap by investigating how regulatory constraints on firm behavior can affect the broader information environment and capital market outcomes.

2.2 Hypothesis Development

The theoretical impact of regulatory exposure, particularly through operational constraints, on investor information asymmetry is ambiguous. On the one hand, greater regulatory exposure could reduce investor information asymmetry by limiting managerial discretion and stabilizing

firms' competitive environments. Operational regulations constrain strategic choices, investment opportunities, and market entry, thereby narrowing the set of feasible managerial actions (Averch and Johnson, 1962; Benmelech and Moskowitz, 2010; Billett, Garfinkel, and O'Neal, 1998; Kalmenovitz, 2023). This reduced managerial flexibility decreases uncertainty around firms' future performance, diminishing the incremental value of privately gathered information to investors. When regulatory constraints clearly bind, the need for investors to obtain costly private signals declines because firm outcomes become more predictable. Thus, regulatory exposure may lead to a more transparent and predictable information environment, an effect we label the "operational uncertainty smoothing" channel.

On the other hand, regulatory exposure might increase information asymmetry by introducing uncertainty related to future regulatory policies and their enforcement. Regulatory rules and their implementation are often influenced by changing economic conditions, political incentives, and shifts in governmental priorities (Shapiro, 1983; Hiriart and Martimort, 2012; Pastor and Veronesi, 2012, 2013). If investors perceive regulatory policy to be unstable or subject to political manipulation, uncertainty about future regulatory interventions and the firm's strategic responses can amplify the role of private information in firm valuation. This uncertainty complicates investors' assessments of firm value, increasing incentives to gather costly private information. Supporting this view, Nagar et al. (2019) document that macroeconomic policy uncertainty heightens investor information asymmetry.

Given these competing forces, the net effect of regulatory exposure on investor information asymmetry is not clear ex ante. Thus, we state our first hypothesis in null form:

H1: Variation in regulatory exposure will not affect investor information asymmetry

We next consider how regulatory exposure potentially influences managerial decisions regarding voluntary disclosures. Prior research suggests that voluntary disclosure practices, such as issuing management forecasts, are strategically employed by managers to reduce investor uncertainty and information asymmetry (Balakrishnan et al., 2014; Lang and Maffett, 2011; Nagar et al., 2019). Managers have incentives to provide forward-looking information when information asymmetry is high, as voluntary disclosures can decrease investors' incentives to seek costly private information and enhance market liquidity. Empirical evidence supports this idea: firms facing elevated investor uncertainty tend to disclose more information voluntarily, aiming to mitigate investor uncertainty, reduce their cost of equity capital and promote a more efficient market (Balakrishnan et al., 2014; Nagar et al., 2019).[2]

However, the relationship between regulatory exposure and voluntary disclosure is potentially more complex in the current context. Regulatory constraints provide an external source of operational predictability, reducing the marginal benefit of managerial disclosure aimed at clarifying future firm performance. Specifically, when regulation constrains managerial discretion and operational outcomes become more predictable, managers might perceive fewer incentives to issue voluntary forecasts, as the scope for reducing investor uncertainty via voluntary disclosure diminishes (Hirst et al., 2008; Marshall and Skinner, 2022). Unlike settings where managers voluntarily increase transparency to guide market expectations, regulation may externally reduce operational uncertainty, making additional managerial disclosure redundant. Conversely, if regulatory policies themselves become uncertain or are inconsistently enforced, managers might still find it optimal to increase voluntary disclosures to address heightened regulatory uncertainty.

[2] By proactively disclosing relevant information, managers can reduce the information advantage held by informed traders, thereby decreasing information asymmetry. Lower information asymmetry, in turn, can enhance market liquidity by narrowing bid-ask spreads and reducing trading costs, ultimately lowering the firm's cost of equity capital (e.g., Balakrishnan et al., 2014; Lang and Maffett, 2011).

Given these competing effects, the net relationship between regulatory exposure and voluntary disclosure decisions is theoretically unclear. Thus, we also present our second hypothesis in null form:

H2: Variation in regulatory exposure will not affect voluntary disclosure

3. Variable Definitions, Empirical Design and Sample

3.1 Definitions of Main Variables

Our primary variable of interest is *Reg Exp,* which measures the number of applicable regulations relevant to a firm's business (Kalmenovitz, 2023). The measure, as constructed in Kalmenovitz (2023), leverages the text of Item 1 from firms' 10-K filings and the original language in each regulation's Form 83-I.[3] Together these sources offer a comprehensive view of a firm's operational and regulatory environment.

The construction of *Reg Exp* begins by calculating cosine similarity scores between the textual descriptions of a firm's business activities in Item 1 and the language of *each* regulation. The 100 regulations with the highest similarity scores are deemed as the most relevant and represent those likely to significantly impact the firm's operations. While the 100 regulations with negative residual scores are randomly selected as irrelevant, forming a control set.[4] These 200 regulations are used to train a machine-learning model designed to identify linguistic patterns that distinguish relevant regulations from irrelevant ones. The trained model is then applied to classify

[3] Form 83-I is a standardized document submitted by federal agencies to the Office of Information and Regulatory Affairs (OIRA) when proposing new regulations. It includes a summary of the regulation's purpose, scope, and affected entities, providing structured metadata on regulatory content.

[4] Residual cosine scores are calculated by subtracting the rule's average score from the raw score. This adjustment helps account for the use of boilerplate language in some regulations, which often results in similar language across many companies.

the remaining regulations as either relevant or irrelevant to each firm. *Reg Exp* is a standardized index that reflects the number of regulations relevant to each firm-year.

Online Appendix Figure A1 illustrates the distribution of *Reg Exp*. In Panel A, the khaki-colored distribution represents the unconditional variation across all industries and periods, exhibiting a broad spread that indicates significant differences in regulatory exposure among firms. The green distribution plots the residuals of *Reg Exp* after controlling for firm fixed effect (i.e., the within-firm variation), showing that substantial variation remains. Our analysis with firm fixed effects utilizes this variation to identify the shift in *Reg Exp* on information asymmetry. Similarly, Panel B of Figure A1 demonstrates significant variation of *Reg Exp* after controlling SIC2-year fixed effects, which highlights the substantial cross-sectional variation in *Reg Exp*. Finally, in Panel C, we plot the interquartile range of the measure by industry (Fama-French 30) and we see there is substantial variation within industry. With respect to specific industries, the Tobacco Products (#3) has the highest median while Retail (#27) has the lowest.

In our main analysis, *Reg Exp* serves as a proxy for the operational restrictions that regulations impose on a firm's activities, which we argue is likely to be a key factor influencing information asymmetry.[5] To ensure the robustness of our findings, we also consider alternative measures of a firm's regulatory burden. These include *Reg Exp Time,* which estimates the time required to comply with relevant regulations, and *Reg Exp Response,* which counts the number of responses or filings required for regulatory compliance. The construction process for these additional variables parallels that of our main variable *Reg Exp,* with the primary difference being

[5] One potential concern is that our measure of regulatory exposure may inadvertently capture exposure to SEC regulations, which could confound our results. However, firms rarely mention SEC regulations in their Item 1 business descriptions, as this section typically focuses on operational aspects rather than compliance with securities laws. Additionally, in Table 6, we utilize two alternative measures of SEC regulatory exposure and include them as a control variable in our analyses. The inclusion of this measure does not alter our main inferences, alleviating concerns that our results are driven by exposure to SEC regulations.

the focus on summing compliance hours and the number of responses, rather than the number of relevant regulations.

To measure investor information asymmetry, we follow Nagar et al. (2019) and Holden and Jacobsen (2014) in selecting quoted spread (in percentage terms) as our main proxy. This measure is constructed as follows:

$$Percent\ Quoted\ Spread_{i,t} = \frac{Ask_{i,t} - Bid_{i,t}}{(Ask_{i,t} + Bid_{i,t})/2}$$

Where $Ask_{i,t}$ and $Bid_{i,t}$ are stock i's bid price and ask price at the second (if the dataset is MTAQ, or mililisecond if from MTAQ) t, respectively. Both variables are time weighted during trading hours for each day. We retrieve the firm-day level observations from the WRDS Intraday database and average them to firm-year-quarter level. To maximize the coverage of our sample, for our main sample, we stack the entire monthly TAQ (i.e., MTAQ) database from 1994 Q1 to 2003 Q2 and daily TAQ (i.e., DTAQ) database from 2003 Q3 to 2019 Q4.[6] The data construction process employs methodologies and cleaning filters consistent with those used by Holden and Jacobsen (2014).

For robustness, we use a second bid-ask spread proxy: a firm's yearly average realized spread. This measure approximates the actual cost an investor incurs when trading a security. The realized spreads for Firm i's trade k are constructed as follows:

$$Percent\ Realized\ Spread_{i,k} = \frac{2D_{i,t}(P_k - M_{k+5})}{M_k}$$

[6] The primary differences between DTAQ and MTAQ are their sample periods and data frequency. The MTAQ is available for the period from 1993 to 2003 and is at the second level while The DTAQ is available for the period from 2003 onwards and is at the millisecond level. For the overlapping period, we use DTAQ as the representative, following previous studies (Stoumbos, 2023). To ensure that the variables constructed from the DTAQ and MTAQ are comparable, in the online Appendix Figure A2, we show that the quoted spreads from both datasets track each other closely during the overlapping period.

Where $D_{i,t}$ equals 1 (-1) if trade k is a buy (sell), P_k is the price of trade k, and M_k (M_{k+5}) is the bid-ask mid-price for trade k (five minutes after trade k). Like the quoted spread, we stack the realized spread measure from MTAQ and DTAQ, using the Lee-Ready Interpolated Second Quote method to decide the mid-point price.

A third robustness measure of bid-ask spread, uses daily data from CRSP that better approximate what large investors, who often make a series of trades and thus exert price pressure throughout the day, pay to transact. Based on Abdi and Ranaldo (2017), this measure refines the Roll (1984) autocovariance measure by estimating bid-ask spreads using daily close, high, and low prices. The "mid-range", defined as the average of the daily high and low log prices, is a proxy for the efficient price, canceling out the half-spreads included in the highs and lows. The final spread estimator is derived as a closed-form solution that accounts for the squared distance between the close log price and the mid-range proxy.

Lastly, we consider the Amihud illiquidity measure as an additional proxy for information asymmetry. This last measure of investor information asymmetry is a trading-volume-based illiquidity measure. This measure, developed by Amihud (2002), is calculated as the ratio of absolute close-to-close return to dollar volume:

$$Amihud_{i,d} = 10^6 * \frac{\left|Ret_{i,d}\right|}{Price_{i,d} * Volume_{i,d}}$$

Where $Ret_{i,d}$, $Price_{i,d}$, and $Volume_{i,d}$ are stock i's return, close price, and trading volume on day d, respectively.

Bid-ask spreads, as measures of information asymmetry, are influenced by several components: (1) adverse selection costs (Glosten and Milgrom, 1985), (2) inventory holding costs (Copeland and Galai, 1983), and (3) the cost of processing orders (Huang and Stoll, 1997). Foucault et al. (2013) highlight that order-processing costs are primarily driven by market

dynamics that vary inter-temporally more than cross-sectionally. In contrast, cross-sectional variation in information asymmetry is more likely to drive adverse selection and inventory holding costs. Therefore, we employ fixed effects in our models to isolate the information asymmetry component of spreads, following prior studies (e.g., Guay et al., 2016; Lang et al., 2012; Schoenfeld, 2017; Nagar et al., 2019). For each of the four proxies for investor information asymmetry, we winsorize the firm-day measures at the 1st and 99th percentiles within each yearly cross-section to minimize the influence of outliers. We then average the daily observations to the year-quarter level for each firm.

3.2 Regression specification

We estimate an ordinary least squares (OLS) regression using our firm-year-quarter panel data to investigate whether regulatory exposure is associated with investor information asymmetry, indexing firm. The regression model is specified as follows:

$$Quoted\ Spread_{i,t} = \beta\ Reg\ Exp_{i,t-1} + X_{i,t-1} + Firm\ FE + Year - Qtr\ FE + \varepsilon_{i,t}$$

where the subscript i indexes firm and t indexes time.

The dependent variable, $Quoted\ Spread_{i,t}$, represents the percentage bid-ask spread, which serves as our proxy for investor information asymmetry. Our primary variable of interest is $Reg\ Exp_{i,t-1}$, which is from the most recent 10-K for a fiscal period prior to year-quarter *t*. This process results in firm-year-quarter bid-ask spread from quarter t, being regressed on the most recent regulatory exposure measure, ensuring investors can condition their trading decisions on the observed firm's regulatory exposure we use as the independent variable of interest. For example, the bid-ask spread of firm *i* in Q2 of 2013 is mapped to the regulatory exposure constructed from the firm's 10-K filing for fiscal year 2012.

To control for other factors that might influence information asymmetry, we include the stock return calculated over the same period as the percentage bid-ask spread, *Stock Return*, and a vector of firm-level control variables, $X_{i,t-1}$, which include the following variables: *Firm Size*, defined as the natural logarithm of total assets; *Profitability*, captured by the firm's ROE; *Tobin's Q,* defined as market value of asset over book value of asset; *Leverage*, calculated as total liabilities divided by total assets; *Cash Flow*, defined as cash flow from operation divided by total assets; *CAPX*, defined as a firm's capital expenditure divided by total assets; *Inst. Inv. Holding Pct*. is defined as the ratio of a firm's share held by institutional investors. *Analyst Following* is defined as the natural logarithm of the number of analysts covering a firm in a given fiscal quarter. Similar to *Reg Exp*, we lag these by a quarter so that they determine the information asymmetry we study, rather than are caused by it.

To facilitate interpretation, all independent variables are standardized to have a mean of zero and a standard deviation of one. This standardization allows the coefficient estimates to be interpreted as the effect of a one-standard-deviation change in the independent variables on the dependent variable. We also include $Firm\ FE$, to control for time-invariant firm-specific characteristics, and year-quarter fixed effects, to account for macroeconomic conditions and other temporal factors that could affect investor information asymmetry across the sample period. The inclusion of these fixed effects helps us isolate the impact of regulatory exposure on bid-ask spreads by controlling for unobserved heterogeneity.

3.3 Sample Construction and Descriptive Statistics

We obtain financial statement data from Compustat, spread data from TAQ and CRSP, and the regulatory exposure measure from Kalmenovitz (2023). Table 1 outlines our sample selection process. Our analysis period spans from 1995 Q1, the earliest quarter for which we have

prior measures of *Reg Exp* (i.e. *Reg Exp* is first available in the fiscal year 1994) and ends in 2020 Q4, the last year for which we have *Reg Exp* values.

To construct our sample, we begin with all firm-year-quarter observations in the Compustat-CRSP merged dataset, excluding financial firms (SIC 6000-6999) and utility firms (SIC 4900-4999), because of their distinct regulatory environments. We then retain observations with valid TAQ-based spread measures and Regulatory Exposure data and non-singleton observations under the firm and year-quarter fixed effect structure. Our final sample comprises 297,770 firm-year-quarter observations from 1995 to 2020.

[INSERT TABLE 1]

Table 2 provides descriptive statistics for the variables used in our regression analyses. The bid-ask spread, our primary measure of information asymmetry, shows a mean of 1.819% and a median of 0.731% of the midpoint price. The standard deviation of the measure is larger than the mean (2.602%), indicating substantial variation across firms. The average Tobin's Q of 2.261 suggests that many firms in the sample are valued above their book value, potentially reflecting growth opportunities or intangible assets. The average institutional ownership of 44.8% suggests institutional investors own an economically significant percentage of shares, which could impact liquidity. Other variables, such as firm size and profitability indicate a diverse range of firms.

4. Empirical Results

In this section, we present the findings from our empirical analysis of the relationship between regulatory exposure and investor information asymmetry and the impact of regulatory exposure on firms' voluntary disclosure practices.

4.1 Regulatory Exposure and Investor Information Asymmetry

We begin our analysis by examining the intertemporal variation in regulatory exposure and its relationship with investor information asymmetry. Figure 1 presents the trends in the average of firms' regulatory exposure and bid-ask spreads overtime. The figure illustrates a negative relationship between regulatory exposure and bid-ask spreads in the time series, with the period of our study having increased regulatory exposure and decreased spreads. These descriptive trends provide an initial indication of a potential linkage between regulatory exposure and firms' information environment.

[INSERT Figure 1]

Building on the descriptive evidence from Figure 1, we conduct a more rigorous empirical analysis to quantify the relationship between regulatory exposure and investor information asymmetry. Table 3 presents the results from estimating our primary regression model, where we explore various specifications by incorporating different fixed effects and time-varying firm-level control variables. Across all specifications, we find a highly significant negative and economically meaningful association between *Reg Exp* and the *bid-ask spread*, indicating that increased regulatory exposure is associated with reduced information asymmetry.

[INSERT Table 3]

In column 1 we report the results of a univariate regression, showing a highly significant negative association between *Reg Exp* and *Percent Quoted Spread*. In Column 2, we introduce

firm-level control variables, and the negative association remains robust. This suggests that the relationship between regulatory exposure and information asymmetry is not driven by firm size, profitability, leverage, or other firm characteristics. In column 3 we further refine the model by incorporating firm and year-quarter fixed effects and continue to find a significantly negative association. In terms of economic magnitude, the coefficient in column 3 implies that a one-standard-deviation increase in *Reg Exp* is associated with a 0.056-percentage-point decrease in quoted spreads. The magnitude translates to a 3.1% reduction in the bid-ask spread relative to its mean value.

In column 4, we retain the same control variables but replace *Reg Exp* with its decile rank (*Reg Exp Dec*). We find a one-decile increase in *Reg Exp* translates into 0.029-percentage-point decline in the bid-ask spread, which is greater than one percent of the mean bid-ask spread. Figure 2 complements this finding by graphically depicting the coefficient of a regression of bid-ask spread on separate fixed effects for each quartile of *Reg Exp*. We find a monotonic decline in bid-ask spreads as the quartile of regulatory exposure increases. This further reinforces the conclusion that regulatory exposure plays a crucial role in shaping investor information asymmetry.

[INSERT Figure 2]

Collectively, these results suggest that firms' aggregate exposure to operational regulation significantly reduces investor information asymmetry.

4.2 Alternative specifications

To ensure the robustness of our primary finding, we conduct several additional analyses using alternative measures of both regulatory exposure and investor information asymmetry. These

robustness tests help verify that our results are not driven by the specific measures used in our main analysis.

First, we examine whether our main findings hold when using three alternative measures of investor information asymmetry: the TAQ-based realized spread, the bid-ask spread developed by Abdi and Ranaldo (2017), and the volume-based illiquidity measure by Amihud (2002), as discussed in Section 3.1.

[INSERT Table 4 Panel A]

Table 4, Panel A presents the results for these alternative measures. Each specification includes the complete set of time-varying firm-level control variables as well as firm and year-quarter fixed effects. In Column 1, we use the realized spread as our dependent variable. The results show a negative and statistically significant association between *Reg Exp* and the realized spread, consistent with our primary findings. This suggests that higher regulatory exposure continues to reduce information asymmetry even when measured by the realized costs of trading. In Column 2, we employ the bid-ask spread measure proposed by Abdi and Ranaldo (2017). Using a measure constructed using daily data that better approximates the costs faced by large traders, we continue to find a significant negative relationship between regulatory exposure and the bid-ask spread, reinforcing the robustness of our findings. Column 3 uses the Amihud (2002) illiquidity measure as the dependent variable. We again observe a negative and significant association between regulatory exposure and trading costs using the price impact of trades relative to trading volume as our proxy for information asymmetry. The consistent negative association between *Reg*

Exp and these alternative measures of investor information asymmetry demonstrates that our primary findings are robust to the choice of information asymmetry proxy.

Second, we test our findings' robustness using alternative regulatory exposure measures. While our main analysis uses *Reg Exp*, which counts the number of relevant regulations, we also consider the compliance burden associated with these regulations. Specifically, we use *Reg Exp Time*, which captures the time needed to comply with regulations relevant to a firm, and *Reg Exp Response*, which captures the estimated number of responses needed for compliance.

[INSERT Table 4 Panel B]

Table 4, Panel B presents the results for these alternative regulatory exposure measures across all four proxies for investor information asymmetry. Each specification includes the complete set of time-varying firm-level control variables and firm and year-quarter fixed effects. In Columns 1 to 4, we replace *Reg Exp* with *Reg Exp Time*. The results show a negative and significant relationship between *Reg Exp Time* and the four information asymmetry proxies, indicating that the time burden of compliance also contributes to reducing information asymmetry. In Columns 5 to 8 of Table 4, Panel B, we use *Reg Exp Response* as the independent variable and continue to find a negative association between regulatory burden and information asymmetry. Overall, the robustness checks presented in Table 4 confirm that our primary findings are not sensitive to the specific measures of regulatory exposure or investor information asymmetry used in the analysis.

4.3 Regulatory Exposure and Insider Trading

Our main findings show a negative association between regulatory exposure and bid-ask spreads, suggesting that regulatory exposure reduces information asymmetry. We argue that this effect arises because operational regulations constrain managers' strategic and operational choices, thereby reducing the information advantage that managers hold over external investors. This mechanism aligns closely with theoretical frameworks linking managerial information advantages to broader investor uncertainty (e.g., Glosten and Milgrom, 1985; Chung and Charoenwong, 2005).

We test this implication using data on insider trading. Specifically, following Cohen et al. (2012), we classify insider trades as either "opportunistic," "routine," or "unclassified." We begin by identifying open market purchases and sales (transaction codes "P" and "S"), which are then categorized based on the insider's trading behavior over the past decade. If an insider has not traded consistently for at least three consecutive years within the last ten years, their trades are labeled as "unclassified." For insiders with a consistent trading history, we examine whether their trades occur in the same month each year. Trades following a regular, predictable pattern are classified as "routine," while those that do not follow a predictable schedule are classified as "opportunistic." In our analysis, we focus on "opportunistic" trades, as these are more likely to reflect the exploitation of superior private information (Cohen et al., 2012).

To test the relationship between regulatory exposure and insider trading, we estimate the following regression model:

$$Insisder_{i,t} = \beta\ Reg\ Exp_{i,t-1} + X_{i,t} + Firm\ FE + Year - Quarter\ FE + \varepsilon_{i,t}$$

where $Reg\ Exp_{i,t-1}$ measures the regulatory exposure of firm i in the fiscal year prior to year-quarter t and $Insider_{i,t}$ represents three measures related to insider trading, including $D(Insisder\ Trades)_{i,t}$, a dummy variable that indicates the presence of opportunistic trades

$Ln(1 + Insisder\ Trading\ Share)_{i,t}$, the natural logarithm of the number of shares traded opportunistically during the fiscal quarter, and $Ln(1 + Insisder\ Trading\ Value)_{i,t}$, the natural logarithm of the trading value of these shares. These variables are set to zero for firm-year-quarter observations with only "unclassified" or "routine" trades or no insider trades. We also include the full set of control variables, firm fixed effects, and year-quarter fixed effects.

[INSERT Table 5]

We present the results in Table 5. In Column 1, we find that a one-standard-deviation increase in regulatory exposure is associated with a 0.5-percentage-point reduction in the likelihood of opportunistic insider trading. This decline suggests that as regulatory exposure increases, insiders are less likely to engage in trades driven by private information, consistent with our hypothesis that regulatory constraints reduce information asymmetry thus limiting managers' informational advantage. Columns 2 and 3 of Table 5 further examine the extent of opportunistic insider trading by analyzing the number of shares and the total value of shares traded. We observe that a one-standard-deviation increase in regulatory exposure leads to a 4.11% decrease in the number of shares traded opportunistically and a 5.92% decline in the value of these trades. These findings reinforce the idea that higher regulatory exposure diminishes insiders' ability to exploit private information.

4.4 Aggregate Regulatory Exposure and SEC Regulation Exposure

Our empirical results thus far show that higher regulatory exposure reduces information asymmetry, evidenced by narrower bid-ask spreads and diminished opportunistic insider trading. These findings suggest that regulatory exposure constrains managerial discretion, limiting

managers' informational advantage and thereby reducing investor uncertainty. We hypothesize that operational constraints imposed by regulation stabilize firm outcomes by restricting managerial flexibility and strategic options. An alternative hypothesis is that our results are driven by the firms' oversight by securities regulators, a hypothesis more similar to that investigated in prior literature. To ensure that our main findings are not simply capturing the effects of disclosure mandates or other reporting-related requirements that also shape the information environment, in this analysis we employ two controls for SEC regulatory intensity. The first proxy is constructed using a similar text-matching algorithm described in Section 3.1 for our main regulatory exposure measure, but applied exclusively to regulatory documents issued by the SEC.[7] The second proxy is developed by Armstrong, Glaeser, and Hoopes (2025), who quantify SEC regulatory intensity based on the frequency of references to the SEC and related regulatory terms within firms' 10-K filings.[8] This measure captures the extent to which a firm's disclosure documents explicitly reference SEC oversight, investigations, or jurisdiction.

[INSERT Table 6]

Table 6 presents the results of these tests with the SEC regulation exposure measure. Across all specifications, our main results remain robust and statistically significant, reinforcing the interpretation that the documented effects on information asymmetry are driven by product market regulations, rather than by concurrent variation in reporting mandates.

4.5 Regulatory Exposure and Future Operation Volatility

[7] The agency-specific measure from Kalmenovitz (2022) is constructed using industry-level regulatory exposure, which is then aggregated to the firm level based on firms' segment sales. Consequently, the sample for Table 6, Column 1 begins in 2000.

[8] Data from Armstrong et al. (2025) covers period after 1997.

Our empirical results thus far show that higher regulatory exposure reduces information asymmetry, evidenced by narrower bid-ask spreads and diminished opportunistic insider trading. These findings suggest that regulatory exposure constrains managerial discretion, limiting managers' informational advantage and thereby reducing investor uncertainty. To further explore the underlying mechanism, we investigate whether regulatory exposure affects the volatility and predictability of firms' future operations, which we term the "operational smoothing" channel. Specifically, we hypothesize that operational constraints imposed by regulation stabilize firm outcomes by restricting managerial flexibility and strategic options. This stabilization should manifest in lower volatility of firms' cash flows and earnings, enhanced earnings persistence, and thus more predictable future performance. By making firm operations more predictable, regulatory exposure reduces variability in investors' expectations, directly lowering information asymmetry.

We begin our empirical exploration of the mechanism by analyzing the association between regulatory exposure and the future volatility of cash flows, earnings, and stock returns. Specifically, we test whether higher regulatory exposure is linked to lower future volatility, which would support the hypothesis that regulatory constraints smooth operational outcomes. Table 6, Panel A, presents the results of this analysis using the following specification:

$$Future\ Vol_{i,[t,t+4]} = \beta_1 Reg\ Exp_{i,t-1} + X_{i,t-1} + Firm\ FE + Year - Quarter\ FE + \varepsilon_{i,t}$$

$Future\ Vol_{i,[t,t+4]}$ is the standard deviation of annual cash flow, earnings, and stock return in the same quarter from year t to year t+4, which controls for seasonality by examining year-over-year

changes for the same quarter.[9] For example, for the quarterly observation Q3 2014, we examine the association between *Reg Exp* computed from the 2013 10-K and the standard deviation of the Q3 cash flow observations from 2014 to 2018. We also include the complete set of control variables, firm fixed effects, and year fixed effects.

[INSERT Table 7 Panel A]

Table 7, Panel A, presents the analysis of the relationship between regulatory exposure and future operational volatility. Columns 1 to 3 report the results for cash flow volatility, earnings volatility, and stock return volatility, respectively. Each model includes a full set of time-varying firm-level control variables, as well as firm and year-quarter fixed effects. Across all three specifications, the coefficient on regulatory exposure (*Reg Exp*) is significantly negative, indicating that higher regulatory exposure is associated with lower future operational volatility. Economically, a one-standard-deviation increase in regulatory exposure reduces future cash flow volatility by 0.002, which represents a 3.77% decline relative to the average future cash flow volatility. Similarly, we observe a 3.33% decrease in earnings volatility and a 1.15% reduction in stock return volatility, relative to their respective means. These findings suggest that regulatory exposure leads to more stable operational outcomes, consistent with the hypothesis that regulations constrain firms' strategic choices and reduce uncertainty, thereby smoothing operations and lowering the variability of investor expectations.

Next, we explore whether regulatory exposure influences earnings persistence—a measure of the predictability of firm performance closely related to operational volatility (Dichev and Tang,

[9] We require at least three valid observations to calculate the standard deviation. Therefore, the sample size in Table 6 Panel A is smaller than that in the main test (Table 3)

2009). Higher earnings persistence implies that current earnings are a strong predictor of future earnings, enhancing the stability of investor expectations. We hypothesize that regulatory exposure increases earnings persistence by constraining managerial actions and stabilizing operational outcomes, which should contribute to reduced information asymmetry.

To test this, we estimate a panel regression model at the firm-year level, avoiding quarterly observations to minimize the effects of seasonality.[10] Specifically, we regress current income before extraordinary items ($IB_{i,t}$) on lag income $IB_{i,t}$ (i.e. $IB_{i,t-1}$), regulatory exposure ($Reg\ Exp_{i,t-1}$), and their interaction, as shown in the following specification :

$$IB_{i,t} = \beta_0 IB_{i,t-1} + \beta_1 Reg\ Exp_{i,t-1} + \beta_2 IB_{i,t-1} * Reg\ Exp_{i,t-1} + X_{i,t-1} + Firm\ FE + Year\ FE + \varepsilon_{i,t}$$

where $Reg\ Exp_{i,t-1}$ measures the regulatory exposure of firm i in the fiscal year prior to year-quarter t, $IB_{i,t}$ is the income before extraordinary item scaled by lagged assets in year t, and $IB_{i,t-1}$ is the income before extraordinary items scaled by lagged assets in year t-1. In the specification, we do not standardize $IB_{i,t-1}$ and $IB_{i,t}$ to facilitate the interpretation of the earnings persistence coefficient.

[INSERT Table 7 Panel B]

Table 7 Panel B reports the results of this analysis. Column 1 presents the result of a reference specification that regress IB_t on IB_{t-1} without additional control variables or fixed effects. The earnings persistence coefficient in this column is 0.593, indicating that, on average, one dollar

[10] We perform the test in the sample of non-missing annual average quoted spreads, to be consistent with our main sample.

increases of IB (relative to asset) in year *t-1* predicts a 0.593-dollar increase of IB (relative to asset) in year *t*. Column 2 incorporates our variable of interest by regressing IB_t on IB_{t-1}, $Reg\ Exp_{t-1}$, and their interaction, without additional control variables or fixed effects. We find a highly significant coefficient on our variable of interest, the interaction of IB_{t-1}*$Reg\ Exp_{t-1}$ indicating significantly increased earnings persistence for more regulated firms. Specifically, a one-standard-deviation increase in regulatory exposure raises the earnings persistence coefficient by 0.010, which represents a 1.69% increase relative to the baseline coefficient in Column 1.

In column 3, we add year fixed effects, time-varying firm level controls variables measured in t-1, their interactions with IB_{t-1}, 2-digit SIC industry fixed effects and their interaction with IB_{t-1}. After controlling for differential earnings persistence related to variation in industry and firm characteristics, which are possibly correlated with *Reg Exp,* we continue to find higher persistence for more regulated firms. Column 4 further includes firm fixed effects, while Column 5 controls for potential earnings conservatism (e.g. Basu 1997) by including a dummy variable for negative IB_{t-1} and its interaction with IB_{t-1}. Across these specifications, the coefficient on the interaction term remains stable, ranging from 0.008 to 0.013. Our mechanism tests reveal that higher regulatory exposure is associated with lower future operational volatility and greater earnings persistence. These results support the hypothesis that regulatory exposure contributes to "operational smoothing." By limiting managerial discretion, regulations appear to stabilize firm performance, making earnings more predictable and reducing the scope for information asymmetry among investors.

4.6 Regulatory Exposure, Policy Uncertainty, and Enforcement

Our main findings thus far indicate that regulatory exposure reduces information asymmetry by constraining managerial discretion and stabilizing firms' operational outcomes.

However, the effectiveness of these regulatory constraints likely depends on investors' perceptions of their credibility and persistence. If investors anticipate regulatory policies to be unstable or inconsistently enforced, the expected operational consistency and associated reduction in information asymmetry may be weakened or even reversed. Consequently, regulatory exposure may paradoxically amplify uncertainty if investors perceive enforcement as uncertain, malleable, or politically influenced.

To explore these nuances, in this section, we examine how policy uncertainty and enforcement intensity interact with regulatory exposure to affect firms' information environments. Specifically, we analyze whether periods characterized by heightened economic policy uncertainty or weakened regulatory enforcement undermine the operational smoothing benefits associated with regulatory constraints. By identifying conditions under which regulatory exposure either enhances or exacerbates investor uncertainty, our tests help clarify how the broader political and institutional environment shapes the informational impact of regulation.

4.6.1 Regulatory exposure, policy uncertainty and information asymmetry

We begin by examining whether policy uncertainty moderates the relationship between regulatory exposure and bid-ask spreads. To assess this, we use the Economic Policy Uncertainty (EPU) index developed by Baker, Bloom, and Davis (2016), which provides a time-varying measure of the level of policy uncertainty. Importantly, we focus on the EPU index that focuses on the uncertainty of regulatory topics. We interact the EPU index with our regulatory exposure variable (*Reg Exp)* to examine how fluctuations in policy uncertainty influence the impact of

regulatory exposure on information asymmetry.[11] To investigate this, we estimate the following equation:

$$Quoted\ Spread_{i,t} = \beta_1\ Regulation\ EPU_t * Reg\ Exp_{i,t-1} + \beta_2\ Reg\ Exp_{i,t-1} + X_{i,t-1} + Firm\ FE + Year - QTR\ FE + \varepsilon_{i,t}$$

where $Quoted\ Spread_{i,t}$ is firm i's quoted spreads in percentage term in year-quarter t, $Reg\ Exp_{i,t-1}$ is the regulatory exposure of firm *i* in the fiscal year prior to year-quarter *t*, and $Regulation\ EPU_t$ is the EPU index on the topic of regulation in year-quarter t, averaged from the monthly level. The measure is based on the number of news articles that contain the terms *economic* or *economy*; *uncertain* or *uncertainty;* one or more of *Congress*, *deficit*, *Federal Reserve*, *legislation*, *regulation*, and *White House*; and one or more of policy term regarding regulation, such as *energy policy*, *energy tax*, *carbon tax*, *cap and trade*, *cap and tax*, and *drilling restrictions*.[12] Following Nagar et al. (2019), we including firm fixed effects in all specifications to account for time-varying shifts in the composition of firms.

[INSERT Table 8]

Table 8 presents the results of our analysis. In Column 1 we omit our *Reg Exp* variable and find a significantly positive association between *Regulation EPU* and bid-ask spreads, consistent

[11] Baker, Bloom, and Davis (2016) provides the related discussion in section II B. See data from: http://www.policyuncertainty.com/categorical_epu.html. Although we chose the categorical EPU index on regulation to align with our focus on regulatory exposure, in the Online Appendix Table A1, we show that our result in robust to using the general EPU measure and using the natural logarithm of both EPU measures as in Baker et al. (2016).
[12] Please see http://www.policyuncertainty.com/categorical_terms.html for a full list of key words on regulation topic.

with Nagar et al. (2019). This suggests that higher policy uncertainty increases information asymmetry, likely due to greater unpredictability in the regulatory environment.

In Column 2, we add regulatory exposure to the specification to examine whether policy uncertainty subsumes the effect of regulatory exposure on bid-ask spreads. The results show that the effect of regulatory exposure remains significant even after controlling for policy uncertainty. This indicates that both regulatory exposure and policy uncertainty independently influence information asymmetry, reinforcing the idea that regulatory exposure has a stabilizing effect on firm operations.[13] In Column 3, we introduce an interaction term between regulatory exposure and policy uncertainty to test whether the stabilizing effect of regulatory exposure is moderated by policy uncertainty. We find a negative and highly significant interaction term, indicating that when policy uncertainty is high, the ability of regulatory exposure to reduce information asymmetry is substantially diminished. This suggests that the positive effects of regulatory exposure on firm stability depend on a predictable regulatory environment.

In Column 4, we extend the analysis by including firm and year-quarter fixed effects and the interaction between *Reg Exp* and *Equity Market Uncertainty* (Baker et al, 2016; Nagar et al., 2019). We continue to find a highly significant effect on *Reg Exp* Regulation EPU*. In terms of economic magnitude, a one-standard-deviation increase in policy uncertainty reduces the effect of a one-standard-deviation increase in regulatory exposure on the bid-ask spread by 0.022 percentage points. Using the treatment effect reported in Table 3, Column 3 as a benchmark, this reduction represents a 39.29% decrease in the effect of regulatory exposure.

[13] These inferences hold when we control firm fixed effects in the specifications. We do not control year-quarter fixed effects in Column 1 and 2 because these fixed effects subsume the variation of policy uncertainty, which only varies over time.

[INSERT Figure 3]

Figure 3 graphically illustrates the cross-sectional results from this analysis. We split the sample into two groups based on policy uncertainty: a high policy uncertainty group (top tercile) and a low policy uncertainty group (bottom tercile). The figure displays two binned scatter plots, showing the relationship between regulatory exposure and quoted spreads for each group. The results indicate that the negative association between regulatory exposure and quoted spreads is stronger in the low policy uncertainty group, consistent with our findings in Table 7. This suggests that the stabilizing effect of regulatory exposure on information asymmetry is more pronounced when the regulatory environment is relatively stable and predictable.

4.6.2 Regulatory enforcement and information asymmetry

We next examine whether variation in regulatory enforcement intensity moderates the relationship between regulatory exposure and information asymmetry. The effectiveness of regulatory exposure in reducing information asymmetry relies on investor perceptions that regulations will be consistently enforced. Weak enforcement can reduce the perceived strength of operational constraints, thereby limiting their effect on firm behavior and investor perceptions. We therefore hypothesize that the negative association between regulatory exposure and information asymmetry is weaker when enforcement intensity is low.

To test this, we proxy enforcement intensity in two ways. First, we use industry-level regulatory enforcement data from *Violation Tracker* to construct a dummy variable identifying low-enforcement industries. Specifically, we classify a 2-digit SIC industry as high enforcement if it has a total number of federal regulatory enforcement incidents below the sample median. Industries that have no regulatory enforcement records include Legal Services (SIC 81), Forestry

(SIC 08), and Social Services (SIC 83), among others. The three industries with the highest enforcement frequencies are Chemicals and Allied Products Manufacturing (SIC 28), Transportation Equipment Manufacturing (SIC 37), and Industrial and Commercial Machinery Manufacturing (SIC 35). To test this hypothesis, we estimate the following model:

$$Quoted\ Spread_{i,t} = \beta_1\ d(low\ enforcement\ industries)_i * Reg\ Exp_{i,t-1} + \beta_2\ Reg\ Exp_{i,t-1} + X_{i,t-1} + Firm\ FE + Year - QTR\ FE + \varepsilon_{i,t}$$

where $Quoted\ Spread_{i,t}$ is firm i's quoted spreads in percentage term in year-quarter t, $Reg\ Exp_{i,t-1}$ measures the regulatory exposure of firm *i* in the fiscal year prior to year-quarter *t*, and $d(low\ enforcement\ industries)_i$ is a dummy variable that whether a firm operates in an industry with lower-than-median federal regulatory enforcement. We include the complete set of control variables, firm fixed effects, and year-quarter fixed effects.

Second, Republican administrations adopt a more laissez-faire stance toward business leading to more lenient regulatory enforcement. We hypothesize that during Republican presidencies, the impact of regulatory exposure on reducing information asymmetry is weaker. To test this hypothesis, we estimate the following specification:

$$Quoted\ Spread_{i,t} = \beta_1\ Republican\ Regime_t * Reg\ Exp_{i,t-1} + \beta_2\ Reg\ Exp_{i,t-1} + X_{i,t-1} + Firm\ FE + Year - QTR\ FE + \varepsilon_{i,t}$$

where $Quoted\ Spread_{i,t}$ is firm i's quoted spreads in percentage term in year-quarter t, $Reg\ Exp_{i,t-1}$ measures the regulatory exposure of firm *i* in the fiscal year prior to year-quarter *t*, and $Republican\ Regime_t$ is a dummy variable that indicates whether the sitting U.S. president in

year t was a Republican. We include the complete set of control variables, firm fixed effects, and year-quarter fixed effects.

[INSERT Table 9 Panel A]

Table 9 Panel A presents the results of the three cross-sectional tests. In Column 1, the interaction between Reg Exp and d(low enforcement industries) is positive, with a coefficient of 0.052. This finding indicates that in these industries , the impact of regulatory exposure on reducing bid-ask spreads is diminished by 5.2 percentage points, representing a 94.3% reduction relative to the benchmark treatment effect reported in Table 3, Column 3.

In Column 2, the interaction term between Reg Exp and Republican Regime is also positive and significant, with a coefficient of 0.026. This finding indicates that during Republican administrations, the impact of regulatory exposure on reducing bid-ask spreads is diminished by 2.6 percentage points, representing a 46.4% reduction relative to the benchmark treatment effect reported in Table 3, Column 3. This result highlights how a business-friendly political environment can weaken the enforcement of regulations, reducing the expected stabilizing effects.

Overall, these results confirm that the information-smoothing benefits of regulatory exposure depend critically on credible enforcement. When enforcement intensity is weak, whether due to industry-level oversight gaps or a broader political environment favoring deregulation, the ability of regulations to reduce information asymmetry is substantially diminished.

4.6.3 Firms' political influence and information asymmetry

We next examine how political dynamics shape the informational benefits of regulatory exposure. When facing regulations, firms take initiative to shape how regulations are applied to

them. Firms actively involved in politics or politically aligned with regulators may anticipate more lenient enforcement, potentially weakening regulatory constraints and diminishing their operational smoothing benefits. We conduct four cross-sectional tests to assess whether these political factors systematically alter the relationship between regulatory exposure and information asymmetry.

First, we investigate how firms' political engagement through contributions and lobbying activities affects the relationship between regulatory exposure and information asymmetry. Regulatory capture theory suggests that politically active firms might influence regulators to secure more lenient enforcement or favorable exemptions (Stigler, 1971; Yackee and Yackee, 2006). Consequently, we hypothesize that politically active firms face weaker operational constraints, potentially diminishing the stabilizing effect of regulatory exposure on their information environment. To test this hypothesis, we estimate the following specification:

$$Quoted\ Spread_{i,t} = \beta_1\ Politically\ Active_i * Reg\ Exp_{i,t-1} + \beta_2\ Reg\ Exp_{i,t-1}\ + X_{i,t-1} + Firm\ FE + Year - QTR\ FE + \varepsilon_{i,t}$$

where $Quoted\ Spread_{i,t}$ is firm i's quoted spreads in percentage term in year-quarter t, $Reg\ Exp_{i,t-1}$ measures the regulatory exposure of firm *i* in the fiscal year prior to year-quarter *t*, and $Politically\ Active_i$, for which we report results with a number of proxies for firms' political activeness.

The first proxy is $PAC\ Active_i$, which indicates whether a firm donates to a political action committee at any time between 2004 and 2017 (e.g. Stuckatz 2022).[14] Out of the 4,630 firms in

[14] Our result is robust to defining *PAC Active* firm as firms whose political contributions are in the top tercile of the distribution.

our sample that have financial information and bid-ask spread measure during 2004 and 2017, 417 made non-zero political contributions. These firms account for 29,946 firm-quarter observations, resulting in an average value of *PAC Active* of 0.12. The model includes the full set of control variables, firm fixed effects, and year-quarter fixed effects.

The second proxy is a firm's monetary spending on lobbying activities. We construct two measures of corporate lobbying activity: the natural logarithm of a firm's annual lobbying expenditures (i.e., *ln(1 + lobbying amount)*) and a dummy variable indicating whether a firm-year is associated with non-zero lobbying spending (i.e., *d(lobbying activities)*). Both variables are derived from *LobbyView*, a comprehensive database based on all lobbying reports filed under the Lobbying Disclosure Act of 1995. Descriptive statistics show that 14.9 percent of firm-year observations involve non-zero lobbying activity, with an average annual expenditure of $262,760 among those firms.

Third, we consider a firm's political influence using its political alignment with the White House. Prior research finds politically unaligned firms generally operate under stricter informational conditions (Christensen et al., 2022). Conversely, politically aligned firms, i.e., those whose political contributions predominantly match the sitting president's party, may anticipate less stringent enforcement and greater regulatory leniency, potentially weakening the regulatory constraints they face (Pandey, Shen, and Wu, 2025). To test this hypothesis, we classify firms based on their political contributions, identifying those that predominantly donate to the party of the sitting president. We estimate the following model:

$$
\begin{aligned}
&Quoted\ Spread_{i,t} \\
&\quad = \beta_1\ Alignment\ with\ WH_{i,t} * Reg\ Exp_{i,t-1} + \beta_2\ Reg\ Exp_{i,t-1} \\
&\quad + \beta_3\ Alignment\ with\ WH_{i,t} + X_{i,t-1} + Firm\ FE + Year - QTR\ FE + \varepsilon_{i,t}
\end{aligned}
$$

where $Quoted\ Spread_{i,t}$ is firm i's quoted spreads in percentage term in year-quarter t, $Reg\ Exp_{i,t-1}$ measures the regulatory exposure of firm i in the fiscal year prior to year-quarter t. $Alignment\ with\ WH_{i,t}$ is a dummy variable that captures the alignment between a firm $i's$ political ideology, inferred from its political contributions, and the sitting U.S. president's party in year t. To classify firms' $Alignment\ with\ WH_{i,t}$ we first classify firms as Republican or Democratic, by sorting firm-years into quintiles based on their proportions of contributions to the Republican and Democratic parties. We assign firms as Republican (Democratic) if across firm-years they rank in the highest quintile of Republican (Democratic) in at least one firm-year, while never ranking in one of the top two quintiles for Democratic (Republican) proportion of donations. This process yields 62 Republican firms and 40 Democratic firms and we classify Republican (Democratic) firms as aligned with the WH in the years in which the president is Republican (Democratic).[15] For the firms that we do not identify whether as either Democratic or Republican, we assign zero to their values of $Alignment\ with\ WH_{i,t}$. We restrict the sample to political active firms and conduct the test between 2004 and 2017.

[INSERT Table 9 Panel B]

Table 9 Panel B presents the results. In Column 1, the interaction term between *Reg Exp* and *PAC Active* is both positive and significant. The coefficient of 0.358 suggests that for politically active firms, the reduction in bid-ask spreads typically associated with regulatory exposure is muted. The effect is substantial, as the coefficient is larger in absolute terms than the

[15] The average contribution to the Republican and Democratic parties are $113,305 and $74,604, respectively, among politically active firms. On average, the firms we classify as Republican allocate 93.8% of their contributions to the Republican Party, while those we classify as Democratic allocate 74.0% to the Democratic Party.

estimated treatment effect reported in Table 3, Column 3 (0.056), suggesting that for firms that participate in political contribution, regulatory exposure actually increases information asymmetry.

In Column 2 and 3,the interaction term between *Reg Exp* and *ln(1 + lobbying amount)* and that between *Reg Exp* and *d(lobbying activities)* are positive and significant. For Column 3, The effect is also larger in absolute terms than the estimated treatment effect reported in Table 3, Column 3, suggesting that regulatory exposure actually increases information asymmetry for firms that spend in lobbying activities.

Finally, in Column 4, we examine the interaction between *Reg Exp* and *Alignment with WH* (political alignment with the White House). The coefficient is 0.072 and significant at the 10% level, suggesting that firms aligned with the sitting president face less regulatory burden, which reverses the typical effect of regulatory exposure on information asymmetry. The positive coefficient, larger in absolute terms than the benchmark treatment effect, implies that for politically aligned firms, higher regulatory exposure is associated with increased bid-ask spreads.

Together, these findings highlight the complex interplay between politics and regulation, showing that political dynamics significantly influence the impact of regulatory exposure on investor information asymmetry. Specifically, the operational smoothing benefits of regulatory exposure are moderated by firms' political activities and alignment with the party in power. Politically active firms or those aligned with the ruling party may face less regulatory burden, undermining the stabilizing effects of regulatory exposure and potentially increasing investor uncertainty.

4.7 Regulatory Exposure and Voluntary Disclosure

Having established that regulatory exposure reduces information asymmetry, as evidenced by the decline in bid-ask spreads, we next explore how this impacts managers' voluntary disclosure

decisions. The relationship between information asymmetry and voluntary disclosure is well-documented: voluntary disclosures, such as management forecasts, provide additional information to the market to value the firm, reducing information asymmetry and the cost of capital (Diamond and Verrecchia, 1991). Because managers have stronger incentives to reduce illiquidity and capital costs when they are high (Leuz and Verrecchia, 2000; Balakrishnan et al. 2014), this suggests that as regulatory exposure decreases information asymmetry, the need for such voluntary disclosures may diminish. However, it is also well known that managers tend to forecast earnings when volatility is low, so they bear low credibility costs (e.g. Skinner 1994; Marshall and Skinner 2022). If managers increase voluntary disclosure because of the increase in earnings persistence, this could suggest our results arise through a disclosure channel.

To empirically differentiate between these hypotheses, we use management forecasts as a proxy for voluntary disclosure and estimate the following model:

$$MF_{i,t} = \beta\ Reg\ Exp_{i,t-1} + X_{i,t} + Firm\ FE + Year - Quarter\ FE + \varepsilon_{i,t}$$

Where $Reg\ Exp_{i,t-1}$ measures the regulatory exposure of firm i in the fiscal year prior to year-quarter t and $MF_{i,t}$ represents two measures related to management forecast, including $D(MF)_{i,t}$, the presence of any management forecast during the quarter t, and $Ln(1 + MF)_{i,t}$, the natural logarithm of the number of management forecasts during the quarter t. We include a comprehensive set of firm characteristics, including firm fixed effects and year-quarter fixed effects, to account for time-invariant firm characteristics and broader economic conditions.

[INSERT Table 10]

We present the results in Table 10. In Columns 1, 2, and 3 of Table 10, the dependent variable is an indicator variable for the incidence of any management forecast from firm *i* during quarter *t*. The independent variables are the three measures of regulatory exposure (i.e., *Reg Exp*, *Reg Exp Time,* and *Reg Exp Response*). In Column 4, the dependent variable is $Ln(1 + MF)_{i,t}$ and the independent variable is *Reg Exp.*

The results in Column 1 show that a one-standard-deviation increase in regulatory exposure is associated with a 0.08-percentage-point decrease in the likelihood of issuing a management forecast. Relative to the mean frequency in our sample 36.5%, a 0.08-percentage-point reduction represents a 2.2% decrease from the mean. This reduction is economically significant, suggesting regulatory exposure has a meaningful impact on firms' disclosure strategies, potentially altering the flow of information to the market in a way that could affect investor behavior and capital costs. We have similar inferences in column 2, 3, and 4 using variations of dependent and independent variables, highlighting the robustness of this result. In figure 4, we complement this finding by regressing management forecast indicator on indicators for regulatory exposure quartile indicators, as well as a series of firm-level controls.

[INSERT Figure 4]

Plotting the coefficients on our quartile indicators in Figure 4, we see a monotonic downward trend in the likelihood of managers' issuing voluntary disclosure forecast as regulatory exposure increases. This further reinforces the conclusion that regulatory exposure plays a role in shaping the information environment by affecting voluntary disclosure. Overall, these results underscore the broader implications of regulatory exposure for corporate transparency. While

regulatory exposure can stabilize operations and reduce information asymmetry, it simultaneously reduces managers' incentives to share information through voluntary disclosures. In addition, because of the linkage between managerial forecasts and liquidity (e.g. Balakrishnan et al. 2014), demonstrating a negative association between forecasting and regulatory exposure ensures our results are not driven by associated changes in firm-level disclosure.

5. Conclusion

This paper investigates how firms' aggregate regulatory exposure influences investor information asymmetry, emphasizing the role of operational regulations in shaping firms' information environments. Using a novel measure of regulatory exposure, we find robust evidence that greater regulatory exposure significantly reduces information asymmetry by constraining managerial discretion and smoothing operational volatility, thereby narrowing bid-ask spreads. This operational smoothing effect holds consistently across multiple alternative measures of both information asymmetry and regulatory exposure.

We further show, however, that the informational benefits of regulatory exposure depend crucially on the broader political and institutional environment. Heightened economic policy uncertainty, politically driven variability in enforcement intensity, and firms' political alignment with regulators can significantly weaken or even reverse the stabilizing effects of regulatory exposure. These findings underscore that the effectiveness of operational regulations in reducing information asymmetry hinges on their credibility and investors' perceptions of enforcement consistency.

Finally, we document that as regulatory constraints reduce operational uncertainty, managers exhibit a decreased reliance on voluntary disclosures such as management forecasts.

Taken together, our results offer new insights into the nuanced interplay between regulatory exposure, political context, and corporate transparency, highlighting important implications for policy makers, investors, and scholars.

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Appendix A. Variable Definitions

Variable	Definition
Main Variable	
Reg Exp	*Reg Exp* measures the number of applicable regulations for a firm's business, following Kalmenovitz (2023). The input data are Item 1 in 10K filings and original text of each regulation's Form 83-I. The measure is developed as follows: First, cosine similarity scores between each firm-regulation pair are calculated. For each firm *i*, the top 100 highest scoring regulations are defined as relevant and 100 randomly selected low scoring regulations are defined as irrelevant. Second, the 200 regulations per firm are used to train a machine learning model to identify linguistic patterns distinguishing relevant versus irrelevant regulations. Third, the trained model is applied to classify all remaining paperwork regulations as relevant or irrelevant to each firm *i*. Finally, *Reg Exp* is computed as the number of active regulations deemed relevant for firm *i*.
Reg Exp Time	*T*he estimated time for the company to comply with the applicable regulations. The construction process is similar to *Reg Exp* but sums up the number of compliance hours across relevant regulations (Kalmenovitz, 2023).
Reg Exp Response	*M*easures the number of responses (i.e., paperwork) the firm must complete to comply with regulations. The construction process is similar to *Reg Exp* but sums up the number of responses across relevant regulations (Kalmenovitz, 2023).
Percent Quoted Spread	$$Percent\ Quoted\ Spread_{i,t} = \frac{Ask_{i,t} - Bid_{i,t}}{(Ask_{i,t} + Bid_{i,t})/2}$$ $Ask_{i,t}$ and $Bid_{i,t}$ are stock i's bid price and ask price at the second (or millisecond) t, respectively. The daily observation is time weighted during trading hours for each day. We winsorize firm-day observation in each yearly cross-section at the 1% and the 99% percentage point before aggregating them to the firm-year-quarter. Unit: percentage point.
Percent Realized Spread	$$Percent\ Realized\ Spread_{i,k} = \frac{2D_{i,t}(P_k - M_{k+5})}{M_k}$$ Where $D_{i,t}$ equals 1 (-1) if trade k is a buy (sell), P_k is the price of trade k, and M_k (M_{k+5}) is the bid-ask mid-price for trade k (five minutes after trade k). We winsorize firm-day observation in each yearly cross-section at the 1% and the 99% percentage point before aggregating them to the firm-year-quarterly level. Unit: percentage point.
CRSP Bid Ask Spread	Bid-ask spread estimated without using quote data, developed by Abdi and Ranaldo (2017). Unit: percentage point.
Amihud Illiquidity	The quarterly average of the daily volume-based illiquidity measure developed by Amihud (2002), which is ratio of absolute close-to-close return to dollar volume as follows: $$Amihud_{i,d} = 10^6 * \frac{\left\|Ret_{i,d}\right\|}{Price_{i,d} * Volume_{i,d}}$$ We winsorize firm-day observation in each yearly cross-section at the 1% and the 99% percentage point before aggregating them to the firm-year-quarter level.
Ln (1+# of MF)	Natural logarithm of management forecast frequency during the fiscal year (data source: IBES)

D (MF)	Management earnings forecasts indicator set equal to one if a firm has at least one management forecast during the fiscal quarter and zero otherwise.
Future Earnings Volatility	The standard deviation of income before extraordinary items and discontinued operations scaled by assets, for the same quarter over a five-year rolling window from year t to year t+4.
Future Cash Flow Volatility	The standard deviation of operating cash flow scaled by assets, for the same quarter over a five-year rolling window from year t to year t+4.
Future Stock Return Volatility	The standard deviation of quarterly stock return for the same quarter in a rolling window from year t to year t+4.
D(Insider Trades)	Indicator of the incidence of opportunistic insider trades, identified using the Cohen et al. (2012) algorithm.
Ln (1 + Insider Trading Share)	Natural logarithm of the number of shares opportunistically traded during the fiscal quarter, identified using the Cohen et al. (2012) algorithm.
Ln (1 + Insider Trading Value)	Natural logarithm of the dollar value of shares opportunistically traded during the fiscal quarter, identified using the Cohen et al. (2012) algorithm.
Regulation EPU	Economic Policy Uncertainty index on the category of regulation topic. The measure is developed by Baker et al. (2016) and constructed daily based on the number of news articles that contain the terms *economic* or *economy*; *uncertain* or *uncertainty;* one or more of *Congress*, *deficit*, *Federal Reserve*, *legislation*, *regulation*, and *White House*; and one or more of policy term regarding regulation, such as *energy policy*, *energy tax*, *carbon tax*, *cap and trade*, *cap and tax*, and *drilling restrictions*.[16]
Equity Market Uncertainty	Equity market uncertainty index developed by Baker et al. (2016). The measure is constructed based on the daily counts of articles containing the term *'uncertainty'* or *'uncertain'*, the terms *'economic'* or *'economy'* and one or more of the following terms: *'equity market'*, *'equity price'*, *'stock market'*, or *'stock price'*.
PAC Active	Indicator equal to one if the firm made a least one political contribution during 2004 and 2017 (Stuckatz 2022).
Republican Regime	Indicator variable equal to one if the observation is in the period of 2001 to 2008 and 2017 to 2020
Alignment with White House	Indicator variable equal to one if the firm's political ideology aligns with the party that occupies the White House, and zero otherwise. We assign firms as Republican (Democratic) if across firm-years they rank in the highest quintile of Republican (Democratic) in at least one firm-year, while never ranking in one of the top two quintiles for Democratic (Republican) proportion of donations. We classify Republican (Democratic) firms as aligned with the WH in the years in which the president is Republican (Democratic). This variable is only defined for politically active firms.
d(low enforcement industries)	A dummy variable indicating whether a firm operates in a 2-digit SIC industry with lower-than-median federal regulatory enforcement.
ln(1 + lobbying amount)	The natural logarithm of a firm's annual lobbying expenditures in a given year. (Data source: *LobbyView*, a comprehensive database based on all lobbying reports filed under the Lobbying Disclosure Act of 1995)

[16] Please see http://www.policyuncertainty.com/categorical_terms.html for a full list of key words on regulation topic.

d(lobbying activities)	A dummy variable indicating whether a firm-year is associated with non-zero lobbying spending. (Data source: *LobbyView*, a comprehensive database based on all lobbying reports filed under the Lobbying Disclosure Act of 1995)

Control Variable Set	
Firm Size	Natural logarithm of total assets (atq)
Profitability	Earnings before interest, taxes, and depreciation and amortization (ebitdaq) scaled by total assets (atq)
Tobin's Q	Market value of asset (atq + mkv - ceqq) divided by book value of asset (atq)
Leverage	Long-term debt (dlttq) plus debt in current liabilities (dlcq) divided by total assets (atq).
Cash Flow	Cash flow from operation (oancfyq) scaled by total assets (atq)
CAPX	Capital expenditure (capxq) scaled by total assets (atq)
Analyst Following	Number of one-year forward annual ESP estimates made to a firm during a fiscal year (IBES item: numest)
Inst. Inv. Holding Pct	The ratio of number of shares by institutional investors over total number of common shares outstanding (data source: 13F)

Figure 1. Regulatory Exposure and Bid-ask Spread over Time

The figure plots inter-temporal variation in the average firms' regulatory exposure and bid-ask spread relative to the level at the beginning of our sample. The red line represents the relative change in regulatory exposure over time, while the blue line represents the relative change in the bid-ask spread. Both measures are generated by first standardizing the firm-quarter values, regressing those values on year dummies, and then plotting the coefficient estimates of the year dummies.

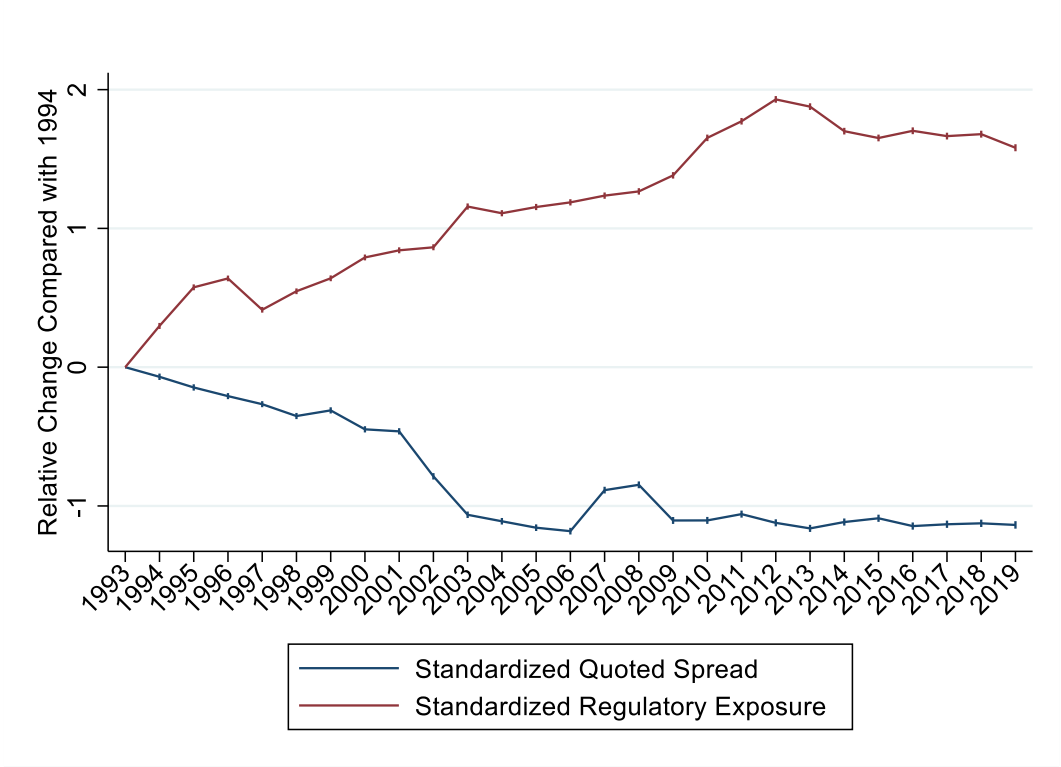


Figure 2. Association between Regulatory Exposure and Bid-ask Spread

Figure 2 plots the relationship between bid-ask spread and quartile of regulatory exposure. We obtain these estimates by regressing bid-ask spread on exposure quartile and firm-level controls (*Firm size, Profitability, Tobin's Q, Leverage, Cash Flow, CAPX, Inst. Pct, and Analyst Coverage)*. All specifications incorporate firm and year fixed effects. All variables are defined in the Appendix. The plotted coefficients display two-tailed 95% confidence intervals based on standard errors clustered at the firm level.

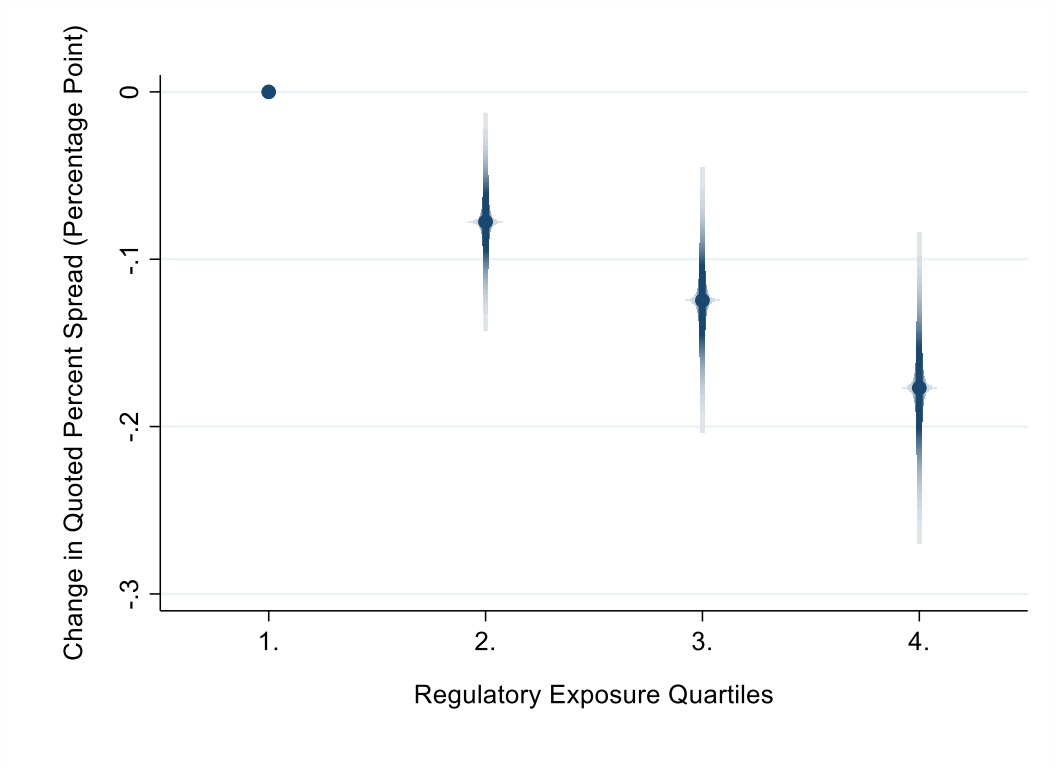


Figure 3. Policy Uncertainty and the Effect of Regulatory Exposure on Bid Ask Spread

The figure displays the interaction effect between policy uncertainty and regulatory exposure on firms' investor information asymmetry. The figure displays two bin scatter plots that examine the relation between regulatory exposure and quoted spreads for the high policy uncertainty group (top tercile) and low policy uncertainty group (bottom tercile). Year fixed effects are controlled for in the analysis, and detailed definitions for both variables can be found in Appendix.

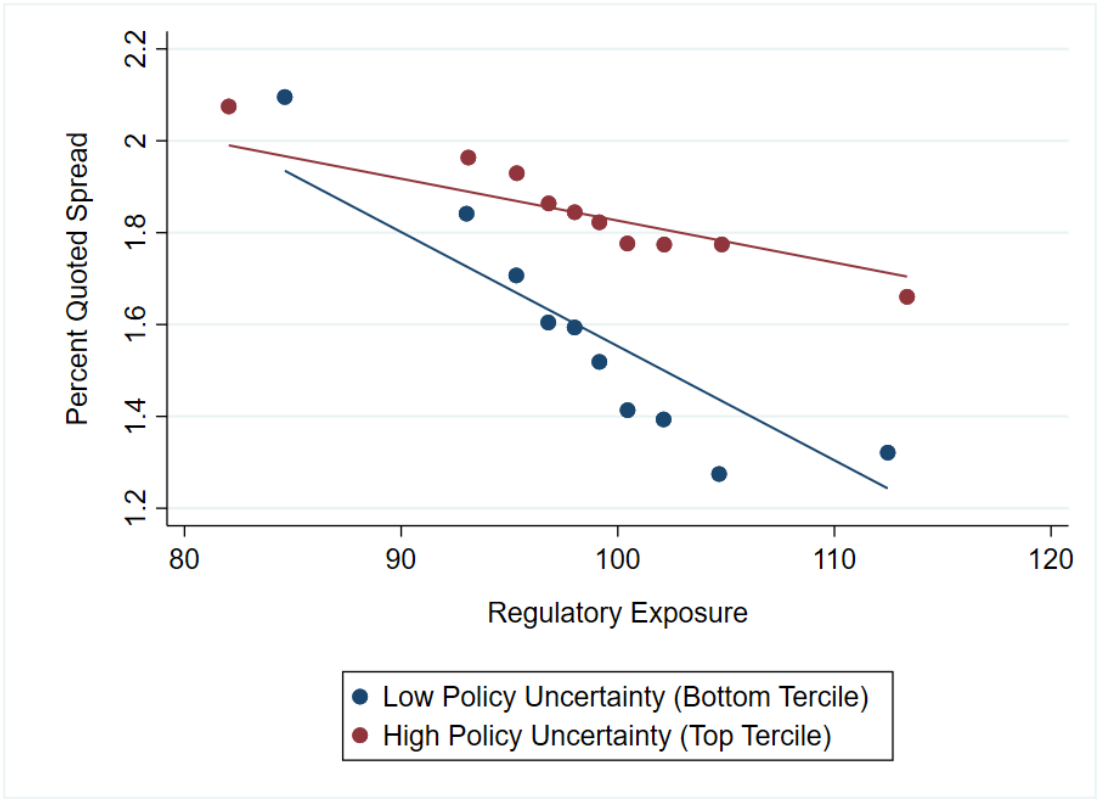


Figure 4. Association between Regulatory Exposure and Voluntary Disclosure

This figure plots the relationship between bid-ask spread and quartile of regulatory exposure. We obtain these estimates by regressing management forecast indicator on exposure quartile and firm-level controls (*Firm size, Profitability, Tobin's Q, Leverage, Cash Flow, CAPX, Inst. Pct, and Analyst Coverage)*. All specifications incorporate firm and year fixed effects. All variables are defined in the Appendix. The plotted coefficients display two-tailed 95% confidence intervals based on standard errors clustered at the firm level.

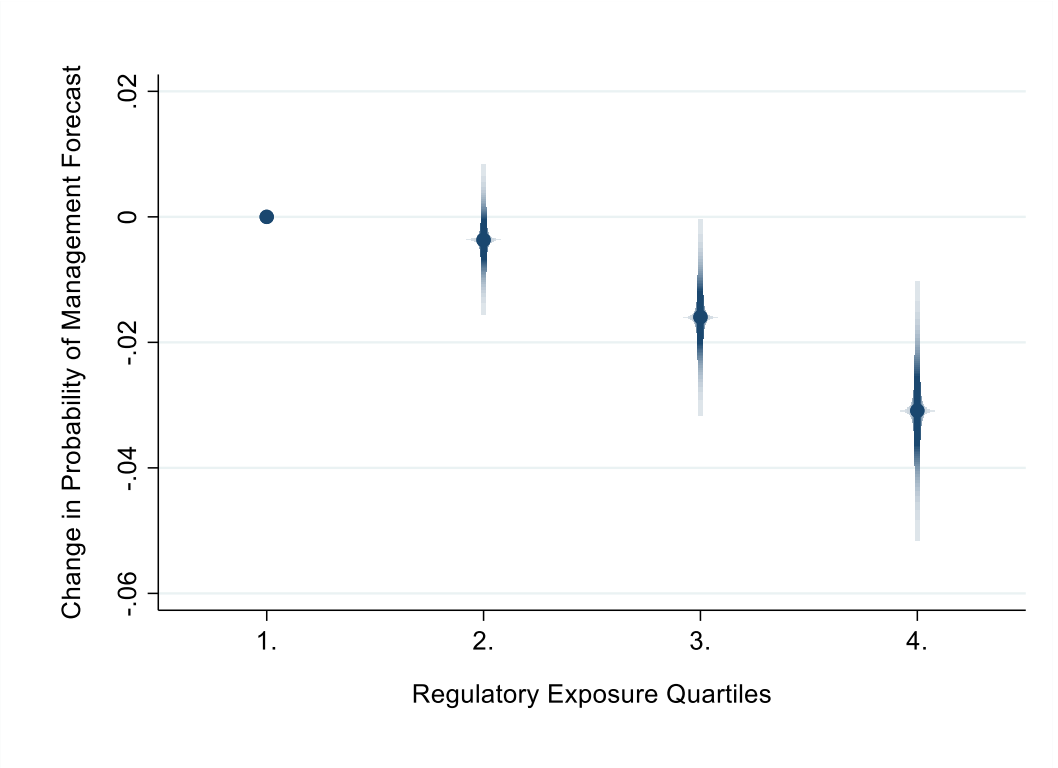


Table 1. Sample Selection

Table 1 presents the sample selection at the firm-year level.

Sample selection criteria	**# of observations**
Compustat Quarterly-CRSP merged dataset between 1994 and 2020	631,111
Less: financial firms and utility firms	(157,744)
Less: missing regulatory exposure measure	(134,037)
Less: missing TAQ measure[17]	(27,104)
Less: missing control variables	(14,113)
Less: singletons under firm and year-quarter fixed effect structure	(343)
Final Sample	297,770

[17] This primarily arises because the firm was not listed on Nasdaq/NYSE/AMEX or has multiple ticker-date observations.

Table 2. Summary Statistics

This table presents descriptive statistics for the key variables employed in our analyses. All variables are defined in Appendix A.

	N	Mean	sd	p25	p50	p75
Reg Exp	297,770	98.381	14.076	93.09	99.746	105.126
Percent Quoted Spread	297,770	1.819	2.602	0.224	0.731	2.332
Percent Realized Spread	297,554	1.022	1.827	0.024	0.225	1.183
CRSP Bid-ask Spread (Abdi & Ranaldo 2017)	289,570	1.813	1.544	0.822	1.314	2.204
Amihud Illiquidity (2002)	297,496	1.053	3.225	0.002	0.021	0.316
Stock Return	297,770	0.033	0.303	-0.139	0.01	0.163
Firm Size	297,770	5.68	1.982	4.186	5.583	7.042
Profitability	297,770	-0.008	0.064	-0.012	0.008	0.021
Tobin's Q	297,770	2.261	1.989	1.148	1.605	2.523
Leverage	297,770	0.223	0.226	0.014	0.176	0.351
Cash Flow	297,770	0.013	0.129	-0.019	0.028	0.078
CAPX	297,770	0.035	0.047	0.008	0.019	0.042
Inst. Pct	297,770	0.448	0.323	0.141	0.436	0.733
Analyst Coverage	297,770	1.342	1.011	0	1.386	2.197
Future CF Vol.	256,637	0.053	0.059	0.019	0.035	0.063
Future Earnings Vol.	256,709	0.03	0.044	0.006	0.014	0.033
Future Return Vol.	256,155	0.261	0.192	0.136	0.21	0.324
D(MF)	297,770	0.365	0.481	0	0	1
Ln(1 + # of MF)	297,770	0.487	0.717	0	0	1.099
D(Insider Trades)	297,770	0.171	0.376	0	0	0
Ln(1 + Insider Trading Share)	297,770	1.696	3.823	0	0	0
Ln(1 + Insider Trading Value)	297,770	2.218	4.974	0	0	0

Table 3. The Effect of Regulatory Exposure on Information Asymmetry Among Investors

The table presents the results from panel OLS regressions of equation (1), which examines the relation between percent quoted spread and regulatory exposure. In column (1), we present a univariate specification by regressing bid-ask spread on the regulatory exposure measure without control or fixed effects. In column (2), we add control variables to column (1). In column (3), we add firm fixed effects and year fixed effects to column (2). In column (4), we use an identical specification to column (3) but we replace *Reg Exp* with the decile rank of *Reg Exp Dec*, which ranges from 1 to 10. We standardize all independent variables to have a mean of zero and standard deviation of one so that the coefficient estimates can be interpreted as the effect of a one-standard deviation change on the dependent variable. T-statistics reported in parentheses below the coefficient are based on standard errors clustered at the firm level. *, **, and *** represent statistically significant coefficients at the 0.10, 0.05, and 0.01 levels, respectively. All variables are defined in Appendix A.

	(1)	(2)	(3)	(4)
VARIABLES		***Percent Quoted Spread***		
Reg Exp	**-0.621*** **	**-0.276*** **	**-0.056*** **	
	(-25.17)	**(-15.53)**	**(-4.44)**	
Reg Exp Dec				**-0.029*** **
				(-5.28)
Stock Return		-0.249***	-0.188***	-0.188***
		(-56.94)	(-47.61)	(-47.61)
Firm Size		-1.089***	-1.088***	-1.089***
		(-40.36)	(-26.86)	(-26.90)
Profitability		-0.067***	-0.185***	-0.185***
		(-6.09)	(-22.66)	(-22.73)
Tobin's Q		-0.466***	-0.423***	-0.423***
		(-37.92)	(-40.39)	(-40.41)
Leverage		0.341***	0.218***	0.218***
		(23.13)	(16.50)	(16.47)
Cash Flow		0.104***	-0.010	-0.010
		(8.98)	(-1.20)	(-1.23)
CAPX		-0.006	-0.076***	-0.076***
		(-0.58)	(-10.03)	(-10.03)
Inst. Pct		-0.415***	-0.128***	-0.128***
		(-29.01)	(-6.39)	(-6.38)
Analyst Coverage		-0.343***	-0.296***	-0.298***
		(-19.52)	(-19.39)	(-19.53)
Observations	297,770	297,770	297,770	297,770
Adjusted R-squared	0.057	0.452	0.703	0.703
Controls	No	Yes	Yes	Yes
FE	None	None	Firm & Year-Quarter	Firm & Year-Quarter

Table 4. Robustness Table

The table presents analyses to demonstrate the robustness of the Table 3 results. Panel A uses three alternative dependent variables to show our results are robust to alternative measures of information asymmetry. Panel B demonstrates our results for each of these outcome variables are robust to alternative measures of regulatory exposure, using the compliance time and responses in place of a count of the regulations the firm is exposed to. We standardize all independent variables to have a mean of zero and standard deviation of one so that the coefficient estimates can be interpreted as the effect of a one-standard deviation change on the dependent variable. T-statistics reported in parentheses below the coefficient are based on standard errors clustered at the firm level. *, **, and *** represent statistically significant coefficients at the 0.10, 0.05, and 0.01 levels, respectively. All variables are defined in Appendix A.

Panel A: Alternative measures of investor information asymmetry

VARIABLES	(1) ***Percent Realized Spread***	(2) ***CRSP Bid-ask Spread***	(3) ***Amihud Illiquidity***
Reg Exp	**-0.044*** **	**-0.036*** **	**-0.048*** **
	(-4.71)	**(-4.55)**	**(-2.75)**
Stock Return	-0.127***	-0.068***	-0.119***
	(-40.59)	(-26.56)	(-21.40)
Firm Size	-0.652***	-0.604***	-1.320***
	(-22.44)	(-24.84)	(-21.85)
Profitability	-0.116***	-0.172***	-0.186***
	(-19.19)	(-32.07)	(-14.35)
Tobin's Q	-0.277***	-0.224***	-0.381***
	(-36.96)	(-32.90)	(-24.76)
Leverage	0.122***	0.138***	0.264***
	(12.96)	(16.70)	(13.17)
Cash Flow	-0.009	-0.022***	0.051***
	(-1.47)	(-4.39)	(3.90)
CAPX	-0.047***	-0.052***	-0.115***
	(-8.03)	(-10.98)	(-10.14)
Inst. Pct	-0.080***	-0.057***	0.048*
	(-5.40)	(-4.22)	(1.70)
Analyst Coverage	-0.162***	-0.135***	-0.175***
	(-14.54)	(-13.65)	(-8.33)
Observations	297,553	289,544	297,494
Adjusted R-squared	0.616	0.676	0.532
Controls	Yes	Yes	Yes
FE	Firm & Year-Quarter	Firm & Year-Quarter	Firm & Year-Quarter

Panel B: Alternative measure of regulatory exposure

VARIABLES	(1) *Percent Quoted Spread*	(2) *Percent Realized Spread*	(3) *CRSP Bid-Ask Spread*	(4) *Amihud Illiquidity*	(5) *Percent Quoted Spread*	(6) *Percent Realized Spread*	(7) *CRSP Bid-Ask Spread*	(8) *Amihud Illiquidity*
Reg Exp Time	**-0.063*** **	**-0.048*** **	**-0.035*** **	**-0.050*** **				
	(-5.44)	**(-5.51)**	**(-4.79)**	**(-3.08)**				
Reg Exp Response					**-0.053*** **	**-0.036*** **	**-0.021** **	**-0.051*** **
					(-4.05)	**(-3.75)**	**(-2.55)**	**(-2.86)**
Stock Return	-0.188***	-0.127***	-0.067***	-0.119***	-0.188***	-0.127***	-0.068***	-0.119***
	(-47.57)	(-40.55)	(-26.51)	(-21.37)	(-47.56)	(-40.54)	(-26.50)	(-21.37)
Firm Size	-1.086***	-0.650***	-0.603***	-1.318***	-1.087***	-0.651***	-0.604***	-1.319***
	(-26.79)	(-22.37)	(-24.78)	(-21.82)	(-26.84)	(-22.42)	(-24.84)	(-21.84)
Profitability	-0.185***	-0.116***	-0.172***	-0.187***	-0.185***	-0.116***	-0.172***	-0.187***
	(-22.71)	(-19.23)	(-32.11)	(-14.39)	(-22.74)	(-19.27)	(-32.16)	(-14.39)
Tobin's Q	-0.422***	-0.276***	-0.224***	-0.381***	-0.422***	-0.276***	-0.224***	-0.381***
	(-40.40)	(-36.92)	(-32.82)	(-24.75)	(-40.40)	(-36.91)	(-32.80)	(-24.76)
Leverage	0.218***	0.122***	0.137***	0.264***	0.217***	0.121***	0.136***	0.263***
	(16.51)	(12.96)	(16.66)	(13.16)	(16.44)	(12.87)	(16.56)	(13.17)
Cash Flow	-0.010	-0.009	-0.022***	0.051***	-0.010	-0.009	-0.023***	0.051***
	(-1.21)	(-1.49)	(-4.43)	(3.89)	(-1.24)	(-1.53)	(-4.48)	(3.89)
CAPX	-0.075***	-0.047***	-0.052***	-0.115***	-0.076***	-0.047***	-0.052***	-0.115***
	(-10.02)	(-8.02)	(-10.98)	(-10.14)	(-10.06)	(-8.06)	(-11.00)	(-10.16)
Inst. Pct	-0.127***	-0.079***	-0.056***	0.049*	-0.127***	-0.080***	-0.057***	0.049*
	(-6.35)	(-5.36)	(-4.18)	(1.72)	(-6.37)	(-5.38)	(-4.20)	(1.72)
Analyst Coverage	-0.295***	-0.162***	-0.135***	-0.174***	-0.294***	-0.161***	-0.135***	-0.173***
	(-19.38)	(-14.51)	(-13.60)	(-8.30)	(-19.32)	(-14.46)	(-13.57)	(-8.27)
Observations	297,770	297,553	289,544	297,494	297,770	297,553	289,544	297,494
Adjusted R-squared	0.703	0.616	0.676	0.532	0.703	0.615	0.676	0.532
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE	Firm & Year-Quarter	Firm & Year-Quarter	Firm & Year-Quarter	Firm & Year-Quarter	Firm & Year-Quarter	Firm & Year-Quarter	Firm & Year-Quarter	Firm & Year-Quarter

Table 5. Regulatory Exposure and Insider Trading Frequency

The table presents the results of OLS regressions of different measures of insider trading frequency on regulatory exposure. The dependent variables are an indicator for the occurrence of opportunistic insider trades, the logarithm of number of shares traded by insiders opportunistically and the logarithm of the value of shares traded by insiders opportunistically, presented in columns 1, 2, and 3, respectively. All columns include the complete set of control variables and firm and year-quarter fixed effects. All independent variables have been standardized to mean zero and standard deviation of one. T-statistics reported in parentheses below the coefficient are based on standard errors clustered at the firm level. *, **, and *** represent statistically significant coefficients at the 0.10, 0.05, and 0.01 levels, respectively. All variables are defined in Appendix A.

VARIABLES	(1) ***D(Insider Trades)***	(2) ***Ln(1 + Insider Trading Share)***	(3) ***Ln(1 + Insider Trading Value)***
Reg Exp	**-0.005***** **(20.20)**	**-0.042**** **(22.44)**	**-0.061***** **(24.24)**
Stock Return	0.014*** (20.20)	0.168*** (22.44)	0.228*** (24.24)
Firm Size	0.074*** (13.64)	0.705*** (12.73)	1.137*** (15.33)
Profitability	0.004*** (4.13)	0.045*** (4.36)	0.067*** (5.20)
Tobin's Q	0.026*** (17.71)	0.285*** (17.75)	0.440*** (20.68)
Leverage	-0.005*** (-2.66)	-0.050*** (-2.69)	-0.093*** (-3.83)
Cash Flow	0.004*** (3.50)	0.047*** (4.04)	0.061*** (4.13)
CAPX	-0.003*** (-3.17)	-0.041*** (-3.83)	-0.050*** (-3.66)
Inst. Pct	0.027*** (8.50)	0.251*** (7.61)	0.339*** (7.82)
Analyst Coverage	0.023*** (8.80)	0.237*** (9.10)	0.324*** (9.53)
Observations	297,770	297,770	297,770
Adjusted R-squared	0.229	0.233	0.248
Controls	Yes	Yes	Yes
FE	Firm & Year-Quarter	Firm & Year-Quarter	Firm & Year-Quarter

Table 6 The Effect of non-SEC Regulatory Exposure on Information Asymmetry Among Investors

The table reports panel OLS regression results from equation (1), which examines the relation between percent quoted spread and regulatory exposure while controlling proxies of firms' exposure to the SEC. In column (1), we control for SEC Regulation Proxy 1, constructed using the same algorithm described in Section 3.1 but limited to regulatory documents issued by the SEC. In column (2), we control for SEC Regulation Proxy 2, developed by Armstrong, Glaeser, and Hoopes (2025). All columns include the complete set of control variables and firm and year-quarter fixed effects. We standardize all independent variables to have a mean of zero and standard deviation of one so that the coefficient estimates can be interpreted as the effect of a one-standard deviation change on the dependent variable. T-statistics reported in parentheses below the coefficient are based on standard errors clustered at the firm level. *, **, and *** represent statistically significant coefficients at the 0.10, 0.05, and 0.01 levels, respectively. All variables are defined in Appendix A.

VARIABLES	(1) **Percent Quoted Spread**	(2) **Percent Quoted Spread**
Reg Exp	**-0.028**** **(-2.56)**	**-0.038***** **(-3.37)**
SEC Regulation proxy 1	-0.032* (-1.95)	
SEC Regulation proxy 2		-0.021*** (-2.67)
Observations	197,472	225,987
Adjusted R-squared	0.710	0.711
Controls	Yes	Yes
FE	Firm & Year-Quarter	Firm & Year-Quarter

Table 7. The Effect of Regulatory Exposure on Operational Smoothness

The table presents the results of regulatory exposure's effect on operational predictability. In Panel A, we regress future cash flow volatility, future earnings volatility, and future stock return volatility on regulatory exposure, in Column 1, 2, and 3, respectively. All columns include the complete set of control variables and firm and year-quarter fixed effects. In Panel B, we examine the effect of regulatory exposure on earnings persistence coefficients. In column 1, we regress IB (income before extraordinary item) on lagged IB, Reg Exp, and their interactions, without control variables or fixed effects. In Column 2, we add year fixed effects, control variables, control variables interacted with lagged IB (i.e., Control Interaction), and 2-digit SIC industry indicator interacted with lagged IB (i.e., Industry Interaction) to the specification of Column 1. In Column 3, we further include firm fixed effects. Lastly in Column 4, we include an indicator for negative lagged IB and its interaction with Lagged IB. All independent variables (except IB and lagged IB) have been standardized to mean zero and standard deviation of one. T-statistics reported in parentheses below the coefficient are based on standard errors clustered at the firm level. *, **, and *** represent statistically significant coefficients at the 0.10, 0.05, and 0.01 levels, respectively. All variables are defined in Appendix A.

Panel A: The effect of regulatory exposure on future operation uncertainty

	(1)	(2)	(3)
VARIABLES	***Future CF Vol***	***Future Earnings Vol***	***Future Return Vol***
Reg Exp	**-0.002*** **	**-0.001***	**-0.003** **
	(-3.69)	**(-1.84)**	**(-2.03)**
Stock Return	-0.001***	-0.000***	0.037***
	(-5.33)	(-4.03)	(72.66)
Firm Size	-0.021***	-0.009***	-0.021***
	(-18.72)	(-10.28)	(-6.33)
Profitability	-0.005***	-0.004***	-0.010***
	(-13.07)	(-13.59)	(-11.63)
Tobin's Q	0.002***	0.002***	-0.002***
	(4.44)	(6.24)	(-2.59)
Leverage	0.000	0.000	0.008***
	(0.36)	(0.54)	(7.45)
Cash Flow	-0.005***	-0.003***	-0.010***
	(-12.54)	(-12.82)	(-10.98)
CAPX	-0.001***	0.000	0.000
	(-4.61)	(1.63)	(0.31)
Inst. Pct	-0.000	0.000	-0.006***
	(-0.27)	(0.46)	(-2.97)
Analyst Coverage	0.000	0.001	-0.002
	(0.23)	(1.53)	(-1.62)
Observations	256,505	256,574	256,013
Adjusted R-squared	0.584	0.479	0.389
Controls	Yes	Yes	Yes
FE	Firm & Year-Quarter	Firm & Year-Quarter	Firm & Year-Quarter

Panel B: The effect of regulatory exposure on earnings persistence

VARIABLES	(1)	(2)	(3)	(4)	(5)
			IB_{it}		
IB_{it-1}	0.593***	0.589***			
	(109.60)	(102.65)			
Reg Exp		0.017***	0.018***	0.011***	0.011***
		(15.06)	(11.21)	(5.57)	(5.63)
IB_{it-1} x *Reg Exp*		**0.010*** **	**0.013*** **	**0.008** **	**0.009*** **
		(3.68)	**(4.35)**	**(2.51)**	**(2.64)**
IB_{it-1} x $I[IB_{it-1}<0]$					-0.140***
					(-5.93)
$I[IB_{it-1}<0]$					-0.023***
					(-11.66)
Observations	74,802	74,802	74,802	74,580	74,580
Adjusted R-squared	0.498	0.502	0.586	0.645	0.646
Controls	No	No	Yes	Yes	Yes
Control Interaction	No	No	Yes	Yes	Yes
Industry Interaction	No	No	Yes	Yes	Yes
FE	None	None	Year	Firm & Year	Firm & Year

Table 8. The Effect of Regulatory Exposure and Policy Uncertainty on Information Environment

The table presents the results of OLS regressions of bid-ask spread on regulatory exposure and policy uncertainty. The dependent variable is percent quoted spread. Column (1) presents the result of univariate regression of bid-ask spread on policy uncertainty, with firm fixed effects and control variables. Column (2) adds regulatory exposure to the specification in column (1). Column (3) adds the interaction term between regulatory exposure and policy uncertainty to column (2). Column (4) further adds year-quarter fixed effects. All independent variables have been standardized to mean zero and standard deviation of one. T-statistics reported in parentheses below the coefficient are based on standard errors clustered at the firm level. *, **, and *** represent statistically significant coefficients at the 0.10, 0.05, and 0.01 levels, respectively. All variables are defined in Appendix A.

	(1)	(2)	(3)	(4)
VARIABLES		***Percent Quoted Spread***		
Reg Exp		-0.217***	-0.217***	-0.058***
		(-15.27)	(-15.41)	(-4.62)
Regulation EPU	0.117***	0.133***	0.129***	
	(20.85)	(23.66)	(21.33)	
Reg Exp x Regulation EPU			**0.022*** **	**0.025*** **
			(3.39)	**(3.38)**
Reg Exp x Equity Market Uncertainty				-0.024***
				(-3.61)
Stock Return	-0.222***	-0.219***	-0.219***	-0.188***
	(-57.69)	(-57.48)	(-57.51)	(-47.56)
Firm Size	-1.499***	-1.376***	-1.376***	-1.088***
	(-36.59)	(-34.00)	(-34.02)	(-26.89)
Profitability	-0.158***	-0.161***	-0.161***	-0.185***
	(-18.02)	(-18.32)	(-18.36)	(-22.68)
Tobin's Q	-0.414***	-0.420***	-0.421***	-0.423***
	(-36.75)	(-37.04)	(-37.08)	(-40.34)
Leverage	0.264***	0.273***	0.272***	0.218***
	(17.82)	(18.81)	(18.79)	(16.50)
Cash Flow	-0.014	-0.011	-0.012	-0.010
	(-1.62)	(-1.28)	(-1.35)	(-1.23)
CAPX	0.003	-0.006	-0.006	-0.076***
	(0.48)	(-0.88)	(-0.87)	(-10.02)
Inst. Pct	-0.446***	-0.402***	-0.401***	-0.128***
	(-24.51)	(-22.20)	(-22.13)	(-6.42)
Analyst Coverage	-0.217***	-0.232***	-0.232***	-0.295***
	(-13.76)	(-14.87)	(-14.90)	(-19.37)
Observations	297,770	297,770	297,770	297,770
Adjusted R-squared	0.674	0.677	0.677	0.703
Controls	Yes	Yes	Yes	Yes
FE	Firm	Firm	Firm	Firm & Year-Quarter

Table 9. The Effect of Regulatory Exposure, Regulatory Enforcement, and Political Influence on Information Environment

The table reports the cross-sectional effect of regulatory enforcement and political influence on the relationship between bid-ask spreads and regulatory exposure. The dependent variable is percent quoted spread. In Panel A, Column (1) regresses quoted spreads on Reg Exp, a dummy variable that whether a firm operates in an industry with lower federal regulatory enforcement, and their interaction. Column (2) regresses quoted spreads on Reg Exp, a dummy variable that indicates a republican regime, and their interaction. In Panel B, Column (1) regresses quoted spreads on Reg Exp and its interaction with a firm invariant indicator variable that indicates whether a firm ever participates in making political contribution. Column (2) regresses quoted spreads on Reg Exp, the natural logarithm of a firm's lobbying monetary amount in a given year, and their interaction. Column (3) regresses quoted spreads on Reg Exp, a dummy variable that indicates whether a firm engages in any lobbying activities in a given year, and their interaction. Column (4) regresses quoted spreads on Reg Exp, a dummy variable for firm's politically aligned with the white house, and their interaction. All non-indicator independent variables have been standardized to mean zero and standard deviation of one. T-statistics reported in parentheses below the coefficient are based on standard errors clustered at the firm level. *, **, and *** represent statistically significant coefficients at the 0.10, 0.05, and 0.01 levels, respectively. All variables are defined in Appendix A.

Panel A: Cross-sectional Effect of Regulatory Enforcement

	(1)	(2)
VARIABLES	Percent Quoted Spread	
Reg Exp	-0.078***	-0.066***
	(-4.79)	(-4.67)
Reg Exp x d(low enforcement industries)	**0.052****	
	(2.25)	
Reg Exp x Republican Regime		**0.026***
		(1.83)
Sample	Firms in the main sample	Firms in the main sample
Observations	297,770	297,770
Adjusted R-squared	0.703	0.703
Controls	Yes	Yes
FE	Firm & Year-Quarter	Firm & Year-Quarter

Panel B: Cross-sectional Effect of Political Influence

VARIABLES	(1)	(2)	(3)	(4)
	Percent Quoted Spread			
Reg Exp	-0.070***	-0.031***	-0.052***	0.011
	(-5.22)	(-2.78)	(-4.48)	(0.34)
Reg Exp x PAC Active	**0.358*** **			
	(9.09)			
Reg Exp x ln(1 + lobbying amount)		**0.050*** **		
		(7.07)		
ln(1 + lobbying amount)		0.036***		
		(3.57)		
Reg Exp x d(lobbying activities)			**0.139*** **	
			(7.17)	
d(lobbying activities)			0.065**	
			(2.52)	
Reg Exp x Alignment with WH				**0.072***
				(1.68)
Alignment with WH				-0.049
				(-1.14)
Sample	Firms reporting from 2004 to 2017	Firms reporting from 1998 to 2017	Firms reporting from 1998 to 2017	Politically Active Firms; Observation from 2004 to 2017
Observations	247,358	228,348	228,348	16,038
Adjusted R-squared	0.650	0.706	0.705	0.652
Controls	Yes	Yes	Yes	Yes
FE	Firm & Year-Quarter	Firm & Year-Quarter	Firm & Year-Quarter	Firm & Year-Quarter

Table 10. The Effect of Regulatory Exposure on Forecast Issuance

The table presents the results of OLS regressions of management forecast on regulatory exposure. The dependent variable in Columns 1 to 3 is an indicator set equal to one for firm-quarters with at least one management forecast. The independent variables in Columns 1, 2, and 3 are regulatory exposure in terms of the number of regulations, compliance time, and number of responses required. In Column 4, the dependent variable is the natural logarithm of one plus the number of management forecasts and the independent variable is regulatory exposure in terms of the number of regulations. All columns include firm and year-quarter fixed effects. All independent variables have been standardized to mean zero and standard deviation of one. T-statistics reported in parentheses below the coefficient are based on standard errors clustered at the firm level. *, **, and *** represent statistically significant coefficients at the 0.10, 0.05, and 0.01 levels, respectively. All variables are defined in Appendix A.

VARIABLES	(1) ***D(MF > 0)***	(2) ***D(MF > 0)***	(3) ***D(MF > 0)***	(4) ***Ln (# of MF)***
Reg Exp	**-0.011***	**-0.008*****		
	(-1.94)	**(-2.95)**		
Reg Exp Time			**-0.010*****	
			(-3.96)	
Reg Exp Response				**-0.010*****
				(-3.65)
Stock Return	-0.008***	-0.007***	-0.007***	-0.007***
	(-5.80)	(-9.32)	(-9.28)	(-9.30)
Firm Size	0.224***	0.086***	0.086***	0.086***
	(12.29)	(11.18)	(11.25)	(11.22)
Profitability	0.019***	0.010***	0.010***	0.010***
	(7.14)	(8.01)	(7.98)	(7.98)
Tobin's Q	-0.006	-0.003*	-0.003*	-0.003*
	(-1.47)	(-1.72)	(-1.70)	(-1.69)
Leverage	0.017***	0.007***	0.007***	0.007***
	(2.95)	(2.63)	(2.67)	(2.62)
Cash Flow	0.016***	0.005***	0.005***	0.005***
	(5.19)	(3.17)	(3.18)	(3.18)
CAPX	0.004	0.001	0.001	0.001
	(1.17)	(0.68)	(0.69)	(0.65)
Inst. Pct	0.120***	0.057***	0.057***	0.057***
	(10.72)	(11.88)	(11.93)	(11.92)
Analyst Coverage	0.144***	0.080***	0.080***	0.080***
	(17.00)	(20.71)	(20.76)	(20.83)
Observations	297,770	297,770	297,770	297,770
Adjusted R-squared	0.619	0.557	0.558	0.558
Controls	Yes	Yes	Yes	Yes
FE	Firm & Year-Quarter	Firm & Year-Quarter	Firm & Year-Quarter	Firm & Year-Quarter

Online Appendix

Content:

Figure A1: Within-industry and Cross-industry variations of Regulatory Exposure

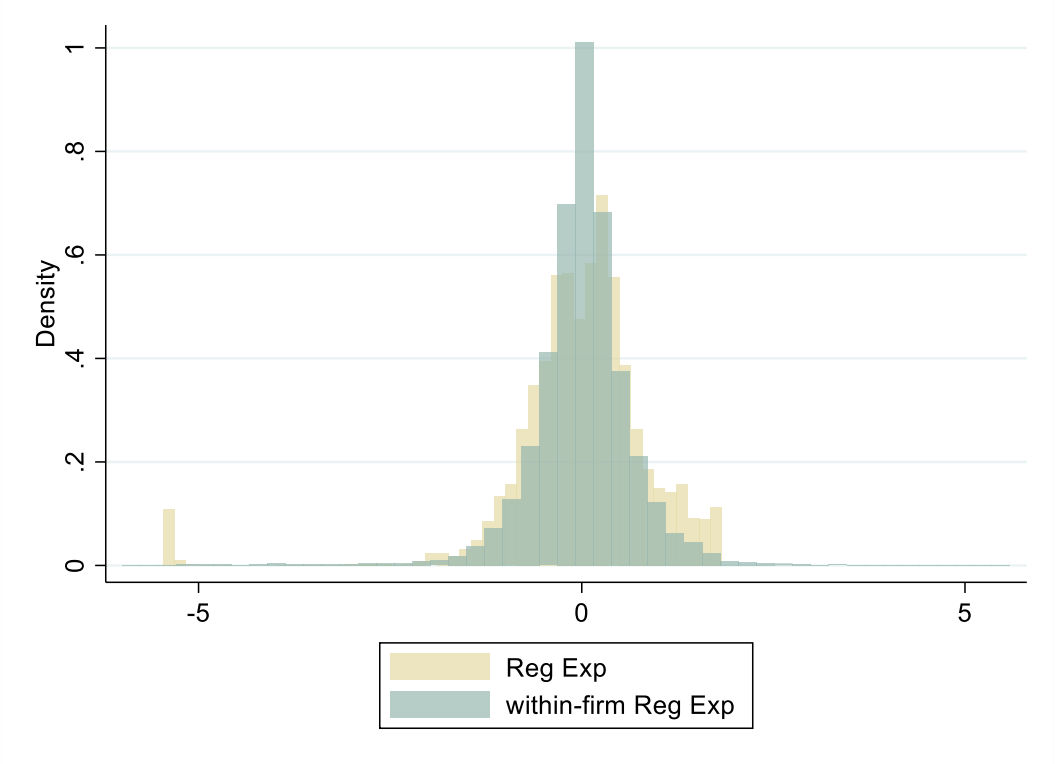
Figure A2: Correlation between MTAQ measure and DTAQ measure over the overlapping period

Table A1: Robustness of the Cross-sectional Test on Economic Policy Uncertainty to Alternative Measure of EPU

OA Figure A1: Within-industry and Across-industry Variations of Regulatory Exposure

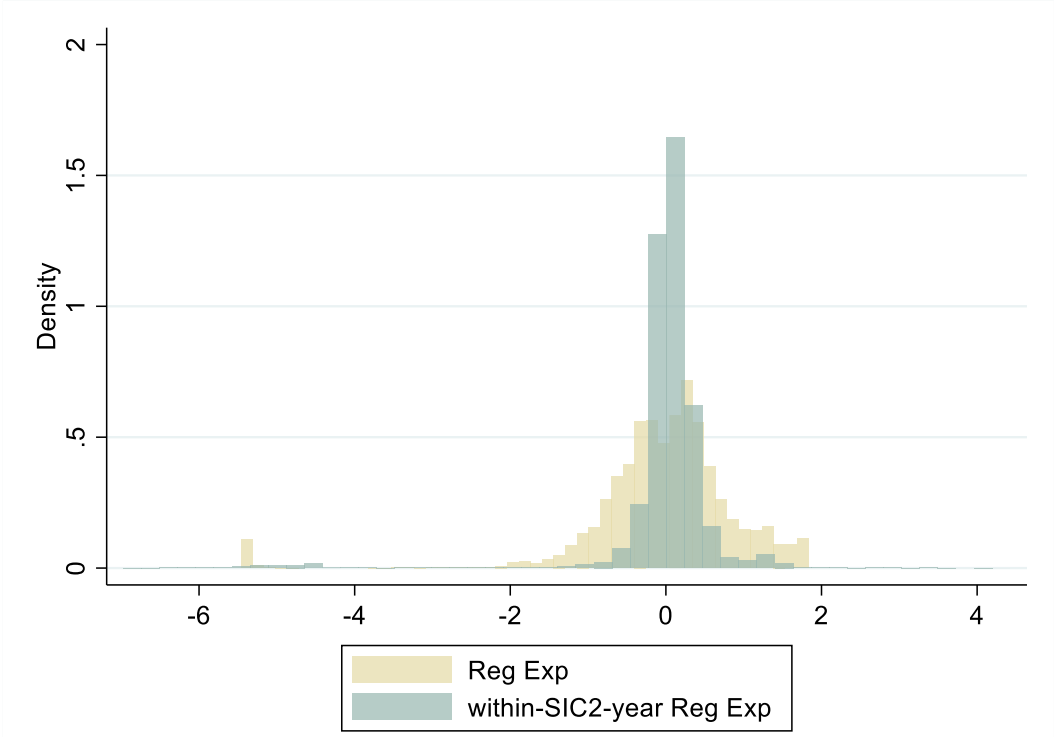
Panel A: Within-firm Distribution of Regulatory Exposure

This figure presents the histogram of the regulatory exposure measure. The khaki distribution illustrates the measure's overall variation, while the green distribution represents its within-firm variation. To enhance visualization, the standardized measure is used in the figure.



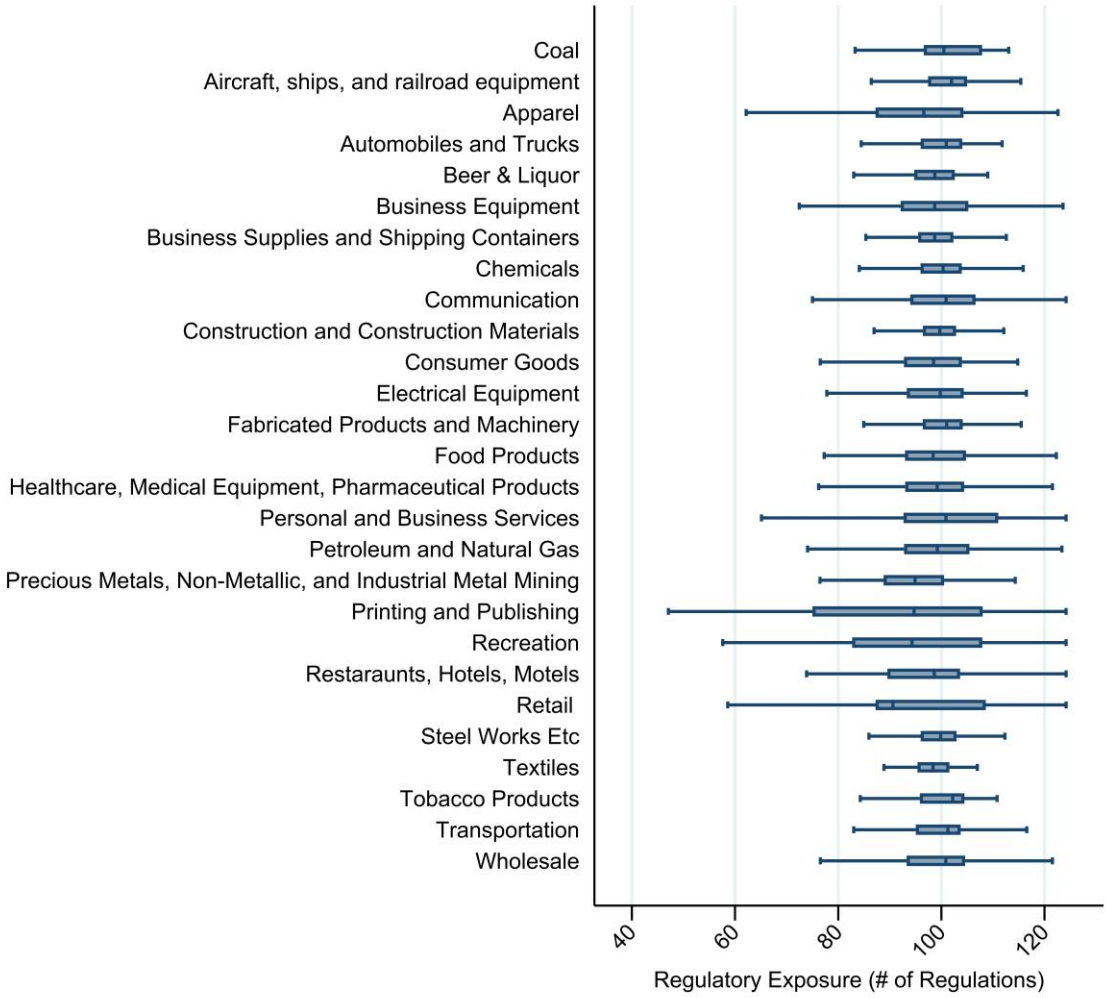
Panel B: Within-SIC2-year Distribution of Regulatory Exposure

This figure presents the histogram of the regulatory exposure measure. The khaki distribution illustrates the measure's overall variation, while the green distribution represents its within-SIC2-year variation. To enhance visualization, the standardized measure is used in the figure.



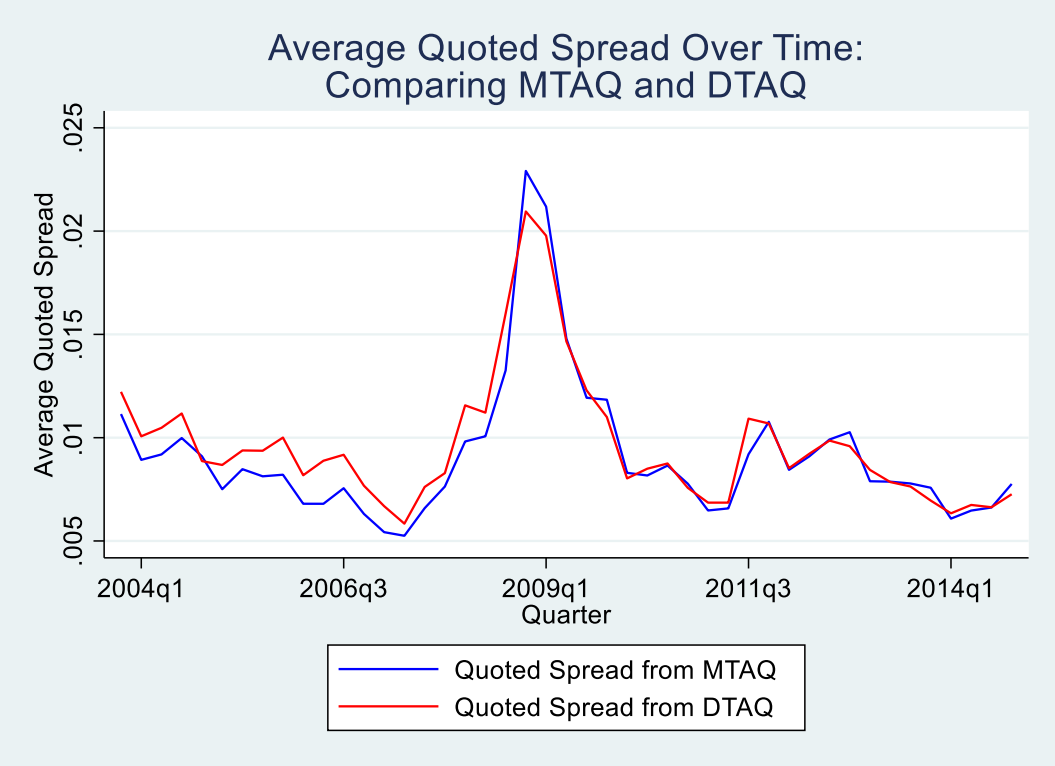
Panel C: Range of Regulatory Exposure Distribution in Different Industries

This figure graphs the distribution of our regulatory exposure (*Reg Exp*) in a box plot measured in each Fama French 30 industry classification. The left-end and right-end of the box represent the 25th percentile and 75th percentile of regulatory fragmentation in the corresponding industry.



OA Figure A2. Correlation Between MTAQ Measure and DTAQ Measure Over the Overlapping Period.

This figure plots the average quarterly percent quoted spreads constructed from MTAQ and DTAQ, respectively, over the period when both datasets are available (from 2004 to 2014)



OA Table A1: Robustness of the Cross-sectional Test on Economic Policy Uncertainty to Alternative Measure of EPU

The table presents the results of OLS regressions of bid-ask spread on regulatory exposure, policy uncertainty, and their interactions. The dependent variable across all columns is percent quoted spread. In Column (1), the dependent variables of interest are the interaction terms between *Reg Exp* and *Regulation EPU,* the categorical economic policy uncertainty index on regulation (i.e., regulatory policy uncertainty). Column (2) replaces Regulation *EPU* with its natural logarithm form, *log(Regulation EPU)*. In Column (3), the dependent variables of interest are the interaction terms between *Reg Exp* and *General EPU,* the general economic policy uncertainty index. Column (4) replaces *General EPU* with its natural logarithm form, *log(General EPU)*. All columns use similar specifications to that in Column (4) of Table 7, including a full set of control variables, firm fixed effects, and year-quarter fixed effects. All independent variables have been standardized to mean zero and standard deviation of one. T-statistics reported in parentheses below the coefficient are based on standard errors clustered at the firm level. *, **, and *** represent statistically significant coefficients at the 0.10, 0.05, and 0.01 levels, respectively. All variables are defined in Appendix A.

	(1)	(2)	(3)	(4)
VARIABLES		***Percent Quoted Spread***		
Reg Exp	-0.058***	-0.060***	-0.058***	-0.058***
	(-4.62)	(-4.74)	(-4.61)	(-4.67)
Reg Exp x Regulation EPU	**0.025*** **			
	(3.38)			
Reg Exp x log(Regulation EPU)		**0.030*** **		
		(3.62)		
Reg Exp x General EPU			**0.026*** **	
			(5.08)	
Reg Exp x log(General EPU)				**0.029*** **
				(4.38)
Reg Exp x Equity Market Uncertainty	-0.024***		-0.032***	
	(-3.61)		(-4.60)	
Reg Exp x Log(Equity Market Uncertainty)		-0.024***		-0.032***
		(-3.99)		(-4.76)
Stock Return	-0.188***	-0.188***	-0.188***	-0.188***
	(-47.56)	(-47.56)	(-47.54)	(-47.53)
Firm Size	-1.088***	-1.088***	-1.088***	-1.088***
	(-26.89)	(-26.90)	(-26.89)	(-26.90)
Profitability	-0.185***	-0.185***	-0.185***	-0.185***
	(-22.68)	(-22.68)	(-22.68)	(-22.69)
Tobin's Q	-0.423***	-0.423***	-0.423***	-0.423***
	(-40.34)	(-40.35)	(-40.35)	(-40.36)
Leverage	0.218***	0.218***	0.218***	0.218***
	(16.50)	(16.51)	(16.49)	(16.49)
Cash Flow	-0.010	-0.010	-0.010	-0.010
	(-1.23)	(-1.22)	(-1.22)	(-1.23)
CAPX	-0.076***	-0.076***	-0.075***	-0.076***
	(-10.02)	(-10.03)	(-10.01)	(-10.02)
Inst. Pct	-0.128***	-0.128***	-0.128***	-0.128***
	(-6.42)	(-6.42)	(-6.41)	(-6.41)
Analyst Coverage	-0.295***	-0.295***	-0.295***	-0.295***
	(-19.37)	(-19.37)	(-19.34)	(-19.35)
Observations	297,770	297,770	297,770	297,770
Adjusted R-squared	0.703	0.703	0.703	0.703
Controls	Yes	Yes	Yes	Yes
FE	Firm & Year-Quarter	Firm & Year-Quarter	Firm & Year-Quarter	Firm & Year-Quarter

OA Table A2: Summary Statistics for the Cross-sectional Variables of Political Influence in Table 9

This table presents descriptive statistics for the cross-sectional variables employed in Table 8. *PAC Active* is a firm invariant indicator variable that indicates whether a firm is politically active. *ln(1 + lobbying amount)* is the natural logarithm of a firm's lobbying monetary amount in a given year, and their interaction. *d(lobbying activities*) is a dummy variable that indicates whether a firm engages in any lobbying activities in a given year. *d(low enforcement industries)* is a dummy variable that whether a firm operates in an industry with lower-than-median federal regulatory enforcement. *Republican Regime* is a dummy variable that indicates a republican regime. *Alignment with WH* is a dummy variable for firm's politically aligned with the white house.

	N	Mean	sd	p25	p50	p75
PAC Active	247,358	0.121	0.326	0	0	0
ln(1 + lobbying amount)	228,466	1.86	4.485	0	0	0
d(lobbying activities)	228,466	0.149	0.356	0	0	0
d(low enforcement industries)	297,770	0.423	0.494	0	1	1
Republican Regime	297,770	0.425	0.494	0	0	1
Alignment with WH	16,040	0.094	0.292	0	0	0