Spillovers from Regulatory Fragmentation: Evidence from Corporate Tax Burdens

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Abstract

Increased corporation regulation in recent decades has raised the likelihood of regulatory oversight spillovers—the extent to which one agency's interactions with a regulated firm affects firm behaviors under the purview of another agency. We study how such spillovers can affect the mission of a specific regulator—the tax authority—using a measure of firm-specific exposure to fragmented regulation. Using a sample of publicly-traded U.S. firms, we document that regulatory fragmentation is associated with higher effective tax rates, indicating that non-IRS oversight constrains tax planning, which is the purview of the tax authority. This relation is increasing in the overall amount of regulation the firm faces and in the relative absence of alternative (e.g., capital market) monitors. Additionally, we observe that regulatory fragmentation is associated with lower IRS scrutiny and less variation in tax burdens within industries, suggesting that fragmented oversight impacts IRS monitoring efforts as well as industry competitive dynamics.

Keywords: regulation, corporate taxes, tax planning, regulatory spillover, IRS

JEL Codes: H25, H26, L21, L51, M4, P43

1. Introduction

Regulation plays a pivotal role in shaping firms' business environment and constraining their operational choices (Gray 1987; Joskow and Rose 1989; Barrios, Kaplan, and Lin 2023). Over the past few decades, governments globally have implemented new policies addressing an array of corporate-related issues, ranging from environmental protection to financial stability. These new policies have often resulted in firms being subject to oversight from multiple regulators, leading to the possibility that one agency's interactions with a regulated firm could affect—by either constraining or encouraging—firm behaviors that are under the purview of another government agency. We term these instances regulatory oversight spillovers. While prior studies have explored the consequences of regulation more broadly on firms (Kalmenovitz 2022; Armstrong, Glaeser, and Hoopes 2024), a growing stream of research has begun to explore the existence and impact of regulatory oversight spillovers (Bischof, Daske, Elfers, and Hail 2022; Agarwal, Lucca, Seru, and Trebbi 2014; Kim and Kim 2024; Rosen 2003). We contribute to this nascent literature by providing evidence on how such spillovers are associated with the purview of a particular regulator—the tax authority.

Understanding the consequences of regulatory oversight spillovers is important in today's increasingly complex regulatory landscape. The proliferation of regulations has likely amplified both the frequency and magnitude of these spillovers, carrying significant implications for the design and implementation of effective regulatory policies. Policymakers aiming to craft efficient regulations must consider how the actions of one regulatory agency can influence or be influenced by another. Similarly, regulators themselves should be aware of how their missions are affected by oversight from other regulators. For instance, if Regulator A knows that an area they were responsible for monitoring was already constrained via oversight from Regulator B, Regulator A

could take this externality into account and reallocate its scarce resources to other critical areas of its mission.

In this paper, we focus on how regulatory oversight spillovers are associated with corporate tax burdens, which fall principally under the purview of the tax authority. We focus on corporate tax burdens, and thus the tax authority, for several reasons. First, both corporate tax burdens and tax authority oversight have received significant policymaker and academic attention in recent years. Dyreng, Hanlon, Maydew, and Thornock (2017) document that corporate effective tax rates have declined markedly over the past several decades, consistent with firms substantially increasing tax planning activities. Some have attributed this trend in part to weakened tax enforcement capabilities. For example, the budget of the Internal Revenue Service (IRS), the U.S. tax authority, has declined by approximately 19 percent over the past decade adjusted for inflation (Center on Budget and Policy Priorities 2022). Second, in the U.S., every firm—public or private—interacts with the IRS, and thus understanding how such interactions are shaped by non-tax authority oversight has broad relevance for corporate America.

Ex ante, whether and how non-tax authority regulatory oversight will be associated with corporate tax burdens is unclear. On the one hand, increased interactions with non-IRS federal agencies could lead to higher corporate tax burdens by constraining firms' incentives and opportunities to engage in tax planning. For example, non-IRS government agencies may request information on or require that the firm document certain aspects of their operations, including customer and supplier contracts, production facilities, and other parts of the supply chain or even specific transactions. For example, the Food and Drug Administration (FDA) might require detailed documentation of clinical trials and supply chain management, and the Environmental Protection Agency (EPA) can require documentation of emission levels and environmental impact

from the firm's production processes. While the creation of this information is primarily intended for compliance with agency-specific regulations, the existence of such documentation regarding the firm's transactions and business structure, and its availability to government agencies, could create concern within the firm that such records could come to light if the firm were to be audited by the IRS and potentially jeopardize their ability to support certain tax positions. For example, discrepancies between these detailed records for non-tax authority agencies and the firm's tax filings could raise red flags during an IRS audit. Moreover, even in the absence of increased documentation, increased oversight by non-tax government agencies can heighten a firm's perceived risks and costs associated with aggressive tax avoidance strategies. Thus, greater interaction with non-IRS federal agencies may increase the firm's perceived likelihood of detection by the IRS, and, conditional on being audited, the extent of back taxes and penalties owed. This mechanism aligns with prior research that indicates that direct monitoring by the IRS and several non-regulatory monitors, such as lenders, institutional owners, analysts, and labor unions, is associated with less tax avoidance (i.e., higher corporate tax burdens) (Hoopes, Mescall, and Pittman 2012; Hasan, Hoi, Wu, and Zhang 2014; Chyz, Ching Leung, Zhen Li, and Meng Rui 2013).

On the other hand, non-IRS regulatory oversight might be associated with reduced tax burdens by encouraging greater tax planning for at least three reasons. First, U.S.-based oversight might encourage firms to locate more of their operations outside of the U.S. to avoid such oversight, potentially increasing their usage of subsidiaries in tax haven countries, which can facilitate greater use of tax planning strategies such as income shifting. Second, having multiple regulators overseeing the firm may increase the likelihood and extent of regulators "shirking" or being able to "pass the buck" amongst each other (Buzbee 2003), creating a multi-agent moral

hazard problem where regulators exert less monitoring (e.g., Itoh 1991). For example, in a fragmented regulatory environment, individual regulators may be more likely to defer to other agencies, potentially leading to regulatory gaps that firms can exploit for tax planning purposes. Finally, regulation is broadly costly, and firms may attempt to recoup these costs by increasing tax planning. Thus, it is an empirical question whether and how non-regulatory oversight interacts with corporate tax burdens.

To examine the impact of non-tax authority regulatory oversight spillovers on corporate tax burdens, we employ a novel firm-specific measure of regulatory fragmentation developed by Kalmenovitz, Lowry, and Volkova (2022). Their methodology uses the full text of the *Federal Register*, in which all federal agencies publish their activities (e.g., new and existing regulations), to develop a proxy of the fragmentation of each regulatory area across federal agencies. The authors then apply this approach to firm Form 10-K disclosures to identify firm-specific exposure to regulatory fragmentation.[1] Given that each of our sample firms is subject to IRS scrutiny, this measure effectively captures the extent to which the firm faces monitoring by multiple non-tax federal agencies. In our primary analyses, we examine the association between regulatory fragmentation with corporate tax burdens, our primary measure of which is the cash effective tax rate (ETR), following prior research (Dyreng, Hanlon, and Maydew 2008; Dyreng et al. 2017). The underlying idea is that corporate tax planning is under the purview of the IRS, and thus if exposure to monitoring by non-tax regulators is associated with corporate tax burdens, this would be consistent with regulatory spillovers.

In our main analysis, based on a sample of U.S. listed firms from 1995 to 2019, we find that regulatory fragmentation is negatively associated with corporate tax burdens, even after

[1] Kalmenovitz et al. (2022) demonstrates that this measure has strong construct validity, as it is positively correlated with measures of regulatory complexity and negatively correlated with measures of regulatory efficiency.

accounting for a vector of time-varying firm-level controls and industry and year fixed effects. Economically, a one-standard deviation increase in regulatory fragmentation is associated with a 2.2 percentage point increase in the cash ETR. This finding is consistent with the idea that regulatory fragmentation subjects the firm to increased non-tax regulatory oversight, which in turn leads them to reduce the extent of their tax planning activities. This association is robust to different approaches to measuring tax burdens (e.g., forward or backward-looking cash ETRs, book ETRs, and a non-ETR-based measure) and to comparing firms facing high versus high regulatory fragmentation. Furthermore, we find that the negative association between regulatory fragmentation and corporate tax burdens becomes stronger with greater regulatory quantity (i.e., the total amount of the firm's regulatory burden). In other words, the potential for additional monitoring from the exposure to multiple regulatory agencies to constrain firms' tax planning activities is amplified when the amount of the corresponding regulatory rules is greater.

To further support the regulatory monitoring mechanism, we conduct two additional tests. First, we investigate how exposure to oversight from multiple non-tax regulatory agencies affects IRS monitoring. We expect that if regulatory fragmentation exposes firms to increased non-tax monitoring that in turn reduces their tax planning activities, this should reduce the need for IRS scrutiny to constrain aggressive tax avoidance. We employ the measure of IRS attention developed by Bozanic, Hoopes, Thornock, and Williams (2017), which captures IRS downloads of firm SEC filings, as a proxy for IRS scrutiny. Consistent with our expectation, we find that regulatory fragmentation is negatively associated with IRS scrutiny, suggesting that oversight from various other government regulators oversight may allow the IRS to spend fewer resources on these firms without compromising the ability to constrain aggressive tax planning.

Second, we explore whether the impact of non-tax regulatory monitoring is moderated by the level of non-regulatory external stakeholder monitoring. Prior studies have demonstrated that monitoring by external stakeholders, such as institutional investors or financial analysts, can constrain aggressive tax avoidance by closely monitoring firms' activities (Kim, Li, and Zhang 2011). If regulatory fragmentation affects tax planning via monitoring mechanisms, we expect its significance for tax planning to decrease as alternative monitoring mechanisms increase. Indeed, we find that the negative association between regulatory fragmentation and corporate tax burdens is weaker when institutional ownership and analyst coverage is greater, providing further evidence that regulatory monitoring is responsible (at least in part) for the relation between regulatory fragmentation and corporate tax planning.

To further understand how monitoring by non-tax regulators affects firm tax planning activities, we next examine how regulatory fragmentation is associated with the organizational structure of the firm, and in particular the firm's subsidiaries in tax havens. The presence of firm subsidiaries in tax havens has been highlighted by prior research as being associated with tax minimization efforts (Hines and Rice 1994; Desai, Foley, and Hines Jr 2006; Gumpert, Hines Jr, and Schnitzer 2016; Dyreng, Hanlon, and Maydew 2019; Kim, Lin, Mao, and Wang 2022).[2] We find that while regulatory fragmentation is associated with an increased number of foreign subsidiaries, it is also associated with a smaller percentage of these foreign subsidiaries being located in tax havens. These findings suggest that while regulatory fragmentation might encourage greater geographic expansion, this expansion does not seem to be done for tax purposes.

We also investigate the potential influence of political risk on the relationship between regulatory fragmentation and corporate tax burdens. It is possible that firms facing more

[2] This is because tax haven countries typically combine favorable tax rules (e.g., low rates) with other business friendly regulation (e.g., ability to maintain some level of opacity).

fragmentated regulatory oversight are also more sensitive to risks emanating from the political sector, and that it is this political sensitivity—not fragmented regulation—that constraints corporate tax planning (e.g., Zimmerman 1983). Utilizing political risk measures developed by Hassan, Hollander, van Lent, and Tahoun (2019), we find a negligible correlation between political risk and regulatory fragmentation, suggesting these are distinct concepts. Further analysis shows that including controls for political risk does not materially alter the association between regulatory fragmentation and tax burdens, reinforcing the robustness of our primary findings and highlighting the independent role of regulatory fragmentation in constraining tax planning activities.

Finally, we investigate implications of non-tax regulatory oversight for industry-level tax burden dynamics. We predict that the increased regulatory oversight associated with regulatory fragmentation may limit the ability of some firms to use tax planning as a means to gain a competitive advantage over their rivals (Gallemore, van der Geest, Jacob, and Peters 2023), and therefore industries facing higher levels of regulatory fragmentation will exhibit lower levels of within-industry variation in corporate tax planning. Consistent with this intuition, we find a negative association between regulatory fragmentation and the intra-industry dispersion in cash effective tax rates (ETRs). These results highlight the important role of regulatory oversight in shaping the competitive landscape of industries, contributing to emerging research on industry-level tax planning dynamics.

Our findings are subject to several caveats. First, since we cannot directly observe the monitoring activities by specific non-tax regulators, it is possible that our findings are driven by mechanisms other than oversight by non-tax federal agencies. However, we take comfort in the fact that our multiple mechanism tests are broadly consistent with a monitoring explanation for our findings. Second, we acknowledge that we do not exploit plausibly exogenous variation in

regulatory fragmentation. We account for various industry- and firm-level factors in our design, and our mechanism tests, which highlight the monitoring role of various regulators, further help to mitigate alternative explanations for our findings. While our findings are correlational in nature and should be interpreted as such, we believe that they are valuable given the academic and policymaker interest in both regulatory oversight spillovers and corporate tax planning.

Our study offers several implications for regulators and policymakers. The finding that regulatory fragmentation is negatively associated with corporate tax burdens suggests that policymakers should carefully weigh the trade-offs between the potential negative effects of fragmentation on firm-level productivity (Kalmenovitz et al. 2022) against its role in constraining corporate tax planning activities. For example, finding a positive association between regulatory fragmentation and corporate tax burdens suggest that efforts to reduce regulatory fragmentation may encourage greater tax avoidance, and thus may need to be accompanied by increases to tax authority resources. Additionally, our study indicates that regulatory oversight by one agency can influence the purview of another regulator. These findings underscore the interconnectedness of regulatory oversight and highlight the importance of considering spillover effects when evaluating the broader impacts of regulations across different sectors of the economy (Barrios and Wollmann 2022). Such considerations are vital for designing regulatory frameworks that minimize unintended consequences.

Beyond these policy considerations, our results contribute to several academic literatures. First, we extend the nascent literature on firm-level consequences of regulatory burdens and fragmentation (Kalmenovitz 2022; Kalmenovitz et al. 2022) by providing empirical evidence on the association between regulatory fragmentation and corporate tax burdens, and documenting the mechanism—monitoring—responsible. In contrast with this prior work, which generally shows

the negative impact of regulatory burdens and fragmentation on firm profitability, our results highlight a potential benefit (from the perspective of regulators) of fragmentation: a reduction in tax planning. We also add to an emerging literature on regulatory oversight spillovers, which primarily documents spillovers involving banking regulators (Bischof et al. 2022; Gallemore and Giese 2024; Agarwal et al. 2014; Kim and Kim 2024; Rosen 2003). By examining the impact of such spillovers on the tax authority's purview, our study broadens the scope of this literature, demonstrating that regulatory spillovers are not confined to a single sector but have broader implications across different regulatory domains.

Second, our study contributes to the tax literature. While prior work has extensively explored the factors influencing corporate tax planning, relatively less attention has been paid to the regulatory-related determinants of corporate tax behavior. Furthermore, the research on the impact of regulatory monitoring on corporate tax burdens has almost entirely focused on oversight by tax authorities, such as the IRS (Hoopes et al. 2012; Belnap, Hoopes, Maydew, and Turk 2022; Gallemore and Jacob 2023; Fox, Jacob, Wilde, and Wilson 2022). Our study extends this literature by showing that non-tax regulators are also influential in shaping a firm's tax planning strategy. In doing so, our perspective opens future avenues for research, particularly in examining specific interactions between tax authorities and non-tax regulators, such as OSHA or the EPA, and how these interactions can influence overall corporate tax behavior. Understanding these interactions is critical for developing a more comprehensive view of how regulatory environments shape corporate strategies and behaviors across multiple dimensions.

2. Hypothesis development

Regulatory oversight spillovers can arise when multiple government agencies oversee a given economic activity; that is, when regulatory oversight is fragmented. Ex ante, the effect of these oversight spillovers emanating from regulatory fragmentation on firm tax behavior is unclear. On the one hand, while non-tax authority regulators are not primarily responsible for monitoring and ensuring compliance with the tax code, there are plausible reasons why regulatory fragmentation could be associated with higher tax burdens.

First, the presence of multiple regulators can intensify the oversight of firm behavior (Bischof et al. 2022). Thus, managers of firms operating under the purview of multiple regulators may be more cautious about engaging in tax avoidance activities. This caution may stem from the anticipation of a higher likelihood of detection or scrutiny by regulatory authorities. The interactions with multiple regulatory bodies often necessitate the firm to document extensive information regarding its operations, including customer and supplier interactions, the location of production and other value-added activities (e.g., marketing), and specific transactions. Although this information may not be directly communicated to the tax authority, its existence within the firm could attract the attention of the tax authority. For example, environmental regulators likely not directly address tax issues in their interactions with the firm, but their oversight could reveal operational anomalies that could subsequently trigger investigations by the relevant tax authorities. Furthermore, information created by the firm for non-tax authority regulators could become available to the tax authority during an audit, and potentially undermine the positions claimed on the firm's tax returns. Thus, greater regulatory fragmentation may increase the perceived costs of engaging in aggressive tax planning, including a heightened probability of detection and greater penalties and back taxes due if audited. Consequently, firms operating in a fragmented regulatory

environment may perceive a greater risk associated with engaging in aggressive tax strategies, leading to greater tax burdens on average.

Additionally, regulatory fragmentation can increase the likelihood of conflicts between different regulators, creating a more complex and uncertain regulatory landscape (Ting 2003; Krause and Douglas 2006; Agarwal et al. 2014). As a result, firms may hesitate to engage in certain economic activities due to the increased uncertainty and potential conflicts among regulators. For example, investments in complex tax planning strategies may become less attractive if firms are unsure how these activities will be viewed or regulated by different agencies. As a result, the likelihood of firms pursuing these tax-motivated strategies may decrease, leading to higher tax burdens.

On the other hand, regulatory oversight spillovers may potentially lead to lower tax burdens for firms for several reasons. First, if firms are subject to extensive oversight from multiple U.S. regulators, they may respond by locating more of their operations outside of the U.S. to avoid such regulation. The presence of foreign operations—especially those in tax havens and other low-tax jurisdictions—can facilitate the use of certain tax planning strategies, such as income shifting. Second, when multiple regulators oversee a specific economic area, the likelihood of regulatory gaps and inefficiencies increases (Weaver 1986; Jacobs 2016). This can occur when regulators engage in a practice commonly known as "passing the buck," where they shift responsibility or fail to coordinate effectively, leading to reduced quality of regulatory oversight (Harrison 1996; Swire 1996; Ting 2003; Krause and Douglas 2006; Kim and Kim 2021). Such gaps and inefficiencies can create opportunities for firms to exploit for tax planning purposes, potentially resulting in lower tax burdens, akin to regulatory arbitrage (Rosen 2003, 2005). Third, regulatory oversight spillovers can impose greater compliance burdens on firms, increasing non-production-

related costs and reducing profitability (Kalmenovitz et al. 2022). In response, firms may be motivated to pursue tax avoidance strategies as a means to offset these added costs, thereby contributing to lower tax burdens.

Considering these contrasting arguments, the relationship between regulatory fragmentation and tax burdens is unclear ex ante. Therefore, we state our hypothesis in the null form:

H1: Regulatory fragmentation is not associated with corporate tax burdens.

Furthermore, the relationship between regulatory fragmentation and tax burdens may be influenced by other factors. For instance, the effect of multiple regulators overseeing a firm's activities could depend on the intensity of that regulatory oversight. Specifically, being subject to a light regulatory burden from several different regulators may have minimal impact on corporate tax burdens, whereas a heavy regulatory burden spread across multiple agencies could have a more significant effect. Additionally, the effect of regulatory fragmentation on tax burdens could be influenced by the presence of other external monitors of firm behavior, such as institutional owners and analysts. We explore how these other factors shape the relation between regulatory fragmentation and tax burdens in our cross-sectional analyses, providing a more complete understanding of how regulatory fragmentation is associated with firm tax behavior.

3. Sample and data

3.1. Measuring non-tax regulatory oversight

To measure the potential for spillovers associated with oversight by non-tax regulators, we employ the regulatory fragmentation measure developed by Kalmenovitz et al. (2022). This proxy quantifies the extent to which a firm is exposed to multiple federal agencies overseeing the same

economic activity. The measure is constructed using the following steps. First, they capture the extent of regulatory fragmentation for each business "topic". This step starts with measuring different agencies' regulatory attention and involvement on the same specific topics. They apply a machine learning technique known as Latent Dirichlet Analysis (LDA) to categorize the government's activities into 100 topics and define $\omega_{i,t,a}$ ($i, t, and\ a$ are subscripts for topic, year, and agency) as the fraction of the words in all Federal Register documents written by each agency for a specific topic in a given year. Based on the regulatory attention share measure, they capture the extent of regulatory fragmentation for each business topic. To do so, they first calculate each topic's regulatory "concentration" measure by squaring and summing these shares , $\sum_{a \in Agency\ Set} \omega_{i,t,a}^2$.This measure, ranging from 0 to 1, is analogous to a Herfindahl–Hirschman index of regulator focus across federal agencies. Accordingly, the topic-specific regulatory fragmentation is defined as $1 - \sum_{a \in Agency\ Set} \omega_{i,t,a}^2$.

Second, they aggregate the topic-specific regulatory fragmentation measure to the firm-year level according to the relevance of a firm's business to those pre-determined topics. To do so, they compute the importance of each topic for each firm-year observation $p_{f,t,i}$ ($f, t, and\ i$ are subscripts for firm, year, and topic), calculated as the fraction of words in the firm's annual report that is devoted to the particular topic. Lastly, they aggregate the fragmentation of each topic by multiplying the fragmentation of each topic by its relative importance for each firm and summing the products for all 100 topics (i.e., $\sum_{t \in Topic\ Set} p_{f,t,i}\ (1 - \sum_{a \in Agency\ Set} \omega_{i,t,a}^2)$)

These steps yield a firm-year variant measure as $1 - \sum_{t \in Topic\ Set} \sum_{a \in Agency\ Set}\ p_{f,t,i} * \omega_{i,t,a}^2$. Intuitively, the measure is each firm's average fragmentation across all business topics,

considering the relevance of each topic to the firm as the weights.[3] The measure thus captures the dispersion of regulatory oversight across agencies for different topics, incorporating the relative importance of those topics for each firm. Moreover, given that each of our sample firms is subject to IRS oversight, this measure likely captures the extent of fragmented non-tax regulatory monitoring.

As shown in Panel A of Figure A1 in the Online Appendix, the measure of regulatory fragmentation exhibits significant variation both within and across industries. The interquartile range of this measure differs among industries. Regarding the median, the Fama-French 30 Classification #29 (Finance), #3 (Tobacco Products), and #5 (Printing and Publishing) have the highest values, while #21 (Communication) has the lowest. Panel B of Figure A1 illustrates the sources of variation in the regulatory fragmentation measure. The khaki distribution represents the overall variation across all industries and periods, which exhibits a broader spread, indicating significant differences in regulatory fragmentation. The green distribution graphs the within-SIC2-year variation, shown that there is still substantial variation within industries.[4]

In the time series, Figure 1 suggests that the level of regulatory exposure remained relatively stable before 2010 and has decreased since then. This trend is consistent with the policy markers' observation on fragmentation, overlap, and duplication of federal activities since 2011(Government Accountability Office 2022) and the debates and efforts to eliminate some of the regulatory fragmentation (U.S. Department of the Treasury 2017; Government Accountability Office 2022).

3.2. Measuring tax burdens

[3] The weights are determined by the topic's probability in the firm's annual report.

[4] This within Industry variation is important given that we include industry year fixed effects in our specification.

Following prior research, we measure corporate tax burdens using contemporaneous cash effective tax rates (Dyreng et al. 2008; Dyreng et al. 2017). We employ the cash ETR because it reflects the cash tax savings associated with tax planning, including the effect of deferred tax payments. Specifically, we employ the following measure:

$$CETR_{i,t} = \frac{Cash\ Tax\ Expense_{i,t}}{Pre\ Tax\ Income_{i,t}}$$

The numerator captures the cash income tax payments in year t, and the denominator captures pre-tax income over that same period. We winsorize the resulting *CETR* at 0 and 1, and set it equal to missing if the denominator is negative, consistent with prior research (Dyreng et al. 2008).

3.3. Regression specification

To investigate whether regulatory fragmentation is associated with tax burdens, we estimate an ordinary least squares (OLS) regression using our firm-year panel data. The regression model is specified as follows:

$$CETR_{i,t} = \beta_0 + \beta_1\ Regulatory\ Fragmentation_{i,t} + Controls_{i,t} + Fixed\ Effects + \varepsilon_{i,t} \quad (1)$$

Our dependent variable is $CETR_{i,t}$, a firm's cash-based effective tax rate. Our primary variable of interest is $Regulatory\ Fragmentation_{i,t}$, following Kalmenovitz et al. (2022) and as described in Section 3.1. To account for potential alternative explanations, we include a vector of time-varying firm-level controls that prior research has shown to be associated with firm tax planning outcomes (e.g., Barrios and Gallemore 2023; Hoopes et al. 2012): the logarithm of a firm's total asset (*Log Assets*), profitability (*ROA*), leverage (*Leverage*), foreign income (*Foreign Income*), tangible asset (*Tangibility*), market to book ratio (*MTB*), net operating loss carryforward (*NOL Carryforward*), and research and development expenditure (*R&D*). We also account for the presence of non-regulatory monitoring by controlling for the institutional investor holding percentage (*Inst. Inv. Holding Pct*) and number of analysts coverage (*Analyst Following*). To

separate the effects of regulatory fragmentation for each topic across government agencies from the impacts of firms operating in multiple areas, we follow Kalmenovitz et al. (2022) and additionally control for *Topic Dispersion*, which captures the extent to which a firm discusses different topics in its 10K filing. Furthermore, we include industry and year fixed effects to account for time-invariant industry-level characteristics and macroeconomic conditions, respectively.[5] We winsorize all continuous independent variables at the 1st and 99th percentiles in each year to minimize the influence of outliers. We also standardize them to mean zero and standard deviation of one for easier interpretation.

3.4. Data sources, sample selection, and descriptive statistics

We obtain financial statement information from Compustat, and the regulatory fragmentation measure from Kalmenovitz et al. (2022). Table 1 describes our sample selection process. Our sample period begins in 1995, which corresponds to the earliest availability of the regulatory fragmentation measure, and extends until 2019, just before the onset of the COVID-19 pandemic. To construct the sample, we begin with all firm-years on Compustat during this period. We then exclude firm-year observations with missing assets (*at*), net income (*ni*), and data necessary for the construction of our dependent and independent variables. Our primary sample consists of 39,850 firm-year observations from 1995 to 2019. Table 2 reports the descriptive statistics for our regression variables.

4. Empirical analysis

4.1. Main results

[5] We do not include firm fixed effects in our main analyses as regulatory fragmentation is likely to be fairly persistent for a given firm over time. That said, in untabulated tests, we document similar findings when replacing industry fixed effects with firm fixed effects, suggesting that our inferences are consistent even when accounting for unobservable firm-specific characteristics that might persist over time.

We begin by examining the univariate associations between regulatory fragmentation and cash ETRs. First, we examine the intertemporal dynamics of both regulatory fragmentation and cash ETR for our sample firms. Specifically, we regress these two measures on indicator variables for each year in our sample period, omitting 1996 (which serves as the base year), and plot the coefficient estimates along with their 95 percent confidence intervals in Figure 1. The figure demonstrates a strong correlation between regulatory fragmentation and cash ETRs over time, indicating that periods of increased regulatory fragmentation correspond to higher cash ETRs. Second, we visually examine the relationship between regulatory fragmentation and cash ETRs by presenting a bin scatter plot that controls for year fixed effects, which we report in Figure 2. We find a clear positive relationship between regulatory fragmentation and cash ETRs, supporting the notion that increased regulatory fragmentation is associated with higher tax burdens.

Next, we examine the association between regulatory fragmentation and tax burdens in a multivariable framework by estimating different versions of equation 1, which we report in Table 3. In Column 1, we include only regulatory fragmentation as an independent variable. Column 2 introduces industry (captured by 2-digit SIC code) and year fixed effects, and Column 3 additionally includes a vector of time-varying firm-level controls. Across each of the three specifications, we find a positive and statistically significant coefficient on *Regulatory Fragmentation*, indicating that greater exposure to monitoring by different regulators is associated with a higher firm-level tax burden. The coefficient in column 3 suggests that a one-standard deviation increase in *Regulatory Fragmentation* is associated with an increase in the one-year cash ETR of 2.2 percentage points, equal to 8.3 percent of the sample average cash ETR (26.4 percent), suggesting that regulatory fragmentation can meaningfully impact the tax liabilities of firms. For

example, for a firm with a pre-tax income of $100 million, a one-standard deviation increase in *Regulatory Fragmentation* would be associated with an additional $2.2 million in tax payments.

Taken together, the results in Table 3, supported by the visual evidence in Figures 1 and 2, suggest that regulatory fragmentation has an economically significant impact on corporate tax burdens. These findings highlight the role of non-tax authority regulatory oversight in shaping firms' tax planning behaviors and underscore the importance of considering regulatory spillovers when evaluating the broader impacts of regulation on corporate tax outcomes.

4.2. Robustness

Next, we assess the robustness of our primary findings by exploring different specifications and alternative tax burden measures, which we present in Table 4. First, we examine whether high levels of exposure to regulatory fragmentation shape tax burdens by employing *High Fragmentation*, as a binary variable that takes the value of one if a firm's *Regulatory Fragmentation* exceeds the sample median, and zero otherwise. We then re-estimate equation 1 employing *High Fragmentation* as our primary independent variable and report these findings in Panel A of Table 4, again varying the inclusion of fixed effects and time-varying firm-level controls across models. In each specification, we consistently find results similar to those in Table 3, with high fragmentation firms exhibiting greater cash tax burdens.

Second, we employ a longer-run cash ETR variable rather than the one-year cash ETR used in our primary analyses. In column 1, the denominator (numerator) of the cash ETR measure is the sum of pre-tax (cash income tax payments) over year t to year t+2. We use a similar approach in columns 2 and 3, except that the measurement period is year t-4 to year t in column 2 and year t-2 to year t in column 3. Each specification includes the full set of time-varying firm-level control variables as well as industry and year fixed effects. We report the results in Table 4, Panel B, and

continue to find that regulatory fragmentation is positively associated with firm tax burdens, suggesting that our primary findings are not driven by variation in short-run (i.e., one-year) ETR measures.

Third, we employ different tax burden measures other than the cash ETRs. In column 1, we employ the firm's one-year book ETR, which is similar to the cash ETR, except that it uses the income tax expense rather than cash taxes paid in the numerator. In column 2, we address a sample selection concern associated with ETR-based measures. Specifically, since interpreting an ETR with a negative denominator is difficult, we require firm-years to have positive pre-tax income to calculate an ETR, consistent with prior research (Dyreng et al. 2008). We examine the sensitivity of our findings to the tax burden measure developed by Henry and Sansing (2018), which does not use pre-tax income in the denominator. In column 3, we adjust the our main CETR measure by subtracting the average CETR for firms in the same industry (SIC2) and size quintile as the focal firm (Balakrishnan, Blouin, and Guay 2019), which captures differences in tax planning opportunities across industries and size groupings. We report the findings using these three different tax burden measures in Table 4, Panel C, and again find results similar to those in Table 3. Collectively, the findings in Table 4 suggest that the positive association between regulatory fragmentation and firm tax burden is robust to different approaches for measuring regulatory fragmentation and tax burdens.

Furthermore, we conduct additional robustness checks to ensure the reliability and validity of these findings. First, we assess whether the effect of regulatory fragmentation on tax burdens is sensitive to specific subsamples within our dataset. Following Broderick, Giordano, and Meager (2020), we execute a bootstrap procedure by re-estimating our main specification 1,000 times, randomly excluding 1 percent of our sample in each iteration. The bootstrap results, presented in

Figure A2 of the Online Appendix, show the distribution of the estimated coefficients (Panel A) and their t-statistics (Panel B). The consistency across these distributions suggests that our findings are not reliant on any specific subset of the sample, affirming the robustness of our results. Second, we show in Table A1 of the Online Appendix that our results are robust to removing firms in the financial (SIC 6000-6999) or utilities (SIC 4900-4999) industries.

4.3. Fragmentation and quantity

Next, we examine how the firm's exposure to multiple regulatory monitors interacts with the overall regulatory burden faced by the firm. We predict that the positive association between regulatory fragmentation and tax burdens will strengthen as the firm's overall regulatory burden increases. The idea is that monitoring by the different regulators resulting from fragmentation regulation should become more binding with respect to tax planning as the intensity of that oversight increases. Put differently, in the case where the firm's collective regulatory burden is quite low, we do not expect that the firm's tax planning will vary with whether the firm is exposed to monitoring by only one regulator or many.

To explore this idea, we employ the regulatory quantity variable developed by Kalmenovitz et al. (2022). This measure captures both the topics that the firm faces regulation over and the intensity over which federal agencies oversee a given topic. Specifically, regulatory quantity represents the weighted average of the number of words in each of the 100 topics found in the Federal Register, where weights used are equal to the relative importance of each topic for the firm's Form 10-K filing. Intuitively, this measure is increasing in the cumulative amount of regulation that relates to the firm's business.

We begin by exploring this idea graphically in Figure 3. We regress the three-year cash ETR on the regulatory fragmentation decile value (treated as a continuous variable), the regulatory

quantity decile value (also treated as a continuous variable), and their interaction term. The decile values are defined according to the corresponding variables' distribution in each year. This regression includes industry and year fixed effects. We then evaluate the predicted ETR value at each combination of the 1st, 2nd, 9th, and 10th deciles of regulatory fragmentation and each decile of regulatory quantity.

The figure highlights several noteworthy observations. First, as predicted, the association between regulatory fragmentation and tax burdens depends on regulatory quantity. When regulatory quantity is low, regulatory fragmentation seems to have little impact on tax burdens. Specifically, within the first decile of regulatory quantity, the tax burdens for the high regulatory fragmentation group (i.e., the top two deciles) and that for the low regulatory fragmentation group (i.e., the bottom two deciles) almost overlap. This finding consistent with the idea that the spread of the regulatory burden across multiple agencies does not affect tax planning when the cumulative regulatory burden faced by the firm is low. In contrast, when regulatory quantity is high, the difference between the average ETRs of high fragmentation firms and low fragmentation firms is substantial, consistent with the monitoring via multiple regulatory agencies becoming more binding as the cumulative amount of the regulation increases.

We further examine this idea in a multivariate framework, by re-estimating equation 1 including both *Regulatory Fragmentation*, *Regulatory Quantity Decile,* and their interaction term as independent variables. *Regulatory Quantity Decile* is defined as the decile ranking of *Regulatory Quantity*, ranging from 1 to 10. We report these findings in Table 5. We document a negative coefficient on the interaction term between *Regulatory Fragmentation* and *Regulation Quantity Decile,* consistent with the positive effect of regulatory fragmentation on tax burdens increasing in the overall regulatory quantity. Our findings suggest that a one-decile increase in

Regulation Quantity increases the association between cash ETR and standardized *Regulatory Fragmentation* by 6 percentage points (or 27.27 percent of the baseline effect based on column 3 of Table 3). Collectively, the findings in Figure 3 and Table 5 suggest that regulatory quantity plays an important role in how fragmented regulation shapes tax burdens, and they highlight the importance of considering the overall regulatory landscape when assessing how such regulation impacts on firms' tax outcomes.

4.4. IRS monitoring

Next, we examine the relation between regulatory fragmentation and IRS oversight. We expect that if the oversight from multiple non-tax regulators constrains firm tax planning activities, then the IRS may reallocate resources to acquiring information on other firms. Therefore, we predict that regulatory fragmentation will be associated with less IRS monitoring of the focal firm. To examine this idea, we employ the measure of IRS attention developed by Bozanic et al. (2017), which is based on the IRS downloads of public firms' SEC filings. Bozanic et al. (2017) argue that the acquisition of information by the IRS is likely to be tied to the usage of that information in the tax enforcement process, either in considering whether to audit a firm or for usage during an audit. Thus, this measure likely captures whether the IRS is actively investigating the firm. That said, it is important to acknowledge that this analysis is limited to IRS downloads of SEC filings and does not capture all avenues through which the IRS obtains information on firms (e.g., tax filings or public non-SEC sources).

We re-estimate equation 1 using *IRS Attention*, an indicator variable that equals one if the number of IRS downloads of SEC filings is greater than zero, as the dependent variable. We report these results in Table 6. We find that regulatory fragmentation is associated with a lower probability of the IRS downloading a firm’s SEC filings. In terms of economic magnitudes, the

estimated coefficient suggests that a one standard deviation increase in *Regulatory Fragmentation* is associated with a 1.4 percentage point decrease in the probability of the IRS downloading a firm's SEC filings. Economically, the magnitude translates to 2.22 percent of the unconditional mean value of IRS attention (i.e., 0.631). This finding suggests that IRS monitoring is declining in the extent to which the firm experiences oversight from multiple different non-IRS government agencies, which is broadly consistent with the idea that firms exposed to greater regulatory fragmentation are less likely to engage in the types of tax planning strategies that would attract IRS attention. It is also consistent with the idea that the extent of non-IRS regulatory monitoring allows the IRS to allocate resources to other firms, which we believe again highlights the importance of considering regulatory oversight spillovers when studying a particular regulator's monitoring behavior.

4.5. Presence of capital market monitoring

Next, we explore whether the association between regulatory fragmentation and tax planning varies with the extent of non-regulator external monitors. Prior research suggests that oversight from certain external stakeholders, such as institutional owners and analysts, play a role in curbing aggressive tax planning behaviors (Kim et al. 2011). Firms that are exposed to monitoring from these non-regulator monitors thus already are discouraged from engaging in aggressive tax planning strategies, and thus the incremental impact of exposure to multiple regulators on their tax planning may be attenuated. Thus, we expect that the positive association between regulatory fragmentation and tax burdens to be less pronounced when firms have higher levels of institutional ownership and analyst coverage.

To test this prediction, we re-estimate equation 1 including one of two additional variables, *Analyst Following* or *Inst. Inv. Holding Pct*, along with their interaction with *Regulatory*

Fragmentation. We define *Analyst Following* as number of earnings forecasts made during the fiscal year. We define *Inst. Inv. Holding Pct* as the percentage of outstanding shares owned by institutional investors. Both measures are increasing in the firm's exposure to non-regulatory external stakeholder monitoring. We report these findings in Table 7. Consistent with our prediction, we find a negative coefficient on the interaction of *Regulatory Fragmentation* and both *Analyst Following* (column 1) and *Inst. Inv. Holding Pct* (column 2). The coefficient in column 1 (2) indicates that a one-standard-deviation increase in *Analyst Following* (*Inst. Inv. Holding Pct*) decreases the association between *Regulatory Fragmentation* and *CETR* by 0.2 (0.3) percentage point, which translates to 9.1 (13.6) percent of the baseline effect based on column 3 of Table 3. We find similar results when using indicator variable versions of the two non-regulatory monitoring variables (defined as equal to one if the firm is in the top quintile of the continuous variable in that year, and zero otherwise) in columns 3 and 4. Collectively, these findings are consistent with the impact of regulatory fragmentation on tax planning being mitigated when firms are subject to monitoring by other external non-regulator stakeholders. These findings also support the underlying monitoring mechanism underpinning our primary finding.

4.6. Tax-motivated corporate organizational structure

Next, we examine a potential driver of our primary findings: the extent to which regulatory oversight spillovers resulting from regulatory fragmentation influences corporate organizational structure, and in particular the usage of tax haven subsidiaries. Prior research asserts that some firms develop complex organizational structures, in part, due to tax planning motives (e.g., Gallemore, Labro, and Scanlon 2024). For instance, companies might establish subsidiaries in tax havens, countries that offer favorable regulatory environments and low tax rates, to shift taxable income to these jurisdictions (Hines and Rice 1994; Dharmapala and Hines 2009). However, as

noted above, the scrutiny from multiple regulatory bodies could lead to additional oversight and documentation of the firm's transactions and operations, and this documentation could potentially jeopardize the ability to exploit certain organizational structures (e.g., tax haven subsidiaries) for tax planning purposes. For example, management might be concerned that, should this documentation come to light during a tax authority audit, it would undermine the firm's ability to defend the choice of transfer prices between tax haven subsidiaries and subsidiaries in higher-tax jurisdictions. Thus, in expectation, firms facing greater regulatory fragmentation may reduce the usage of these types of tax planning strategies (consistent with our prior results showing a positive relation between regulatory fragmentation and tax burdens), and consequently locate fewer subsidiaries in tax haven jurisdictions.

To explore this idea, we employ data from Exhibit 21 of Form 10-K, in which firms are required to list their material subsidiaries (e.g., those with a sufficient number of sales or assets). Prior research shows that these disclosures are generally highly accurate in their representation of the firm's material subsidiaries (Dyreng, Hoopes, Langetieg, and Wilde 2020). Using this data, we construct four measures reflecting the extent of the firm's subsidiaries in foreign countries and tax havens: *Log (1 + # of foreign subsidiaries)*, *Log (1 + # of domestic subsidiaries)*, *Foreign Sub/Total Sub*, and *Haven Sub/ Foreign Sub*. The first two variables represent the natural logarithm of one plus the count of the firm's foreign (non-U.S.-based) and domestic (U.S.-based) subsidiaries. When using these two variables, we additionally control for *Log (1 + # of subsidiaries)*, which captures the natural logarithm of one plus the total count of subsidiaries. The latter two variables are ratios: the first compares the number of foreign subsidiaries to the total

number of subsidiaries, and the second compares the number of subsidiaries in tax havens to the total number of foreign subsidiaries.[6]

In Table 8, we re-estimate equation 1 using one of these four organizational structure variables as the dependent variable. In columns 1 (2) of Table 8, we find a positive (negative) and statistically significant coefficient on *Regulatory Fragmentation*, indicating that firms exposed to more fragmented regulation report higher (lower) relative usage of foreign (domestic) subsidiaries and supporting the idea that increased regulatory fragmentation drives firms to expand their operations internationally. Economically, a one standard deviation increase of *Regulatory Fragmentation* is associated with a 14.4 percent increase in the number of foreign subsidiaries and a 6.0 percent decrease in the number of domestic subsidiaries. When we use the ratio of foreign to total subsidiaries as the dependent variable in Column 3, we document a positive coefficient on *Regulatory Fragmentation*, consistent with the results in Columns 1 and 2. Finally, in column 4, we document a negative coefficient on *Regulatory Fragmentation*, suggesting that while regulatory fragmentation on average leads firms to locate more of their subsidiaries abroad, it simultaneously deters firms from locating more of these subsidiaries in tax havens.

The findings in Table 8 collectively indicate that while regulatory fragmentation is positively associated with the usage of foreign subsidiaries, it is not associated with an increased percentage of these subsidiaries being located in tax haven jurisdictions, suggesting that these subsidiaries are not being primarily located for tax planning purposes. This result aligns with our broader finding that regulatory fragmentation increases corporate tax burdens, suggesting that the increased oversight from multiple regulators constraints firms' usage of certain organizational structures to lower their tax burdens.

[6] When we utilize the ratios of subsidiaries, we exclude cases where firms have no subsidiaries (Column 3) or no foreign subsidiaries (Column 4).

4.7. Regulatory fragmentation and political risk

As an additional robustness test, we examine whether the observed relationship between regulatory fragmentation and firms' tax burdens could be a manifestation of political risk. Hassan et al. (2019) argue that variation in firm-level political risk often stem from unique regulatory environments. Furthermore, they show that political risk is associated with a reduction in capital investment, consistent the uncertainty emanating from the political sector encouraging managers to delay investment. Since tax planning strategies can be thought of as a form of risky investment, it is possible that our primary finding of a positive relation between regulatory fragmentation and tax burdens could instead reflect that political risk is associated with both more complex regulatory environments (e.g., fragmentation) and less investment in tax planning.

To examine whether political risk is responsible for our primary findings, we conduct two additional analyses, both employing the political risk proxy developed by Hassan et al. (2019) (which we label *Political Risk*). The measure captures the extent to which sentences containing discussions of political issues by managers are located near expressions of uncertainty. Hassan et al. (2019) conduct a number of analyses that demonstrate that this measure, derived from a textual analysis of earnings calls, captures the firm's exposure to overall political uncertainty. First, we examine the relationship between regulatory fragmentation and political risk by creating a bin scatter plot of these two variables, which we report in Figure A3 of the Online Appendix. This plot shows a negligible correlation between political risk and regulatory fragmentation, suggesting that these two constructs are relatively distinct of one another. Second, we re-estimate equation (1) additionally controlling for *Political Risk*, as well as the tax-specific political risk proxy developed by Hassan et al. (2019) (*Tax Policy Risk*). We present these analyses in Table 9, including *Political Risk* (*Tax Political Risk*) in Column 1 (2). We find that the inclusion of these variables does not

materially affect the coefficient on *Regulatory Fragmentation*, and we do not document a statistically significant association between corporate tax burdens and either of the political risk measures. Taken together, the results in Table 9 and Figure A3 in the Online Appendix suggests that regulatory fragmentation and political risk are relatively distinct concepts, and that the association between regulatory fragmentation and corporate tax burdens does not appear to be driven by firm-level exposure to political risk.

4.8. Industry-level consequences

In our final set of analyses, we delve into the implications of regulatory oversight spillovers for industry-level tax burden dynamics. Specifically, we predict that regulatory fragmentation, by constraining tax avoidance opportunities via oversight spillovers, diminishes the opportunities for industry members to differentiate themselves or compete via tax planning. Consequently, we anticipate that industry-level exposure to regulatory fragmentation is positively associated with the similarity in firm-level ETRs across that industry.

We examine this idea using both univariable and multivariable approaches. First, in Figure 4, we create a bin scatter relating the average *Regulatory Fragmentation* in each SIC2 industry-year to $ETR\ Dispersion_{j,t}$ defined as the standard deviation of ETR within a 2-digit SIC industry j in year t. We observe a strong negative association between these two variables, consistent with greater levels of industry-level exposure to regulatory fragmentation constraining the ability of firms in that industry to gain competitive advantages via tax planning, thus reducing the spread of tax burdens within that industry.

We also test this idea in a multivariable framework by estimating the following regression:

$$ETR\ Dispersion_{j,t} = \beta_0 + \beta_1\ Regulatory\ Fragmentation_{j,t} + Controls_{j,t} + \text{FE} + \varepsilon_{j,t} \quad (2)$$

The unit of observation is at the industry-year level. The independent variable of interest is $Regulatory\ Fragmentation_{j,t}$, which we define as the average of the firm-level $Regulatory\ Fragmentation_{i,t}$ within industry j in year t. We include the same vector of control variables as in equation 1, now averaged at the SIC2 industry-year level. We also include the average *CETR* (*Mean CETR*) for all firms in that SIC2 industry-year to account for the general tax burden faced by that sector.[7]

We present the results of estimating equation 2 in Table 10. In column 1, we only include *Regulatory Fragmentation* and *Mean CETR* as independent variables. In subsequent columns, we layer in additional controls and fixed effects: column 2 includes year fixed effects, column 3 includes industry-year fixed effects (employing the SIC1 industry classification), and column 4 includes industry-year fixed effects and the industry-level time-varying control variables. Figure 4 is a visual illustration of Table 10 Column 2.

Across each specification, we find a negative and statistically significant coefficient on *Regulatory Fragmentation*. Taking Column 1 as an example, a one-standard-deviation increase in average regulatory fragmentation corresponds to a 0.007 reduction in *ETR Dispersion*, representing 8.13% of its unconditional sample mean 0.086. Applying this back-of-the-envelope calculation, the estimates in Table 10, which range from 0.007 to 0.035, correspond to an economic magnitude ranging from 8.13% to 40.70% of *ETR Dispersion*'s mean value. These findings are consistent with industry-level exposure to regulatory fragmentation constraining tax avoidance strategies, restricting firms' ability to engage in tax planning as a means of competition within their respective industries and thus fostering greater similarity in tax burdens among industry

[7] Given that the observations in this test are at the industry-year level, in contrast to the firm-year observations utilized in our primary analysis, we have opted to winsorize all variables according to their full-sample distribution, rather than their annual distribution, due to the relatively limited number of observations available for each individual year.

members. Overall, these results highlight the role of regulatory fragmentation in shaping industry-level tax burden dynamics, and consequently the competitive landscape within industries.

5. Conclusion

This study examines the impact of regulatory oversight spillovers on corporate tax burdens. Oversight from non-tax authority regulatory agencies can create documentation and information regarding the firm's operations and transactions, which in turn could be used by the tax authority in its tax enforcement efforts, either in identifying firms to audit or in conducting an actual audit. This could influence managements' perceptions of the costs to tax planning, inducing them to engage in less aggressive tax avoidance and thus exhibit higher tax burdens. If so, this would constitute a regulatory oversight spillover: that is, the oversight from one regulator influencing firm behavior that is under the purview of another regulator.

We operationalize the idea of regulatory oversight spillovers using a measure of regulatory fragmentation—the regulation of a particular topic by multiple government agencies—developed using textual analysis on the Federal Register and corporate annual reports. Since all U.S. firms are subject to IRS oversight, variation in firm-level exposure to regulatory fragmentation thus captures the extent to which non-tax authority oversight differs across firms. Using a sample of U.S. public firms, we document that regulatory fragmentation is positively associated with corporate tax burdens, measured using cash ETRs. This finding is broadly consistent with the existence of regulatory oversight spillovers: that is, non-tax authority oversight constraining firms' tax planning, which is under the purview of the IRS.

In further tests, we document that the positive association between regulatory fragmentation and tax burdens is stronger when the overall amount of regulation is greater, consistent with the monitoring by multiple non-tax authority monitors being more constraining

when the extent of that monitoring is more significant. Furthermore, we find that regulatory fragmentation is negatively associated IRS attention, suggesting that the oversight provided by these non-tax authority government agencies may be a substitute for IRS scrutiny. We also find that this positive association between regulatory fragmentation and tax burdens is mitigated in the presence of other external non-regulatory firm stakeholders (e.g., institutional owners), consistent with regulatory fragmentation playing a more important role in constraining tax planning in the relative absence of alternative monitors. These findings are broadly consistent with the notion that the additional external monitoring that comes with regulatory fragmentation constraining firms' ability or incentives to engage in tax avoidance. Finally, we document that regulatory fragmentation is associated with reduced dispersion in tax burdens within an industry, suggesting that monitoring by non-tax authority regulators reduces the ability of firms to gain a competitive advantage over industry peers through tax planning.

Our study contributes to several literatures. First, we add to the emerging literature on the consequences of regulatory burdens and fragmentation. Prior work in this area has linked regulatory fragmentation to increased spending on non-productive activities and decreased profitability, whereas our study highlights an additional consequence—higher tax collections by tax authorities. Second, our study contributes to the literature on corporate tax burdens and tax planning, and specifically the role of regulatory monitoring, which to date has focused almost exclusively on the role of tax authority oversight. In contrast, we examine the impact of *non-tax authority* oversight on tax burdens. By documenting the role of regulatory oversight by non-IRS government agencies in shaping corporate tax burdens, our study provides valuable insights into the complex interplay between regulation and taxation, and specifically that oversight from one regulator can impact firm behaviors under the purview of another regulator.

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Appendix: Variable definitions

This appendix provides the definitions for key variables employed in this study. Compustat/CRSP variable names are provided in parentheses where applicable.

Main variables

Variable	Definition
1 Y CETR	Cash taxes paid divided by pre-tax income minus special items, measured in year t.
Regulatory Fragmentation	Regulatory fragmentation measures the extent to which a firm's business is overseen by multiple federal agencies, following Kalmenovitz et al. (2022). Firstly, we define $\omega_{i,t,a}$ ($i, t, and\ a$ are subscripts for topic, year, and agency) as the fraction of the words in all Federal Register documents written by each agency in a given topic in a year. Secondly, we compute the importance of each topic for each firm-year observation $p_{f,t,i}$($f, t, and\ i$ are subscripts for firm, year, and topic) defined as the fraction of words in the firm's annual report devoted to the topic. Lastly, we multiply the fragmentation of the topic by its relative importance for each firm and sum the products for all 100 topics, as $1 - \sum_{t \in Topic\ Set} \sum_{a \in Agency\ Set}\ p_{f,t,i} * \omega_{i,t,a}^2$. Intuitively, this can be estimated as a weighted sum across all 100 topics of the dispersion of each topic across agencies where the weights equal the topic probability in the firm's annual report**.**
Regulatory Quantity	$= \sum_{t \in Topic\ Set} \sum_{a \in Agency\ Set}\ p_{f,t,i}\ \omega_{i,t,a}^2\ \boldsymbol{log(Topic\ Words, Fedreg)}$ where log ($Topic\ Words$, $Fecreg$) is the natural logarithm of the number of words in each topic.
Topic Dispersion	= 1 - $\sum_{t \in Topic\ Set} p_{f,t,i}^2$, where $p_{f,t,i}$ is the fraction of the annual report of firm f in year t dedicated to a given topic.

Control variables

Variable	Definition
Log Assets	Natural logarithm of total assets (at)
ROA	Earnings before interest, taxes, and depreciation and amortization (ebitda) scaled by total assets (at)
Leverage	Long-term debt (dltt) plus debt in current liabilities (dlc) divided by total assets (at).
Foreign Income	Foreign income (pifo) scaled by total assets (at).
Tangibility	Total net Property Plant and Equipment asset (ppent) scaled by total assets
MTB	Market value of equity (mve) divided by book value of equity (ceq)
NOL Carryforward	Net Operating Loss Carryforward (tlcf) scaled by total assets (at)
R&D	R&D expense (xrd) scaled by total assets (at)
Inst. Inv. Holding Pct	Number of shares by institutional investors, divided by total number of common shares outstanding (data source: 13F)
Analyst Following	Number of one-year forward annual ESP estimates made to a firm in a given year (IBES item: numest)
Log (10-k Length)	Natural logarithm of number of words in 10-K files (Source: Loughran-McDonald website)
Number of Segment	Number of segments (source: Compustat historic segment disclosure file)

Robustness variables

Variable	Definition
High Fragmentation	An indicator variable equal to one if *Regulatory Fragmentation* is above the median and zero otherwise.
1Y Book ETR	Total income tax divided by pre-tax income minus special items, measured in year t.
1Y Delta MVA	The tax avoidance measure developed by Henry and Sansing (2018), constructed as the difference between a firm's cash taxes paid, adjusted for tax refunds receivable, and the product of its pre-tax book income and the statutory tax rate (i.e., 0.35 on and before 2017 and 0.21 after 2017), adjusted by the market value of a firm's equity.
3YR CETR(F)	Cash taxes paid divided by pre-tax income minus special items, measured over the window of [t, t+2].
3YR CETR(L)	Cash taxes paid divided by pre-tax income minus special items, measured over the window of [t-2, t].
5YR CETR(F)	Cash taxes paid divided by pre-tax income minus special items, measured over the window of [t, t+4].

Other variables

Variable	Definition
IRS Attention	An indicator variable that equals one if the number of IRS downloads of SEC filings for a given firm-year is greater than zero and zero otherwise, using the approach developed by Bozanic et al. (2017).
High Analyst Coverage	An indicator variable equal to one if *Analyst Following* is in the top quintile of the sample, and zero otherwise.
High Inst. Inv. Holding Pct.	An indicator variable equal to one if *Inst. Inv. Holding Pct* is in the top quintile of the sample, and zero otherwise.
Log (1 + the number of subsidiaries)	The logarithm of the number of subsidiaries.
Log (1 + the number of foreign subsidiaries)	The logarithm of the number of foreign subsidiaries.
Log (1 + the number of domestic subsidiaries)	The logarithm of the number of domestic subsidiaries.
Foreign Sub/Total Sub	The ratio of foreign subsidiaries over total subsidiaries
Haven Sub/ Foreign Sub	The ratio of haven subsidiaries over foreign subsidiaries
Political Risk	The measure of firm-level exposure to political risk developed by Hassan et al. (2019) is defined as the frequency with which sentences containing discussions of political issues by managers are located near expressions of uncertainty.
Tax Policy Risk	The measure of firm-level exposure to tax-related political risk developed by Hassan et al. (2019) is defined as the frequency with which sentences containing discussions of tax policy political issues by managers are located near expressions of uncertainty.
ETR Dispersion	The standard deviation of ETR within a 2-digit SIC industry j in year t.

Figure 1: Regulatory Fragmentation and Tax Burdens over Time

The figure presents the results of regressing either *1YR CETR* (blue line) or *Regulatory Fragmentation* (red line) on year indicator variables, omitting the variable for 1996 (used as the base year). We plot the coefficients on each year indicator variable along with their 95 percent confidence interval. All variables are defined in the Appendix.

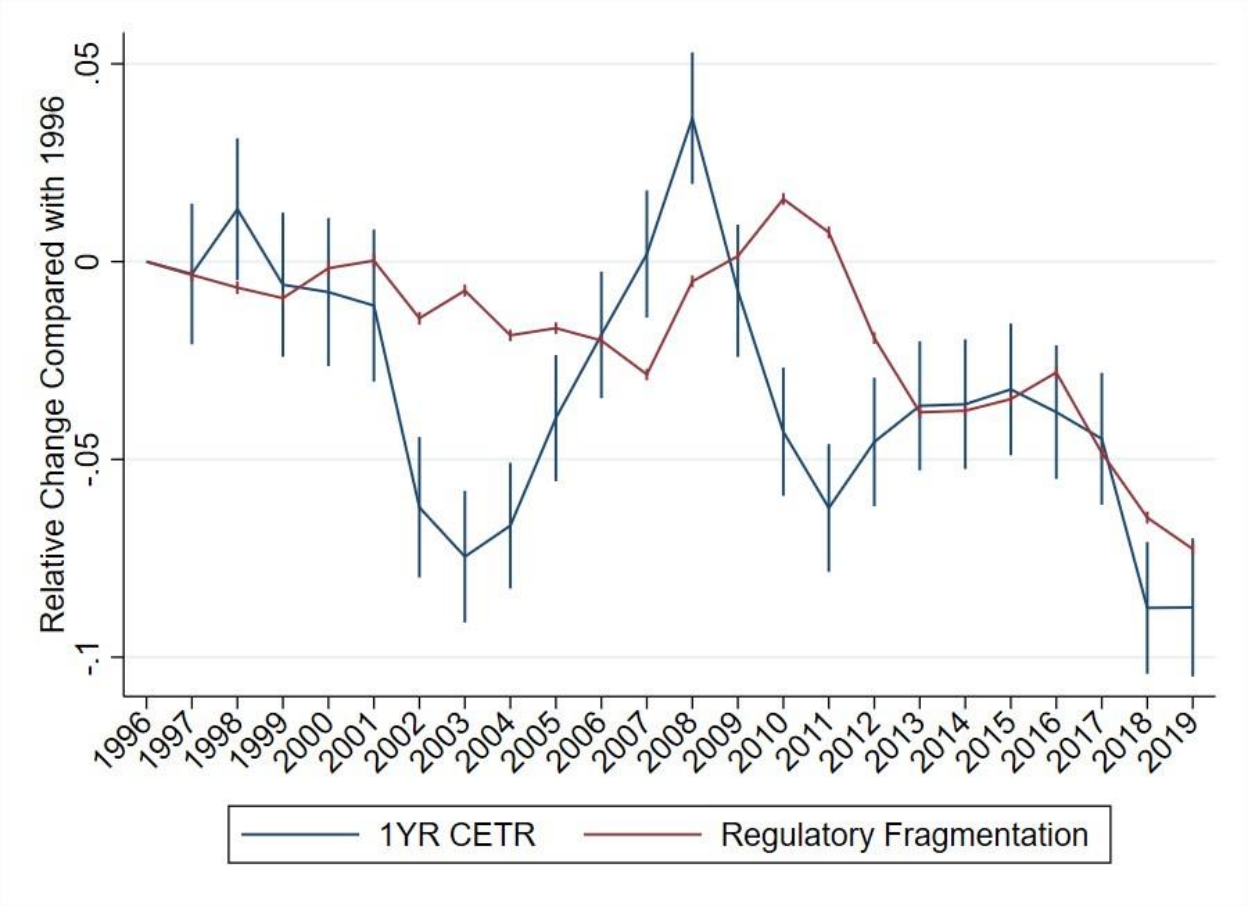

Figure 2: Association between Regulatory Fragmentation and Tax Burdens

The figure presents a bin scatter plot that examines the relationship between *Regulatory Fragmentation* and *1YR CETR*. We control for year fixed effects in the analysis. All variables are defined in the Appendix.

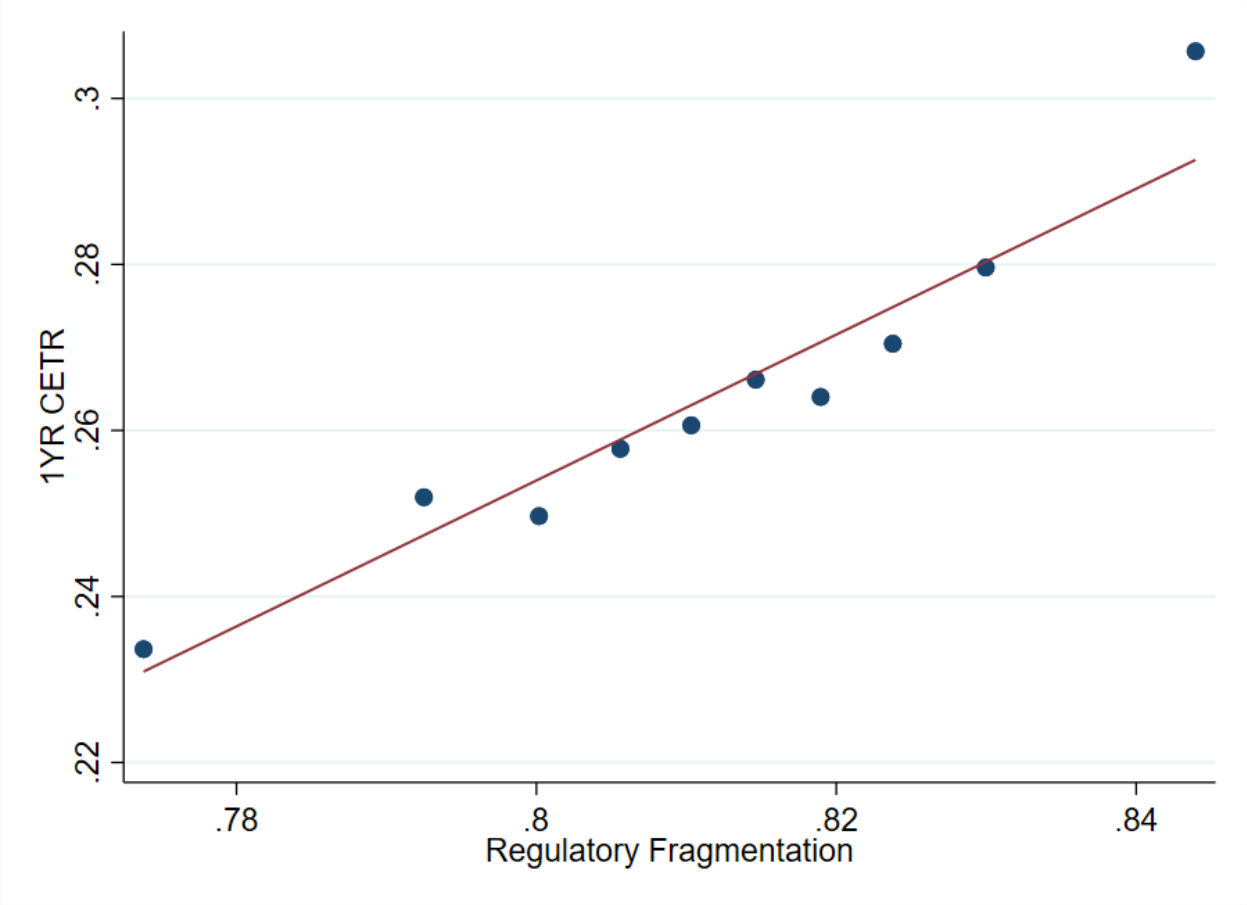

Figure 3: Regulatory Fragmentation, Regulatory Quantity, and Tax Burdens

The figure presents the results of regressing *1YR CETR*, the one-year cash ETR, on three independent variables: the regulatory fragmentation decile value (treated as a continuous variable), the regulatory quantity decile value (also treated as a continuous variable), and their interaction term. The decile values are defined using the entire sample. We also include year and industry fixed effects in the specification. We then evaluate the predicted ETR value at each combination of the 1st, 2nd, 9th, and 10th deciles of regulatory fragmentation and every decile of regulatory quantity. The figure presents the linear predicted values for each group, with shades indicating the 95 percent confidence interval. Standard errors are clustered at the firm level. All variables are defined in the Appendix.

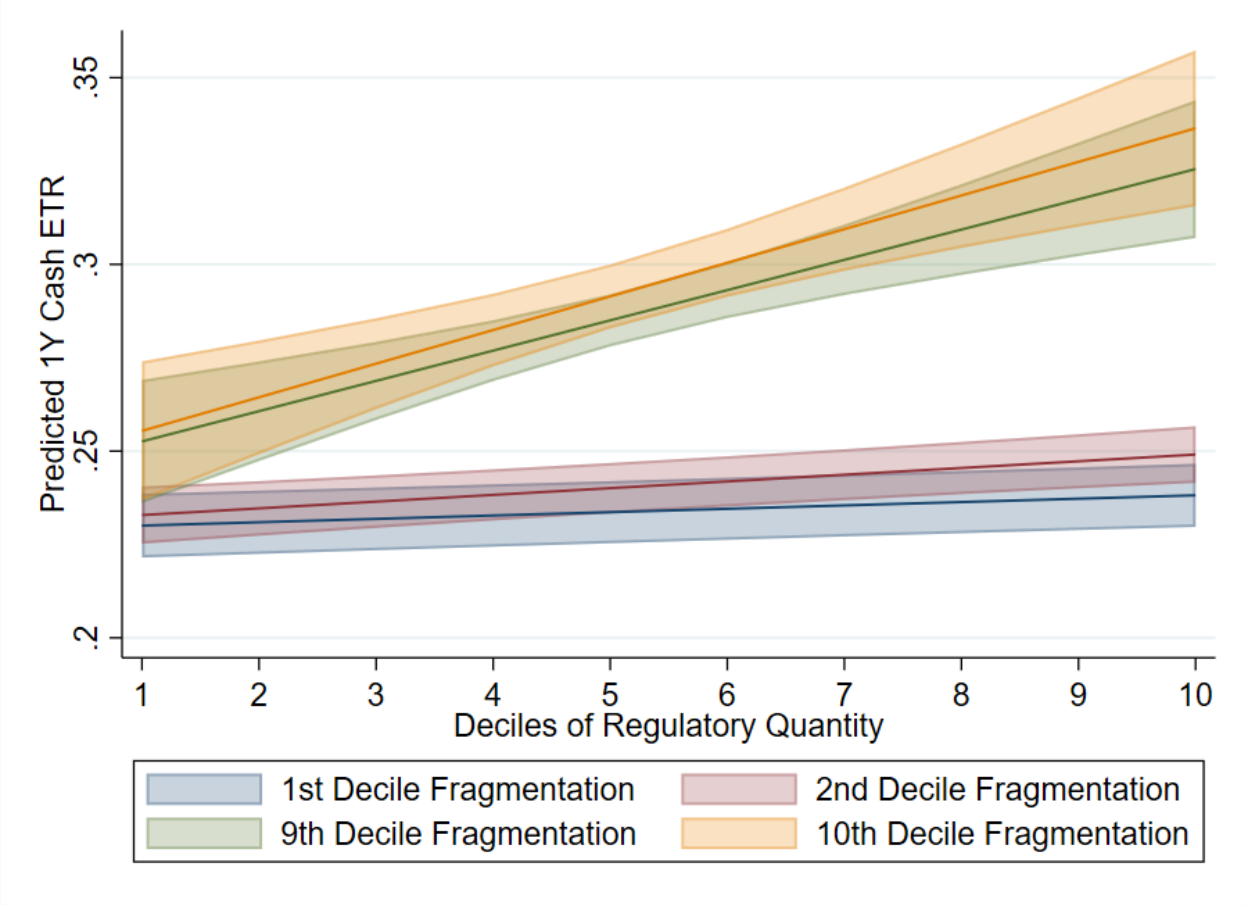

Figure 4: Association between Regulatory Fragmentation and Tax Burden Dispersion

The figure presents a bin scatter plot that examines the relationship between the average *Regulatory Fragmentation* and the standard deviation of *1YR CETR*, with both defined at the SIC2 industry-year level. We control for year fixed effects and the industry-year mean value of ETR in the analysis. All variables are defined in the Appendix.

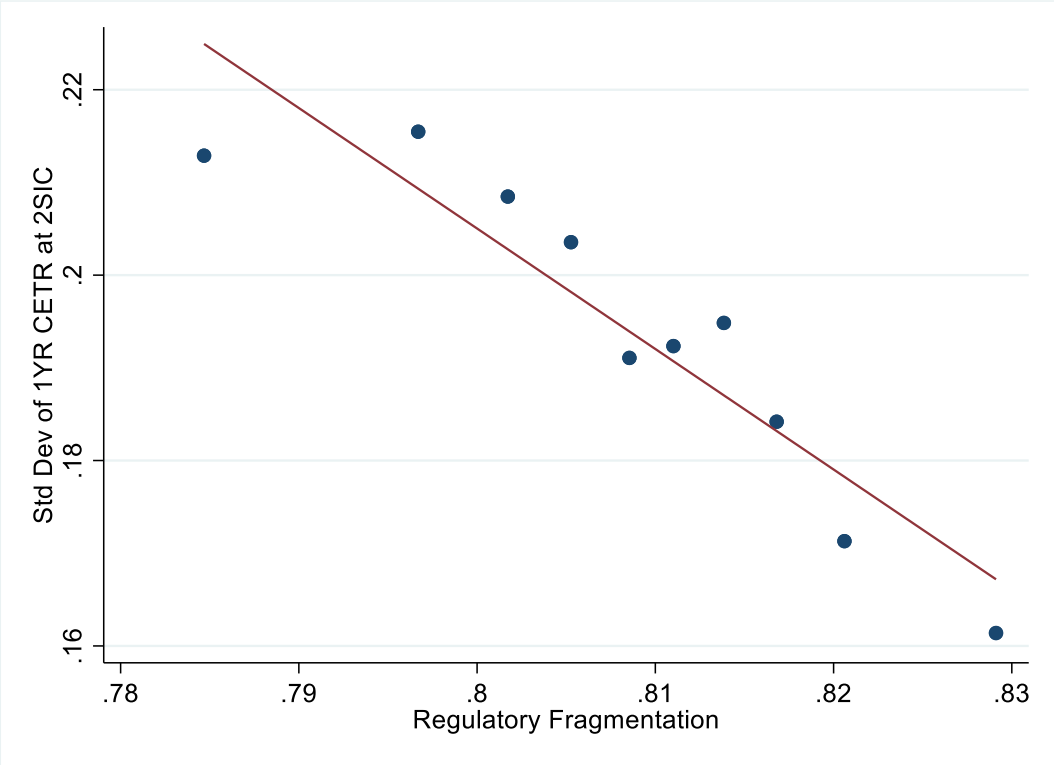

Table 1: Sample Selection

This table presents our sample selection process and final main regression sample. All variables are defined in the Appendix.

	# of firm-year
Compustat-CRSP merged (1995 - 2019)	160,806
Less: firms with negative pre-tax income	(48,489)
Less: Missing regulatory fragmentation measure	(68,167)
Less: Missing *1YR CETR* variable & control variables	(4,300)
Total	39,850

Table 2: Descriptive Statistics

This table presents descriptive statistics on the key variables employed in our analyses for our primary sample of 39,850 firm-year observations. All variables are defined in Appendix.

	Mean	Std Dev	25 Pctl.	Median	75 Pctl.
1 Year ETR	0.264	0.216	0.106	0.244	0.353
Regulatory Fragmentation	0.811	0.029	0.794	0.813	0.832
Topic Dispersion	0.928	0.024	0.924	0.934	0.942
Regulatory Quantity Decile	5.741	2.887	3	6	8
Firm Size	6.786	1.895	5.496	6.751	8.005
ROA	0.134	0.086	0.078	0.126	0.178
Leverage	0.203	0.188	0.039	0.166	0.313
Foreign Income	0.016	0.032	0	0	0.02
Tangibility	0.222	0.219	0.05	0.152	0.322
MTB	2.834	4.24	1.245	1.988	3.34
Net Operating Loss Carryforward	0.082	0.333	0	0	0.034
R&D	0.022	0.044	0	0	0.024
Analyst Coverage	6.078	7.197	0	3	9
Inst. Inv. Holding Pct	0.528	0.352	0.179	0.605	0.848
Log (10-k Length)	10.637	0.575	10.298	10.667	11.004
Number of Segment	1.587	0.897	1	1	2

Table 3: Regulatory Fragmentation and Tax Burdens

The table presents the results from OLS regressions of equation (1). The dependent variable is *1YR CETR*, defined as the one-year cash ETR. The key independent variable is *Regulatory Fragmentation*, which is the measure of the extent to which a firm's business is overseen by multiple federal agencies developed by Kalmenovitz (2022). In column (1), we only include *Regulatory Fragmentation* as an independent variable. In column (2), we additionally include SIC2 industry fixed effects and year fixed effects. In column (3), we additionally include the firm-level time-varying control variables from equation (1). All variables are defined in Appendix. All independent variables have been winsorized at the 1st and 99th percentiles in each year and 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.

	(1)	*(2)*	*(3)*
VARIABLES	***1YR CETR***	***1YR CETR***	***1YR CETR***
Regulatory Fragmentation	**0.022*** **	**0.021*** **	**0.022*** **
	(15.48)	**(7.89)**	**(8.16)**
Topic Dispersion			0.005
			(1.33)
Regulatory Quantity Decile			0.002
			(0.67)
Firm Size			0.013***
			(4.53)
ROA			-0.006*
			(-1.83)
Leverage			-0.002
			(-0.73)
Foreign Income			-0.005**
			(-2.48)
Tangibility			-0.019***
			(-6.78)
MTB			-0.006***
			(-3.67)
Net Operating Loss Carryforward			-0.051***
			(-8.84)
R&D			-0.020***
			(-5.90)
Analyst Coverage			-0.009***
			(-4.37)
Inst. Inv. Holding Pct			0.006***
			(2.72)
Log (10-k Length)			-0.007***
			(-4.22)
Number of Segment			0.001
			(0.43)
Observations	39,850	39,850	39,850
Adjusted R-squared	0.010	0.051	0.068
Controls	No	No	Yes
FE	None	SIC2 & Year	SIC2 & Year

Table 4: Robustness to Alternative Specifications

The table presents the results from OLS regressions of modified versions of equation (1). Panel A presents the results of estimating equation (1) replacing *Regulatory Fragmentation* with *High Fragmentation*, an indicator variable equal to one if *Regulatory Fragmentation* is above the median and zero otherwise. The specifications for columns (1) – (3) in this panel are otherwise the same as the corresponding columns in Table 3. Panel B presents the results of estimating equation (1) using alternative definitions of cash ETR, with column (1), (2), and (3) employing a cash ETR measured over the years [t, t+2], [t, t+4], and [t-2, t] respectively. For column 3, *Regulatory Fragmentation* and control variables are calculated in the rolling window of [t-2, t]. Panel C presents the results of estimating equation (1) using alternative dependent variables, all defined in year t. Column (1) use *1Y BETR*, the one-year GAAP ETR. Column (2) uses *1Y DMVA*, the one-year delta MVA measure developed by Henry and Sansing (2018). Column (3) uses the *Adjusted CETR*, which is the one-year cash ETR adjusted for the mean ETR in the firm's industry and size quintile, following Balakrishnan, Blouin, and Guay (2017). Each column in Panel B and C includes the full set of control variables, SIC2 industry fixed effects, and year fixed effects. All variables are defined in Appendix. All continuous independent variables have been winsorized at the 1st and 99th percentiles in each year and 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.

Panel A: Alternative Measure of Regulatory Intensity - Indicator for High Regulatory Fragmentation

	(1)	*(2)*	*(3)*
VARIABLES		***1YR CETR***	
High Fragmentation	**0.031*** **	**0.019*** **	**0.020*** **
	(11.72)	**(5.37)**	**(5.44)**
Observations	39,850	39,850	39,850
Adjusted R-squared	0.005	0.050	0.066
Controls	No	No	Yes
FE	None	SIC2 & Year	SIC2 & Year

Panel B: Measuring Cash ETR in a Rolling Window

	(1)	*(2)*	*(3)*
VARIABLES	***3YR CETR(F)***	***5YR CETR(F)***	***3YR CETR (L)***
Regulatory Fragmentation	**0.022*** **	**0.023*** **	**0.023*** **
	(7.62)	**(6.47)**	**(7.83)**
Observations	33,274	26,835	30,501
Adjusted R-squared	0.095	0.094	0.091
Controls	Yes	Yes	Yes
FE	SIC2 & Year	SIC2 & Year	SIC2 & Year

Panel C: Alternative Measures of Contemporaneous ETR

	(1)	*(2)*	*(3)*
VARIABLES	***1YR BETR***	***1YR DMVA***	***Adjusted CETR***
Regulatory Fragmentation	**0.008*** **	**0.002*** **	**0.010*** **
	(3.79)	**(5.63)**	**(4.51)**
Observations	39,850	53,020	39,850
Adjusted R-squared	0.092	0.330	0.011
Controls	Yes	Yes	Yes
FE	SIC2 & Year	SIC2 & Year	SIC2 & Year

Table 5: Regulatory Fragmentation and Quantity

The table presents the results from OLS regressions of modified versions of equation (1). The dependent variable is *1YR CETR*, defined as the one-year cash ETR. The key independent variable is *Regulatory Fragmentation*, which is the measure of the extent to which a firm's business is overseen by multiple federal agencies developed by Kalmenovitz (2022). We also include an additional independent variable, *Regulatory Quantity Decile*, which captures the within-year decile rank of the quantity of regulation to which the firm is exposed, as measured by Kalmenovitz et al. (2022), and its interaction with *Regulatory Fragmentation*. Each column include SIC2 industry fixed effects and year fixed effects. Column (1) ((2)) does (does not) include the vector of firm-level time-varying control variables from equation (1). All variables are defined in Appendix. All continuous independent variables have been winsorized at the 1st and 99th percentiles in each year and 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.

	(1)	***(2)***
VARIABLES	***1YR CETR***	
Regulatory Fragmentation	0.021***	0.022***
	(7.44)	(8.06)
Regulatory Quantity Decile	0.001	0.001
	(0.24)	(0.25)
Regulatory Fragmentation X Regulatory Quantity Decile	**0.005*** **	**0.006*** **
	(2.93)	**(3.44)**
Observations	39,850	39,850
Adjusted R-squared	0.052	0.068
Controls	No	Yes
FE	SIC2 & Year	SIC2 & Year

Table 6: Regulatory Fragmentation and IRS Attention

The table presents the results from the OLS regression of a modified version of equation (1). The dependent variable is *IRS Attention*, an indicator variable that equals one if the number of IRS downloads of SEC filings for a given firm-year is greater than zero and zero otherwise, using the approach developed by Bozanic et al. (2017). The key independent variable is *Regulatory Fragmentation*, which is the measure of the extent to which a firm's business is overseen by multiple federal agencies developed by Kalmenovitz (2022). The regression includes the firm-level time-varying control variables from equation (1), as well as SIC2 industry and year fixed effects. The sample period of this table is between year 2004 and year 2015, consistent with Bozanic et al. (2017). All variables are defined in Appendix. All continuous independent variables have been winsorized at the 1st and 99th percentiles in each year and 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.

VARIABLES	***(1)*** ***IRS Attention***
Regulatory Fragmentation	**-0.014**** **(-2.41)**
Observations	23,449
Adjusted R-squared	0.480
Controls	Yes
FE	SIC2 & Year

Table 7: Regulatory Fragmentation and Capital Market Monitoring

The table presents the results from OLS regressions of modified versions of equation (1). The dependent variable is *1YR CETR*, defined as the one-year cash ETR. The key independent variable is *Regulatory Fragmentation*, which is the measure of the extent to which a firm's business is overseen by multiple federal agencies developed by Kalmenovitz (2022). In each column, we also include an additional independent variable along with its interaction with *Regulatory Fragmentation*. In columns (1) and (2), the additional variable is *Analyst Following* and *Inst. Inv. Holding Pct.*, respectively. *Analyst Following* is the number of analysts covering a firm in a fiscal year. *Ins. Inv. Holding Pct* is the percentage of a firms' shares outstanding is held by institutional investors. In columns (3) and (4), the additional variable is *High Analyst Coverage* and *High Inst. Inv. Holding Pct.*, respectively, where each variable is defined as an indicator variable equal to one if the corresponding underlying variable is in the top quintile of the sample, and zero otherwise. Each column includes the firm-level time-varying control variables from equation (1), as well as SIC2 industry and year fixed effects. All variables are defined in Appendix. All continuous independent variables have been winsorized at the 1st and 99th percentiles in each year and 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.

	(1)	(2)	(3)	(4)
VARIABLES		***1YR CETR***		
Regulatory Fragmentation	0.023***	0.023***	0.024***	0.025***
	(8.25)	(8.30)	(8.01)	(8.65)
Reg Frag X Analyst Coverage	-0.002*			
	(-1.67)			
Reg Frag X Inst. Inv. Holding Pct		-0.003**		
		(-2.15)		
Reg Frag X High Analyst Coverage			-0.006**	
			(-2.94)	
Reg Frag X High Inst. Inv. Holding Pct				-0.008**
				(-2.29)
Effect of ***Reg Frag*** in the ***High Analyst Following*** Group			.006	
(P-value for the F-stat)			(0.1228)	
Effect of ***Reg Frag*** in the ***High Inv. Holding Pct*** Group				.007*
(P-value for the F-stat)				(0.0977)
Observations	34,993	34,993	34,993	34,993
Adjusted R-squared	0.365	0.365	0.365	0.365
Controls	Yes	Yes	Yes	Yes
FE	Firm & Year	Firm & Year	Firm & Year	Firm & Year
Lower order term	Yes	Yes	Yes	Yes

Table 8: Regulatory Fragmentation and Subsidiary Structure

The table presents the results from OLS regressions of modified versions of equation (1). The key independent variable is *Regulatory Fragmentation*, which is the measure of the extent to which a firm's business is overseen by multiple federal agencies developed by Kalmenovitz (2022). Each column employs a different dependent variable. In column (1), the dependent variable is the logarithm of the number of foreign subsidiaries, *Log (1 + the number of foreign subsidiaries)*. In column (2), the dependent variable is the logarithm of the number of domestic subsidiaries, *Log (1 + the number of domestic subsidiaries*. In column (3), the dependent variable is the ratio of foreign subsidiaries over total subsidiaries, *Foreign Sub/Total Sub*. In column (4), the dependent variable is the ratio of haven subsidiaries over foreign subsidiaries, *Haven Sub/ Foreign Sub*. Each column includes the firm-level time-varying control variables from equation (1), as well as SIC2 industry and year fixed effects. Columns (1) and (2) employ the same sample as Table 3, Column (3). Column (3) only employs observations with non-zero subsidiaries (i.e., non-zero denominator). Column (4) only employs observations with non-zero foreign subsidiaries (i.e., non-zero denominator). All variables are defined in Appendix. All continuous independent variables have been winsorized at the 1st and 99th percentiles in each year and 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.

VARIABLES	*(1)* ***Log (1 + # of foreign subsidiaries)***	*(2)* ***Log (1 + # of domestic subsidiaries)***	*(3)* ***Foreign Sub/Total Sub***	*(4)* ***Haven Sub/ Foreign Sub***
Regulatory Fragmentation	**0.144***** **(8.11)**	**-0.060***** **(-5.93)**	**0.026***** **(3.97)**	**-0.017**** **(-2.21)**
Log (1 + # of subsidiaries)	1.078*** (62.76)	1.389*** (159.95)		
Observations	39,850	39,850	29,149	20,936
Adjusted R-squared	0.773	0.890	0.501	0.091
Controls	Yes	Yes	Yes	Yes
FE	SIC2 & Year	SIC2 & Year	SIC2 & Year	SIC2 & Year

Table 9: Regulatory Fragmentation and Political Risk

The table presents the results from OLS regressions of modified versions of equation (1). The dependent variable is *1YR CETR*, defined as the one-year cash ETR. The key independent variable is *Regulatory Fragmentation*, which is the measure of the extent to which a firm's business is overseen by multiple federal agencies developed by Kalmenovitz (2022). In column 1, we additionally include *Political Risk*, the measure of firm-level exposure to political risk developed by Hassan et al. (2019). In column 2, we additionally include *Tax Political Risk*, the measure of firm-level exposure to tax-related political risk developed by Hassan et al. (2019). Each column includes the firm-level time-varying control variables from equation (1), as well as SIC2 industry and year fixed effects. All variables are defined in Appendix. All continuous independent variables have been winsorized at the 1st and 99th percentiles in each year and 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.

	(1)	(2)
VARIABLES	***1YR CETR***	
Regulatory Fragmentation	**0.026*** **	**0.026*** **
	(6.82)	**(6.83)**
Political Risk	0.003*	
	(1.73)	
Tax Policy Risk		0.003*
		(1.70)
Observations	24,463	24,463
Adjusted R-squared	0.074	0.074
Controls	Yes	Yes
FE	SIC2 & Year	SIC2 & Year

Table 10: Within-Industry Tax Burden Dispersion

The table presents the results from OLS regressions of equation (2). Each observation corresponds to the 2-digit SIC industry-year level. The dependent variable is *ETR Dispersion*, is the standard deviation of one-year cash ETR within the two-digit SIC industry. The key independent variable, *Mean Regulatory Fragmentation*, is the average of *Regulatory Fragmentation* within a two-digit SIC industry, where *Regulatory Fragmentation* is the measure of the extent to which a firm's business is overseen by multiple federal agencies developed by Kalmenovitz (2022). Each column also includes *Mean 1YR CETR* (the average one-year cash ETR in that SIC2 industry-year). In column (1), we only include *Mean Regulatory Fragmentation* and *Mean 1YR ETR*. In column (2), we additionally include year fixed effects. In column (3), we replace year fixed effects with SIC1 industry by year fixed effects. In column (4), we additionally include yearly industry averages of the control variables from equation (1). All variables are defined in Appendix. All continuous independent variables have been winsorized at the 1st and 99th percentiles and 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 SIC2 industry level. We use *, **, and *** to denote statistical significance at the 0.10, 0.05, and 0.01 levels.

VARIABLES	***(1)*** ***ETR Dispersion***	***(2)*** ***ETR Dispersion***	***(3)*** ***ETR Dispersion***	***(4)*** ***ETR Dispersion***
Mean Regulatory Fragmentation	**-0.007****	**-0.033*****	**-0.035*****	**-0.018****
	(-2.59)	**(-3.39)**	**(-3.20)**	**(-2.28)**
Mean 1YR CETR	0.051***	0.055***	0.055***	0.063***
	(12.08)	(12.15)	(10.95)	(17.80)
Unit of Observation	Industry-Year	Industry-Year	Industry-Year	Industry-Year
Observations	1,534	1,534	1,491	1,491
Adjusted R-squared	0.293	0.323	0.339	0.455
Controls	No	No	No	Yes
FE	None	Year	SIC1 x Year	SIC1 x Year

ONLINE APPENDIX

to

Spillovers from Regulatory Fragmentation: Evidence from Corporate Tax Burdens

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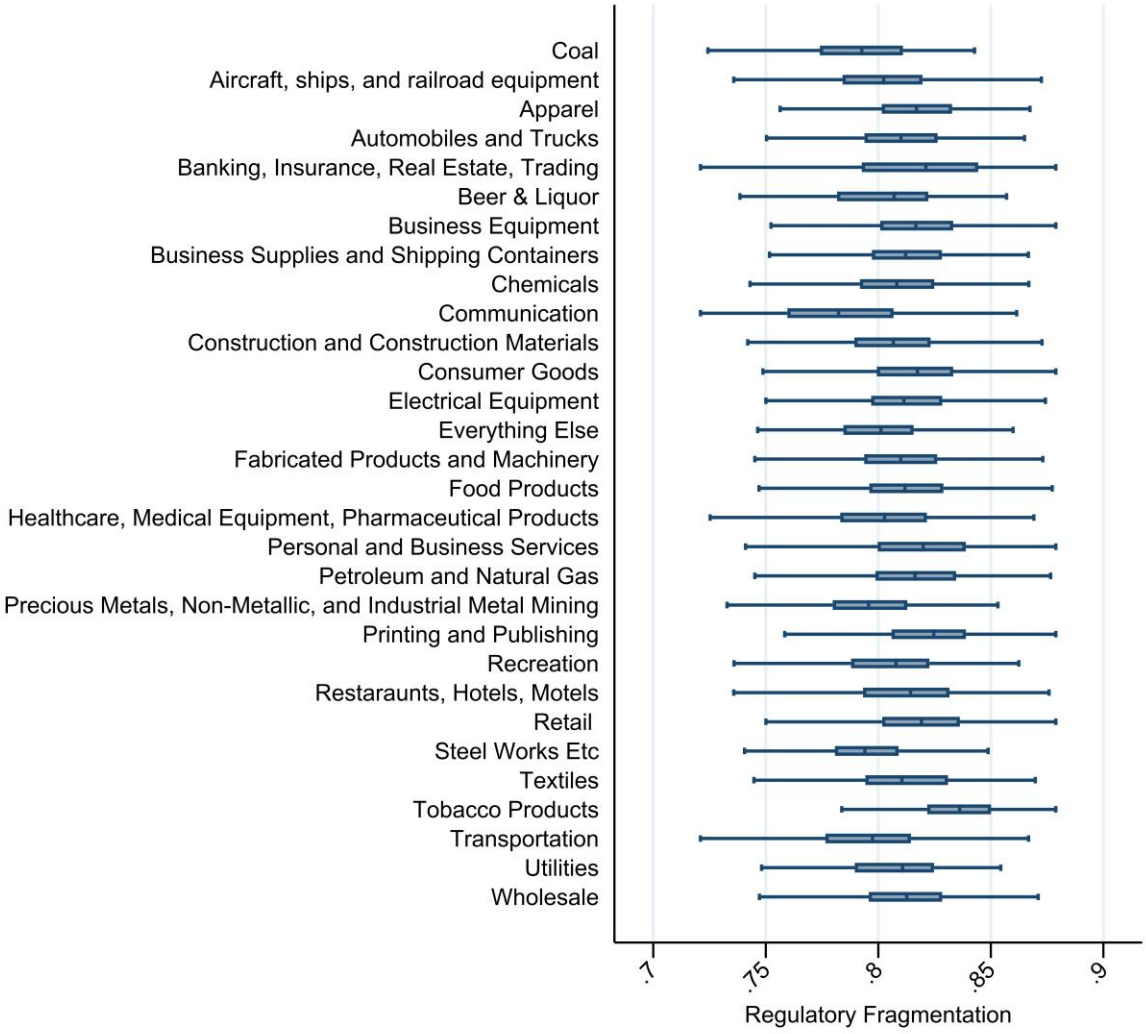
Figure A1: Variation in Regulatory Fragmentation

Panel A: By-industry Distribution of Regulatory Fragmentation

This figure graphs the distribution of our regulatory fragmentation 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.



Panel B: Source of Regulatory Fragmentation's Variation

This figure presents the histogram of the regulatory fragmentation 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.

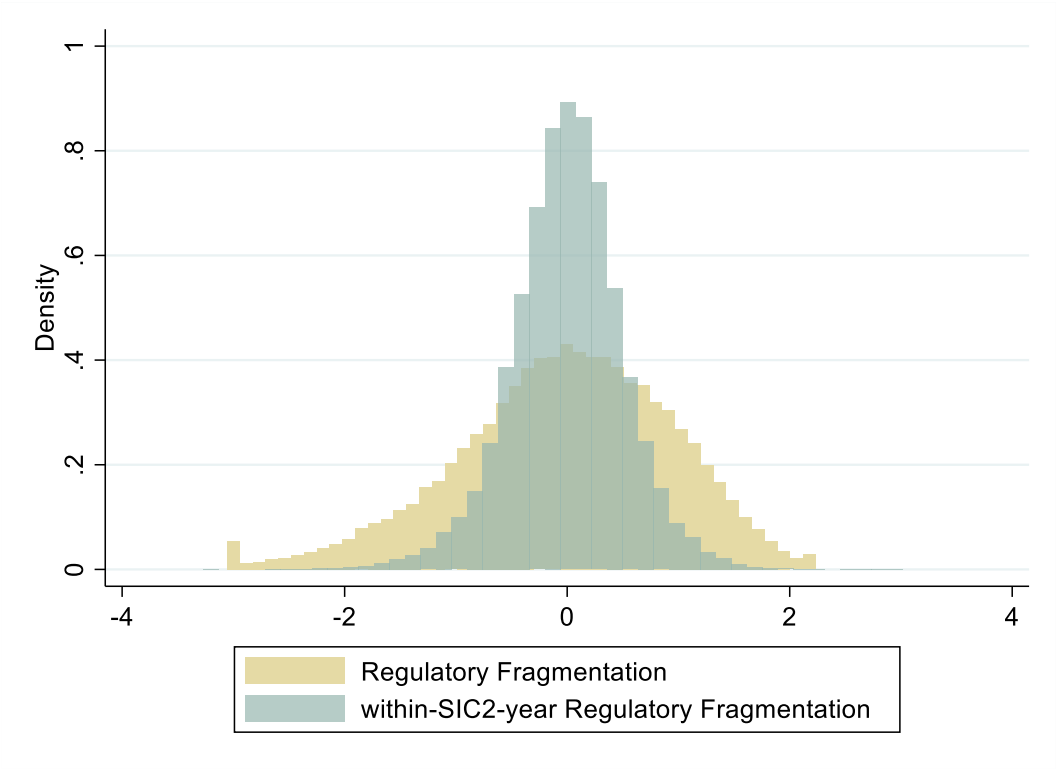
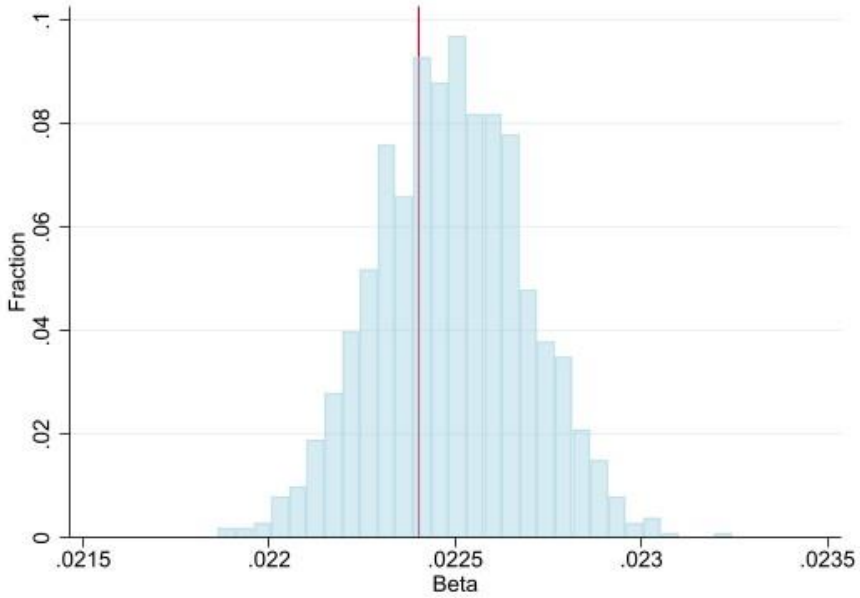


Figure A2: Sensitivity to Sample Composition

The two figures below plot the distribution of t-statistics and coefficient from estimations of our main specification (Table 3, column 3). Each time we randomly drop 1 percent of the sample, following Broderick et al. (2020). The vertical red line corresponds to the coefficient and t-statistics of the regression in Table 3, column 3.

Panel A: Distribution of Coefficients



Panel B: Distribution of t-statistics

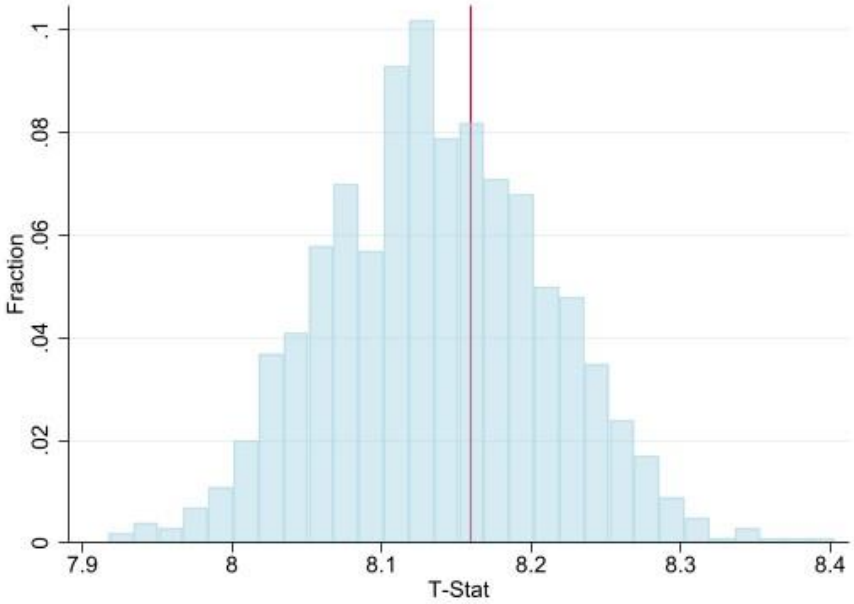


Figure A3: Association between Regulatory Fragmentation and Political Risk

The figure presents a bin scatter plot that examines the relationship between *Regulatory Fragmentation* and *Political Risk* (the measure of firm-specific exposure to political risk developed by Hassan et al. (2019)). We control for year fixed effects and firm-level time-varying control variables in the analysis. All variables are defined in the Appendix.

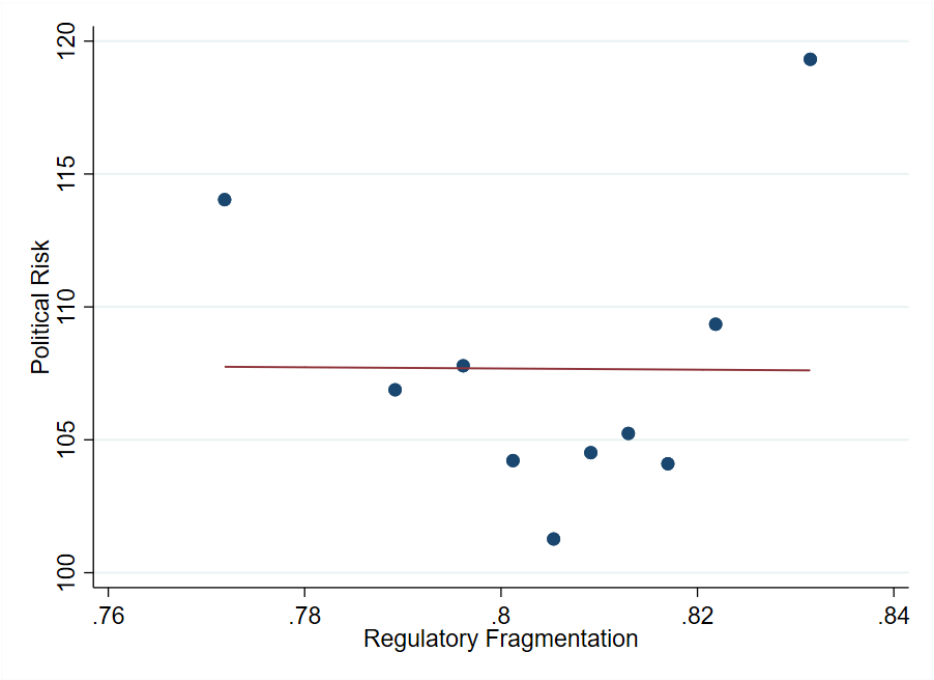


Table A1: Excluding Financial and Utility Firms

The table presents the results from panel OLS regressions of equation (1), which examines the relation between tax burden and regulatory fragmentation. The dependent variable, *1YR CETR*, is defined as the one-year cash ETR. The independent variable, *Regulatory Fragmentation*, captures the extent to which a firm's business is overseen by multiple federal agencies, developed according to the textual description of a firm's 10K and regulatory documents (Kalmenovitz et al. 2022). The sample of this period excludes all financial and utility firms. The specifications of this tables is the same as the corresponding column in Table 3. In column (1), we present a univariate specification by regressing one-year cash ETR on the fragmentation measure without control or fixed effects. In column (2), we add 2-digit SIC industry fixed effects and year fixed effects to column (1). Column (3) uses full set of controls in column (3) and 2-digit SIC industry fixed effects and year fixed effects. All variables are defined in Appendix. All continuous independent variables have been winsorized at the 1st and 99th percentiles in each year and 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.

VARIABLES	*(1)* *1YR CETR*	*(2)* *1YR CETR*	*(3)* *1YR CETR*
Regulatory Fragmentation	**0.014*** **	**0.012*** **	**0.013*** **
	(8.90)	**(3.93)**	**(4.10)**
Topic Dispersion			0.004
			(0.77)
Regulatory Quantity Decile			0.003
			(0.77)
Firm Size			0.017***
			(5.49)
ROA			-0.005
			(-1.54)
Leverage			-0.006***
			(-2.94)
Foreign Income			-0.005***
			(-2.86)
Tangibility			-0.020***
			(-6.70)
MTB			-0.007***
			(-3.93)
Net Operating Loss Carryforward			-0.051***
			(-8.65)
R&D			-0.021***
			(-6.27)
Analyst Coverage			-0.012***
			(-5.21)
Inst. Inv. Holding Pct			0.006***
			(2.81)
Log (10-k Length)			-0.006***
			(-3.37)
Number of Segment			0.001
			(0.62)
Observations	32,940	32,940	32,940
Adjusted R-squared	0.004	0.046	0.067
Controls	No	No	Yes
FE	None	SIC2 & Year	SIC2 & Year