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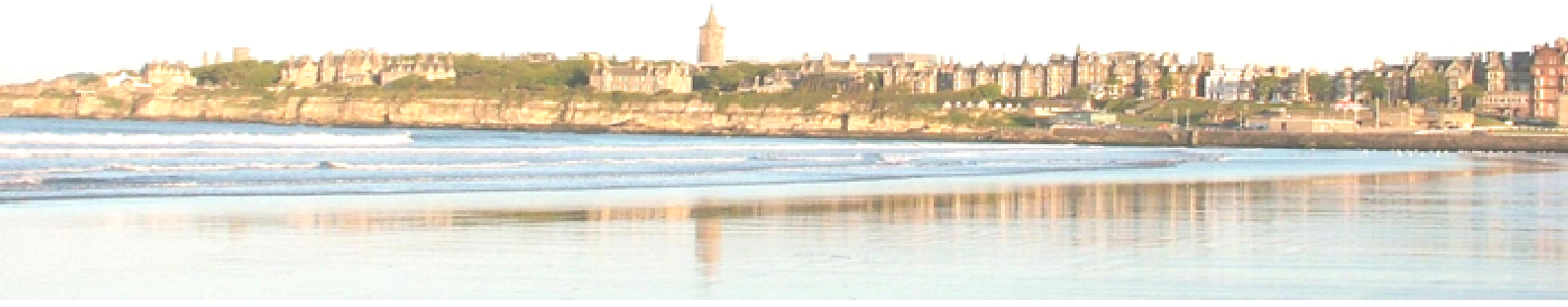

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Informational Lobbying and Regulatory Enforcement: Theory and Application*

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Abstract

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1 Introduction

Lobbying is an ubiquitous way for firms and interest groups to gain political influence. Economic theory has established two main motives: The political decision maker may decide in a lobbying interest group's favour in exchange for a reward (e.g. Laffont and Tirole (1991), Grossman and Helpman (1994)), or the interest group may engage in informational lobbying to communicate private information that is relevant for the decision (e.g. Potters and Van Winden (1992), Grossman and Helpman (2001)).

Recent empirical evidence suggests that lobbying is also used to influence decisions in the context of the enforcement of laws or regulations (Correia (2014), Lambert (2019)). This is surprising from a theoretical point of view: If lobbying is effective in reducing the probability of getting caught, wrongdoers will have higher incentives to lobby than compliant firms. However, this allows the enforcement agent to infer that a lobbying firm has probably done wrong. Hence, if investigations of wrongdoing are costly, an enforcement agent could save some of these costs by focusing investigations on lobbying firms. However, this would make them more likely to be punished and remove the incentives to lobby in the first place. Indeed, the existing theoretical models of potential wrongdoers' influence on law enforcement decisions are confined to the quid-pro-quo motive (e.g. Polinsky and Shavell (2001)) rather than informational lobbying.

This paper's main contribution to this literature is to offer a theoretical rationale for informational lobbying in the context of regulatory enforcement: We model informational lobbying as a costly technology for a firm to disclose its 'type', i.e., private information on its private and the social consequences of violating the regulation. Then, it may be optimal for the enforcement agent to commit to a lower investigation effort towards those types of firms for whom the social return on investigation effort is low. These types may be particularly hard or easy to deter, or their violation less harmful for society. This creates incentives for these types to be disclosed in the first place and allows the enforcement agent to focus her costly investigation effort on cases with a high return on investigation effort.

Using a dataset of bank lobbying and enforcement actions in the US, our second contribution is to show that it is only those banks with a high corporate governance quality that are less likely to receive an enforcement action when they lobby. Interpreting corporate governance quality as a proxy for a bank's privately known ability to manage risks, we argue that this result is in line with our theory. Hence, our empirical analysis supports the informational motive for lobbying in the context of bank regulation.

Our theory extends a standard model of crime and deterrence in the tradition of Becker (1968) by introducing the possibility of costly disclosure of a potential offender's private information in the spirit of Townsend (1979).[1] The game starts with the regulatory enforcement agent announcing and committing to an investigation strategy, i.e., intensities of investigating a firm, conditional on the information that she will have by then. A firm then decides whether to comply with or violate the regulation and whether to disclose some private information that reveals both its private gain and society's harm from this potential violation. Last, the enforcement agent implements the investigation strategy, which is more likely to yield evidence if the investigation intensity is higher and the firm guilty. If evidence is found, an exogenously given punishment is imposed on the firm.

As we assume that the enforcement agent's objective is to maximise social welfare, the availability of lobbying can never reduce welfare in equilibrium. There may be three sets of types disclosed in equilibrium: First, those types that would have been undeterred anyway are promised to be let off the hook. This saves investigation and enforcement costs without compromising deterrence. Second, types with very low private gains from a violation can be investigated with a much lower intensity and still remain deterred. Third, some types who would have been deterred without disclosure may only cause little harm to society when violating the regulation. These last types may also be let off the hook in the optimal investigation strategy, which reduces deterrence. However, this may still be optimal as it allows the enforcement agent to investigate the remaining types with a higher intensity, for whom the social return on investigation effort is higher.

In each of these cases, the driving force for the enforcement agent to reward disclosure is to save investigation costs where the return on investigation effort is low. Hence, disclosure will occur in equilibrium whenever the optimal investigation effort would have been high absent disclosure, such as in cases where violating the regulation is particularly harmful in general. Furthermore, compliant firms will only ever engage in costly disclosure if their costs of being investigated are sufficiently high, e.g. if the investigation technology is sufficiently noisy.

Next, we apply the model to the example of regulatory enforcement actions in the context of US bank regulation. A violation of this regulation is often associated with banks funding

[1] In a way, the lobbying decision in our model might also be seen as an extreme form of Bayesian persuasion (Kamenica and Gentzkow (2011)), in which the set of possible signals is restricted to a perfectly informative and a perfectly uninformative signal. The analysis in Hedlund (2017) suggests that such a restriction may be a plausible simplification in the context of the sender's private information on the state of nature.

a too risky portfolio. We argue that a bank may be privately informed about their ability to manage higher risks. In line with the assumptions in our theoretical model, this ability is related to both the banks' private gain and social harm from a violation. Previous evidence suggests that better governance is associated with banks' better risk management (Ellul and Yerramilli (2013)) but higher risk taking incentives.[2] Hence, we suggest that the quality of a bank's corporate governance may be used as a proxy for this unobservable 'quality' of a bank.

In our panel dataset of 173 large US bank holding companies and their subsidiaries, we find that bank holding companies with stronger corporate governance and a poorly performing portfolio of subsidiaries are more likely to lobby. This is in line with the idea that bank holding companies whose subsidiaries are at risk of being penalised lobby in an attempt to avoid that. Furthermore, banks whose parent companies have lobbied and have a high corporate governance indicator are less likely to receive an enforcement action than subsidiaries of their non-lobbying, high-quality counterparts. For bank holding companies with low corporate governance quality, this result is reversed. This supports the idea that regulators' reaction to lobbying depends on the lobbying firm's quality. Last, we show a positive relationship between lobbying and future performance, which is entirely driven by high-quality bank holding companies.

Our paper seeks to add to our understanding of lobbying. Most of the existing literature on firms' political influence is set in the context of the design or implementation of regulations (rather than their enforcement) and has identified two main motives for lobbying: First, firms and political decision makers may exchange favours on a quid pro quo basis to induce a regulator to misrepresent some information vis-a-vis the ultimate decision maker (e.g. Laffont and Tirole (1991) or, in the context of bank regulation, Boyer and Ponce (2012)) or directly compensate the government for enacting a regulatory framework it prefers less (e.g. Harstad and Svensson (2011)). The second motive is disclosure of relevant information. Literature in this strand usually assumes that firms' and regulators' interests are sufficiently aligned and show that truthful disclosure is an equilibrium of a cheap-talk (Grossman and Helpman (2001)) or a signaling game (Potters and Van Winden (1992)).

This alignment of interests assumed by the existing literature on informational lobbying does not exist in the context of enforcement. As a result, the existing literature on political influence in this context is confined to the quid-pro-quo motive. Papers in this literature have

[2]Beltratti and Stulz (2012), Erkens, Hung, and Matos (2012) and Minton, Taillard, and Williamson (2014) link certain indicators of good coporate governance to weaker performance during the financial crisis, which may be explained by these risk taking incentives.

looked at the impact of such influence on deterrence (Polinsky and Shavell (2001)), optimal enforcement (Malik (1990)) and corruption (Damania, Fredriksson, and Mani (2004)). To the best of our knowledge, no attempt has been made to explain informational lobbying in the context of enforcement.

The second literature to which our paper contributes is the empirical literature on corporate lobbying. A first strand of this literature examines determinants of lobbying, which include firm size (Hansen and Mitchell (2000) and Brasher and Lowery (2006)), investment opportunities and cash flows (Hill, Kelly, Lockhart, and Van Ness (2013)) and corporate governance (Mathur, Singh, Thompson, and Nejadmalayeri (2013)). In the banking industry, Gibson, Odabasioglu, and Padovani (2018) show that larger, less creditworthy banks with more vulnerable balance sheets and more diversified business profiles are more likely to lobby. The second strand of this literature is concerned with firms' benefits from lobbying, which include a reduced exposure to enforcement of regulations (see the aforementioned Correia (2014) and Lambert (2019)) or anti-fraud laws (Yu and Yu (2011) and Wu, Johan, and Rui (2016)), a higher likelihood of being granted a corporate bailout (Faccio, Masulis, and McConnell (2006) or, in the context of banking, Asai (2022)) and better access to finance (Claessens, Feijen, and Laeven (2008)).

A third and broader strand of this literature concerns the relationship between regulators and banks. Agarwal, Lucca, Seru, and Trebbi (2014) discuss the inconsistency regarding the behaviour of state and federal regulators and provide evidence suggesting that this relates to their institutional design and incentives. Several studies in this strand assess the interplay between favourable regulatory changes and allocation of government support of politically connected banks, such as the elimantion of restrictions on bank branching (Kroszner and Strahan (1999)), deregulation during the pre-crisis period (Igan and Mishra (2014)), favourable selection in government bailout and investment programs (Duchin and Sosyura (2012); Igan, Mishra, and Tressel (2012)) or legislative outcomes (Agarwal, Amromin, Ben-David, and Dinc (2018)).

Our contribution to this literature, particularly vis-a-vis Lambert (2019), is to link bank holding companies' lobbying decisions to their subsidiaries' financial characteristics, and to show how the sign of the relationship between lobbying and enforcement probability varies with the quality of corporate governance. Furthermore, using the insights from our theoretical model, we argue that our results support the informational motive for lobbying, whereas Lambert (2019) is more supportive of the quid-pro-quo motive. In this sense, both papers can be seen as complementary.

2 A Model of Informational Lobbying and Regulatory Enforcement

In this section, we extend the basic economic model of crime and enforcement pioneered by Becker (1968) in two ways: First, and most importantly, we introduce a costly technology for potential offenders to disclose their types to an enforcement agent, which we interpret as lobbying. Second, we allow for any possible relationship between private gains and social harm caused by a crime so as to make our theory as widely applicable as possible. In fact, our theory is generally applicable to any area of law enforcement, although regulatory enforcement may be the most plausible application, as it seems easier for firms to convince a regulatory enforcement agent of whether they can gain more or less from violating the regulation and, if they do, how harmful this would be for society, than for an individual in the context of e.g. a potentially violent crime.

A risk-neutral firm makes a binary decision between complying with or violating a regulation. Violating the regulation yields it a gain g but may impose harm on society and result in the firm being punished. The firm's private gain g is its private information, but it is common knowledge that g is drawn from an interval $[0, \overline{g}]$ with the probability distribution $F(g)$ and density $f(g)$.

An enforcement agent is tasked with investigating violations of the regulation. The cost $C(p)$ of investigating a case is an increasing, at least once continuously differentiable and weakly convex function of the probability p that an investigation of a guilty firm yields evidence that can be used in court, where $C(0) = 0$. For the sake of simplicity, we will just refer to p as 'investigation probability'. In order to ensure the existence of a strictly positive optimal investigation probability, we assume a lower Inada condition $C'(p) \to_{p \to 0} 0$.

We assume that, if evidence is found, it is not perfectly accurate. In particular, we assume that, even if the investigated firm is compliant, evidence will still be found with probability λp (type-I error), where $\lambda \in (0, 1)$ is a parameter for the investigation technology's inaccuracy. Hence, the probabilities of evidence being found or not, conditional on whether the regulation was violated, can be summarised as follows:

	no evidence	evidence
compliance	$1 - \lambda p$	λp
violation	$1 - p$	p

At the beginning of the game, we assume that the enforcement agent commits to an investi-

gation strategy which specifies such an investigation probability p conditional on all information that is available to her.[3] If an investigation has produced evidence for the guilt of a type-g firm, this firm will be punished, which imposes a disutility with a monetary equivalent of T on it.[4]

Our main contribution to this model is to introduce the possibility that, after the compliance decision, but before an investigation might take place, a firm might engage in 'informational lobbying'. We assume that this comes in the form of disclosure of its type g to the enforcement agent at cost L.[5] Let $\ell \in \{0, 1\}$ denote a firm's disclosure decision, where $\ell = 1$ indicates that full information on g is disclosed. Then, the enforcement agent's investigation strategy $p^\ell(g)$ is contingent on the information available to her. If $\ell = 0$, the enforcement agent cannot do any better than applying the same probability $p^0(g) \equiv p^N$ to all firms that have not disclosed their g. Given that the firm violates the regulation whenever it is optimal for it to do so, its expected payoff is

$$\Pi(\ell; g, p^\ell(g)) = \max\left\{g - p^\ell(g)T, -\lambda p^\ell(g)T\right\} - \ell L. \tag{1}$$

We will measure social welfare as the difference between the expected impact of a violation of the regulation on society and expected investigation and punishment costs. First, we assume that punishment T comes at social costs αT, where the parameter α is specific to a particular application and to the way society typically punishes offenses in this application.[6] Second, we have already defined investigation cost $C(p)$ as a function of the enforcement agent's choice of investigation probability p. Last, we denote the impact of a violation of a regulation on society as a continuous function $v(g)$, i.e., we allow this social impact to vary across types of firms. We don't impose any assumption about the extent to which an offending firm's private payoff g from a violation of the regulation is reflected in the social payoff $v(g)$,[7] or about the specific

[3] The assumption of commitment to the investigation strategy is necessary whenever one wants to study costly punishment in a model with deterrence as the only purpose of punishment. In such a model, once a crime has already happened, any costly investigation or punishment is socially wasteful ex post. As we are interested in the analysis of disclosure rather than the question of whether any punishment would be ex-post optimal, we ruled this problem out by assumption.

[4] T is exogenously given in our model. In the concluding Section 6, we will discuss the appropriateness of this assumption and the consequences of relaxing it for our results.

[5] For simplicity, we assume that this communication of g is perfectly accurate, but the model's qualitative results would not change if we assumed that it comes in the form of a noisy signal.

[6] For instance, if punishment comes in the form of a monetary fine, it will just be a welfare neutral transfer of wealth from the offender to the government, so that $\alpha = 0$. However, other forms of punishment, such as closing down the offending firm or incarceration of the firm's management, may come at some social cost, in which case $\alpha > 0$.

[7] See, for instance, the discussion in Polinsky and Shavell (2007). A recent example of a model that allows for

relationship between social harm and private gain from the violation, other than the following Assumption that ensures that there is no type whose violation of the regulation is too beneficial for society.

Assumption 1 *For all g, $v(g) < \min\{L, \alpha g\}$.*

Based on these definitions, expected social welfare conditional on the firm's type g and disclosure decision ℓ is

$$w(p^\ell(g); g, \ell) = \begin{cases} v(g) - p^\ell(g)\alpha T - C(p^\ell(g)) - \ell L, & \text{if } g > (1-\lambda)p^\ell(g)T; \\ -\lambda p^\ell(g)\alpha T - C(p^\ell(g)) - \ell L, & \text{otherwise.} \end{cases} \tag{2}$$

We assume that the enforcement agent's interests are perfectly aligned with society's, so that her objective is to choose the investigation strategy, $p^1(g)$ and $p^0(g) \equiv p^N$, so as to maximise

$$W(p^\ell(\cdot)) = \int_{\underline{g}}^{\overline{g}} \left[\ell(g) w(p^1(g); g, 1) + (1 - \ell(g)) w(p^N; g, 0)\right] f(g) dg, \tag{3}$$

where $\ell(g)$ denotes a type-g firm's equilibrium decision of whether to disclose information ($\ell(g) = 1$) or not ($\ell(g) = 0$).

Let us briefly summarise the timing of the model: At time 0, the regulatory enforcement agent announces and commits to an investigation strategy $p^\ell(g)$ contingent on the information available to her by the time it is implemented. The firm draws its type g from a distribution on $[0, \overline{g}]$ with cdf $F(g)$ and privately observes this g. At time 1, the firm decides whether to comply with or violate the regulation. Furthermore, the firm may spend L to disclose g to the enforcement agent. At time 2, the enforcement agent's investigation strategy $p^\ell(g)$ is implemented. At time 3, payoffs are realised. As the only move of the uninformed player, the enforcement agent, is made at time 0, the appropriate equilibrium concept is Subgame Perfect Nash Equilibrium.

3 Optimal Investigation Strategies and Disclosure

3.1 Benchmark: No Disclosure Available

As a benchmark, let us start by analysing a version of our model in which the disclosure technology for types is unavailable. In this case, the enforcement agent cannot do any better than choosing a fixed investigation probability p^N.

different fractions of the offender's private gain to be reflected in social welfare is Büchel, Feess, and Mühlheußer (2020) who, however, assume a specific functional form of $v(g)$, which we do not.

According to equation (1), a compliant type g firm's expected payoff is $-\lambda p^N T$: As the firm complies with the regulation, it will not gain the individual payoff g from the violation, but may still be punished with probability λp^N. By contrast, when violating the regulation, it gains g but will now be fined with probability p^N, resulting in an expected payoff of $g - p^N T$. Comparing these payoffs under compliance and violation shows that there is a threshold type

$$\widetilde{g}(p^N) := (1-\lambda)p^N T \tag{4}$$

such that the firm prefers to violate if and only if $g \geq \widetilde{g}(p^N)$. Note that $\widetilde{g}(p^N)$ is increasing in p^N. Let us define

$$\begin{aligned} G_D(p^N) &= [0, \widetilde{g}(p^N)) \\ G_U(p^N) &= [\widetilde{g}(p^N), \overline{g}] \end{aligned}$$

to be the sets of types who are deterred and undeterred, respectively, under investigation probability p^N absent the possibility of disclosure.

Anticipating the firm's compliance decision, the regulatory enforcement agent will choose p^N so as to maximise

$$W_{NL}(p^N) = \int_0^{\widetilde{g}(p^N)} \left[-\lambda\alpha p^N T\right] f(g)dg + \int_{\widetilde{g}(p^N)}^{\overline{g}} \left[v(g) - \alpha p^N T\right] f(g)dg - C(p^N) \tag{5}$$

The first integrand is equal to expected enforcement costs due to a compliant firm, and the second integral is made up of the social payoff from the violation and the costs of imposing enforcement on a violating firm. Finally, the investigation costs must be spent in any case, so that they arise with probability one. The intuitive trade-off of increasing p^N is that it increases investigation costs but at the same time increases the set $G_D(p^N)$ of types of firms who will choose to comply with the regulation. Let us define p^N_{NL} to denote the optimal choice of the investigation probability if no disclosure is available.[8]

The following Proposition states the plausible result that the enforcement agent wants to investigate more thoroughly if the marginal cost of doing so is low and marginal benefit is high:

Proposition 1 *The optimal investigation probability if disclosure is not available, p^N_{NL}, is non-increasing in the social value of the violation and the marginal investigation costs.*

Proof. All proofs are in the Appendix. ■

[8] As we have not made any assumption that guarantees uniqueness of the optimal investigation probability, we slightly abuse notation by picking any $p^N_{NL} \in \arg\max W_{NL}(p^N)$ for the sake of readability. When performing comparative statics analysis below, we will follow Milgrom and Shannon (1994) by using the strong set order to compare the argmax sets.

3.2 Equilibrium with Disclosure Available

If disclosure is available and a firm indeed does disclose its type g, the enforcement agent can make the investigation probability $p^1(g)$ contingent on that type. We will analyse this scenario in two steps: First, we will determine the optimal enforcement strategy towards disclosing firms for a given enforcement probability $p^0(g) \equiv p^N$ for non-disclosing firms. Based on this result, we will then analyse the optimal enforcement probability p^N for non-disclosing firms given that, for each p^N, the optimal $p^1(g)$ for disclosing firms is implemented.

In the previous subsection, we saw that, absent any disclosure technology, p^N divides the set of all types, $[0, \overline{g}]$, into those types that prefer complying with the regulation over violating it, $G_D(p^N) = \left[0, \widetilde{g}\left(p^N\right)\right)$, and those who prefer the latter over the former, $G_U(p^N) = \left[\widetilde{g}\left(p^N\right), \overline{g}\right]$. Increasing the investigation probability p^N makes violating less attractive for all types, which means that some types that preferred violating under the lower p^N will prefer complying under the higher p^N. By contrast, if disclosure is available, changes in the investigation strategy towards disclosing firms have a very different effect: As the enforcement agent can choose a unique investigation probability just for a particular type, changing that probability will leave all other types' compliance and disclosure decisions unaffected.

This insight greatly simplifies the analysis of the optimal $p^1(\cdot)$: For any given investigation strategy p^N towards non-disclosing firms, expected social welfare (3) can be maximised by deciding for each g separately whether disclosure should be rewarded by reducing the investigation probability to some $p^1(g) < p^N$, and whether this type should be deterred from violating the regulation. In other words, the enforcement agent's problem includes deciding which of the following actions each type g should be induced to take:

A violate and disclose

B comply and disclose

O violate and don't disclose

N neither violate nor disclose

If, for a given investigation strategy p^N towards non-disclosing firms, there is an investigation strategy $p^1(g)$ towards disclosing firms that induces a type g to take a specific one of these actions $i \in \{A, B, O, N\}$, we call this action implementable under that given p^N. For each implementable action i, the enforcement agent then determines the optimal $p^1(g)$ among those that implement this action i. For each action i, we will denote by $G_i(p^N)$ the set of all types

of firm for whom action i is implementable and optimal from the enforcement agent's point of view.

As actions O and N do not involve any disclosure of the firm's type, O is implementable whenever the firm prefers violating the regulation over complying with it ($g \in G_U(p^N) = [\widetilde{g}(p^N), \overline{g}]$, and N is implementable for any $g \in G_D(p^N) = [0, \widetilde{g}(p^N))$. Therefore, the following proposition focuses on the implementability of the actions A and B that do involve disclosure, and the optimal enforcement strategy $p^1(g)$ towards disclosing firms if the enforcement agent wants to implement either action.

Proposition 2 *Consider a given enforcement probability $p^N \geq \frac{L}{T}$ for non-disclosing firms.*

(a) Action A (violate the regulation and disclose one's type) is implementable for all types $g \in [\max\{g_A(p^N), 0\}, \overline{g}]$, where

$$g_A(p^N) = L - \lambda p^N T. \tag{6}$$

If Action A is optimal and implementable ($g \in G_A(p^N)$), the optimal enforcement probability for disclosing firms is $p^1(g) = 0$.

(b) Action B (comply with the regulation and disclose one's type) is implementable for all types $g \in [0, g_B(p^N)]$ if $g_B(p^N) \geq 0$, where

$$g_B(p^N) = (1-\lambda)\left(p^N T - \frac{L}{\lambda}\right). \tag{7}$$

If Action B is optimal and implementable ($g \in G_B(p^N)$), the optimal enforcement probability for disclosing firms is

$$p^1(g) = \frac{g}{(1-\lambda)T}. \tag{8}$$

Part (a) of Proposition 2 shows that Action A, to violate the regulation and disclose one's type, is implementable if $p^1(g)$ is sufficiently low to cover the firm's disclosure cost. If the enforcement agent seeks to implement action A for a type g, and as deterrence is the only aim of investigation and punishment in our model, it is optimal for the enforcement agent to let this type entirely off the hook. As for Action B, to comply with the regulation while disclosing one's type (part (b) of the Proposition), $p^1(g)$ needs to be sufficiently far below p^N to induce the firm to spend L to disclose its type, and the enforcement agent prefers lower investigation probabilities in order to save costs. On the other hand, however, $p^1(g)$ must still be sufficiently high in order to deter the firm from violating the regulation. The optimal enforcement probability to

implement Action B makes each type $g \in G_B(p^N)$ indifferent between violating and complying with the regulation.

When comparing the respective threshold types for which Actions A and B are implementable, given by (6) and (7), it is straightforward to see that $g_A(p^N) < 0$ if and only if $g_B(p^N) > 0$. Hence, whenever Action B is implementable ($0 \leq g \leq g_B(p^N)$), so will be A and N as $g_A(p^N) \leq 0 \leq g$ in this case.

Let us now analyse the enforcement agent's optimal choice of which implementable action to induce for each type, for given p^N. Expected welfare conditional on type g for each action $i \in \{A, B, O, N\}$, if $p^1(g)$ is set at the optimal one among all levels that implements that action, is

$$w_A(g) := v(g) - L \tag{9}$$

$$w_B(g) := -\frac{\lambda\alpha g}{1-\lambda} - C\left(\frac{g}{(1-\lambda)T}\right) - L \tag{10}$$

$$w_O(g; p^N) = v(g) - \alpha p^N T - C(p^N) \tag{11}$$

$$w_N(p^N) = -\lambda\alpha p^N T - C(p^N) \tag{12}$$

Under Action A, the regulation is violated and disclosure costs incurred, but there are no investigation or punishment costs. Under Action B, the firm is deterred but bears disclosure costs, and positive (albeit lower than p^N) investigation costs and, in the case of a type-I error, punishment costs are incurred. Finally, welfare under Actions N and O is the same as in the benchmark model without the possibility of disclosure.

Proposition 2 helps us narrow down the implementable actions that the enforcement agent needs to compare for certain sets of types. First, for all types who are undeterred in the absence of disclosure, $g \in G_U(p^N)$, A and O are the only actions that are implementable. Comparing $w_A(g)$ and $w_O(g; p^N)$, the enforcement agent prefers A over O for all these types if and only if $p^N \geq \widetilde{p}^N$, which is defined as

$$\alpha\widetilde{p}^N T + C(\widetilde{p}^N) = L. \tag{13}$$

In order to avoid tedious case distinctions, we assume that any $p^N \geq \widetilde{p}^N$ lies in the range for which Proposition 2 holds, i.e., $\frac{L}{T} < \widetilde{p}^N$, which requires that α is sufficiently small:

Assumption 2 $C\left(\frac{L}{T}\right) < (1-\alpha)L$.

Part (a) of the following Proposition 3 shows that the types that the enforcement agent is most eager to be disclosed are those types that are undeterred anyway. Hence, if p^N is so low that it's

not even optimal for the enforcement agent to induce those types of firm to disclose, it won't be optimal to induce any type to do so.

Second, the set of types who are deterred in the absence of disclosure, $g \in G_D(p^N)$, can be divided into subsets according to whether A or B is implementable. Part (b) of Proposition 3 uses these insights to formulate optimal social welfare for given p^N.

Proposition 3 *(a) Disclosure occurs in equilibrium if and only if* $p^N \geq \widetilde{p}^N$.

(b) Expected social welfare under the optimal investigation probability $p^1(g)$ *for disclosing firms for any given investigation probability* p^N *for non-disclosing firms is*

$$\begin{aligned} W_L(p^N) = &\int_0^{g_B(p^N)} \max\{w_A(g), w_B(g), w_N(p^N)\} f(g)dg \\ &+ \int_{\max\{g_A(p^N), g_B(p^N)\}}^{\widetilde{g}(p^N)} \max\{w_A(g), w_N(p^N)\} f(g)dg \\ &+ \int_0^{g_A(p^N)} w_N(p^N) f(g)dg + \int_{\widetilde{g}(p^N)}^{\overline{g}} \max\{w_A(g), w_O(g; p^N)\} f(g)dg. \end{aligned} \tag{14}$$

The first integral in (14) is concerned with the set of types for whom Action B (complying with the regulation and disclosing the type) is implementable, in which case we know that Actions A (violating the regulation and disclosing the type) and N (complying without disclosing) are also implementable. The second integral covers the types for whom Actions A and N, but not B, are implementable. In the set of types covered by the third integral, the firm is deterred absent the possibility of disclosure, but neither of the actions that involve disclosure is implementable. The last integral covers the set $G_U(p^N)$ of types that are undeterred absent disclosure.

Let us now turn to analysing the enforcement agent's choice of investigation strategy towards non-disclosing firms, p^N. The enforcement agent anticipates her optimal choice of $p^1(g)$ based on any choice of p^N. Therefore, her objective at this stage is to choose p^N so as to maximise (14). Let p_L^N denote this optimal choice of p^N.

Increasing p^N will create a similar trade-off between deterrence and investigation costs for types who are not induced to disclose as in the case without the possibility of disclosure. However, if disclosure is available, the enforcement agent can avoid some of the social cost of a higher p^N by inducing the firm to disclose its type. In other words, the availability of disclosure tilts the aforementioned trade-off when increasing p^N more towards its benefits. Hence, we would intuitively expect the incentives for the enforcement agent to increase p^N to be higher if

disclosure is available. The following Proposition confirms this intuition for a specific parameter range:

Proposition 4 *$p^N_{NL} \leq p^N_L$ whenever disclosure costs are sufficiently high such that $\widetilde{p}^N$ is not too far below p^N_{NL}.*

The intuitive reason for Proposition 4 is that most effects of the availability of disclosure increase the marginal social benefits and reduce the marginal social costs of the investigation probability p^N for non-disclosing firms: Increasing p^N widens the set of types that will be disclosed whenever this yields a socially preferable outcome, and the expected costs of higher p^N will be incurred for a smaller set of types that are not disclosed.

The reason why Proposition 4 does not hold more generally is the following countervailing effect: Whenever the set of disclosed types is equal to the set of types who would be undeterred absent disclosure, the social benefits of deterrence is lower than it would be if disclosure is unavailable. As undeterred firms create less social costs if they disclose their types, there is less to gain from deterrence for society.[9]

Proposition 4 illustrates how the availability of disclosure improves the enforcement agent's optimal investigation strategy: She induces those firms to disclose their types who would have been undeterred anyway ($g \in G_A(p^N) \cap G_U(p^N)$), whose violation imposes little harm to society ($g \in G_A(p^N) \cap G_D(p^N)$) or who are particularly easy to deter ($g \in G_B(p^N)$), by promising to investigate them with lower intensity if they disclose their types. This allows her to focus her costly investigation effort on those types for whom the threat of an investigation yields the highest social benefit in terms of deterrence. This focus of the investigation effort on non-disclosing types is represented in the model by the higher investigation probability $p^N_L > p^N_{NL}$ established by Proposition 4.

It is important to point out that, due to our assumption that the enforcement agent's interests are aligned with society's, the availability of disclosure is welfare enhancing whenever it occurs in equilibrium. This is true even if the aforementioned countervailing effect exists and dominates the other effects discussed above, so that the optimal investigation probability p^N_L towards non-disclosing firms if disclosure is available is *below* that p^N_{NL} in the absence of disclosure. In that latter case, the enforcement agent's commitment to 'rewarding' disclosure by certain types reduces her expected investigation costs even if non-disclosing types had been

[9] Lemma 1 in Appendix D shows formally how the set of types that are deterred without but undeterred with disclosure available, and the set of types that are undeterred with or without disclosure available, depend on p^N.

investigated with the same probability as without that commitment. More generally, a sufficient (but not necessary) condition for the availability of disclosure to strictly enhance welfare is that $p^N_{NL} \geq \widetilde{p}^N$.[10]

The results that we have presented so far are true for any distribution of types and any relationship between private and social payoffs from a violation. Beyond these, a more specific characterisation of the equilibrium can only be obtained when introducing more structure to the model. For instance, the following Proposition shows that, if private and social consequences of a violation are somewhat aligned, this will translate into a monotonic relationship between the firm's type and the action that it is induced to take in equilibrium.

Proposition 5 *If $v(g)$ is a weakly increasing function, then, for any p^N for which these sets are non-empty, $G_B(p^N)$ will be an interval that includes $g = 0$, and $G_A(p^N)$ will be an interval that includes $G_U(p^N)$.*

According to Proposition 5, if there is the aforementioned alignment between private and social payoffs from the violation, it will be the types with the highest private gains and lowest social harm from the violation who will be let entirely off the hook if they disclose their types (action A), as this action is socially most desirable for these types. On the other hand, if there are some firms that disclose their types while being deterred (action B), it will be those with the lowest private gains from the violation: The higher the private gain g from the violation, the higher the investigation probability $p^1(g)$ must be in order to deter this type from violating, and the less likely the cost savings from the lower investigation probability are to outweigh the disclosure costs L.

More specifically, recall from Proposition 3 that there is no disclosure for $p^N < \widetilde{p}^N$. Once p^N is above, but sufficiently close to, $\widetilde{p}^N$, the set of types who disclose and violate the regulation is $G_A(p^N) = G_U(p^N)$, but the set of types who disclose while being deterred is $G_B(p^N) = \emptyset$. As p^N increases even more, action B might potentially become implementable and optimal, while the set $G_A(p^N)$ shrinks according to Lemma 1. Finally, for even larger p^N, $G_A(p^N)$ also will also contain some types that would have been deterred absent the possibility of disclosure under the same investigation probability p^N:

Proposition 6 *If $v(g)$ is a weakly increasing function, there is a threshold $\widetilde{\widetilde{p}}^N > \widetilde{p}^N$ given by*

$$v(\widetilde{g}(\widetilde{\widetilde{p}}^N)) - L = -\lambda\alpha\widetilde{\widetilde{p}}^N T - C(\widetilde{\widetilde{p}}^N) \tag{15}$$

[10] See the discussion on Implication 1 below for more details.

such that $G_A(p^N) \cap G_D(p^N) \neq \emptyset$ *if and only if* $p^N > \widetilde{\widetilde{p}}^N$.

It is worth noting that even restricting attention to increasing functions $v(g)$ does not enable us to derive general comparative statics results, unlike in the case where disclosure was unavailable discussed in Proposition 1. While the same intuitive effects on marginal benefits and costs of investigation effort that drove Proposition 1 are still present when introducing disclosure to the model, this possibility also gives rise to some additional effects that tend to go in the opposite direction: If disclosure is available, increasing the investigation probability towards non-disclosing types may increase or reduce the set of types who disclose in equilibrium.[11] In the former case, a parameter change typically has the opposite effect than that in the situation without disclosure. For instance, higher marginal investigation costs also increase the benefit from making disclosure more likely, as disclosing firms are investigated with lower probabilities. Whenever higher investigation probabilities towards non-disclosing types make disclosure more likely, this constitutes a countervailing effect.

4 Implications

So far, we have extended a standard model of crime and enforcement by introducing the possibility of costly disclosure of a potential offender's private benefits from committing an offense, and analysed the enforcement agent's equilibrium choice of investigation strategy. We interpret such disclosure as informational lobbying. In this section, we will discuss the practical implications of our model for our understanding of informational lobbying in the context of regulatory enforcement. We will start with presenting some of our model's implications for the incidence of informational lobbying, both in general and for certain subsets of firms. Then, we will analyse which consequences of lobbying our results predict for outcomes such as the equilibrium level of deterrence or firms' payoffs.

4.1 Incidence of Lobbying in Equilibrium

Given the aim of the paper to present a rationale for informational lobbying in the context of regulatory enforcement, the most obvious question to ask is under which circumstances we would expect informational lobbying to occur in equilibrium. We know from Proposition 3 that, whenever the optimal investigation probability towards non-lobbying firms p_L^N is below some threshold $\widetilde{p}^N$, it is not optimal to induce any type of firm to disclose its type. The following result

[11] See Lemma 1 in Appendix D.

presents some requirements for parameters that are sufficient to ensure lobbying in equilibrium to occur.

Implication 1 *Informational lobbying occurs in equilibrium if the violation is sufficiently harmful for society and disclosure costs are sufficiently small.*

Not surprisingly, low disclosure costs make informational lobbying attractive both from the firm's and society's point of view and, therefore, likely to occur in equilibrium. The role of the impact of a violation on society is not as obvious, as disclosure in our model is often rewarded by letting violators off the hook. However, this does not necessarily mean more violations: Recall that Proposition 3 has shown that lobbying occurs in equilibrium if and only if those types are disclosed that would have been undeterred even without disclosure. Hence, for a given investigation probability towards non-disclosing firms, the question whether any disclosure occurs at all in equilibrium is independent of the social payoff from the violation. In other words, Implication 1 predicts that we should expect informational lobbying predominantly in the context of those regulations that require a high investigation effort to avoid harm to society.

Beyond the factors mentioned in Implication 1, another way in which applications differ is the relationship between private and social payoffs from the violation. If private and social payoffs from the violation are aligned, then disclosing the type and violating the regulation tends to be socially more attractive for those types for whom this action is implementable. If, however, greater private *gain* from the violation is associated with greater social *harm*, these two requirements are at odds with each other. In that case, the intersection of types for whom disclosing and violating is implementable and socially optimal is typically smaller for a given investigation probability towards non-disclosing firms. In other words, given that informational lobbying does occur, we would expect it to be more widespread in applications where firms that are more difficult to deter create *lower* social harm when violating the regulation. However, as the equilibrium investigation strategies will also differ, this plausible effect cannot be established as a general result.

Another prediction that depends on the relationship between private and social payoffs from the violation is related to the question of whether compliant firms would disclose their types. If that relationship is positive, social welfare from lobbying violators tends to be high for those types for whom social welfare from lobbying compliant firms is low as, according to Proposition 2 (b), deterring lobbying firms gets increasingly costly in terms of investigation effort as the private gains from the violation increase. By contrast, if the relationship between private and

social payoffs from the violation is negative, social welfare from lobbying violating and compliant firms will be high for the same types, which makes lobbying by compliant firms less likely to be the socially optimal action. The following Implication states this result (b) and another necessary condition (a) for compliant firms to disclose their types in equilibrium:

Implication 2 *If (a) the investigation technology is sufficiently accurate, or (b) sufficiently high values of $v(g)$ are clustered on a sufficiently large interval of the lowest types, then compliant firms will never engage in informational lobbying.*

Intuitively, part (a) is due to the fact that, if compliant firms can be almost certain to avoid punishment, they cannot gain from costly disclosure. More generally, for informational lobbying by compliant firms to ever occur in equilibrium, there must be some costs associated with being investigated.[12]

As a final caveat, it is important to keep in mind that our model can only deliver plausible predictions in situations where its assumptions are met. For instance, our analysis has focused on deterrence as the only aim of punishment. Under this assumption, there are no social costs of letting wrongdoers who wouldn't have been deterred anyway off the hook. However, especially in contexts beyond that of regulatory enforcement, there are often social benefits of punishing wrongdoers beyond mere deterrence, such as retribution or, in the case of incarceration, incapacitation for further crimes. If these other social benefits from punishment depend on the social harm of the offense (as in the case of incapacitation), so will the net social gain from inducing otherwise undeterred firms to disclose their types. In such a case, our prediction from Implication 1 to expect lobbying if the offense is sufficiently harmful may be reversed.

4.2 Consequences of Lobbying

Let us now turn to discussing the impact that our model predicts informational lobbying to have. First, it is important to reiterate that informational lobbying in our model always improves welfare whenever it occurs in equilibrium due to our assumption that the regulatory enforcement agent's objective is to maximise welfare. In other words, if society is better off without any informational lobbying, then the enforcement agent will simply not induce firms to disclose their types. If one wants to study a potential welfare loss due to lobbying, some conflict of interest between the enforcement agent's and society's objectives must be included in the model.

[12]It is easy to see that a model in which investigations are perfectly accurate but impose hassle costs on the investigated, whether guilty or compliant, is technically equivalent to the present model.

What our model can help predict is the means by which such a welfare improvement is achieved. In a nutshell, the reason why it pays off to induce firms to engage in costly disclosure of types is to save investigation costs: If a type of firm is undeterred anyway ($g \in G_A(p^N) \cap G_U(p^N)$), threatening these types with investigation and punishment does not achieve anything. If a type is very easy to deter ($g \in G_B(p^N)$), a lower investigation probability can still maintain deterrence while saving investigation costs. Both of these effects save costs while keeping deterrence constant. However, some types of firms who would have been deterred absent disclosure may cause particularly little harm to society when violating the regulation, in which case it may be optimal to promise to let them off the hook ($g \in G_A(p^N) \cap G_D(p^N)$), thus reducing deterrence. Furthermore, given the special treatment towards types that offer low benefits from investigation effort, it may be optimal to investigate the remaining types more intensely, thus increasing deterrence.

Hence, an important practical question is whether our model predicts deterrence to be higher or lower in the presence of informational lobbying. Recall that in the benchmark model without the possibility of disclosure, there was a monotonic, positive relationship between investigation effort and deterrence. The following Implication shows that this result carries over to the model with informational lobbying whenever no types who would have been deterred absent disclosure are induced to disclose their type and violate the regulation:

Implication 3 *Suppose that $v(g)$ is weakly increasing in g. If p^N is above (below) $\widetilde{\widetilde{p}}^N$, as defined in* (15)*, then deterrence is weakly decreasing (increasing) in p^N.*

In other words, if $v(g)$ is weakly increasing in g, deterrence is an inverted U-shaped function of the investigation probability p^N towards non-disclosing firms. Its peak is where $p^N = \widetilde{\widetilde{p}}^N$, the threshold above which the enforcement agent will want to induce some otherwise deterred types of firms to disclose their types and violate the regulation. For a given p^N, this discussion implies that deterrence is higher when disclosure is available than when it is not, provided that p^N is below or not too far above $\widetilde{\widetilde{p}}^N$. However, if p^N is sufficiently far above $\widetilde{\widetilde{p}}^N$, the opposite may be true, so that no clear-cut comparison can be made:

Implication 4 *If disclosure of types is available, deterrence may be higher or lower than absent the possibility of disclosure.*

Another relevant question, given the fact that informational lobbying is always welfare enhancing in our model whenever it occurs in equilibrium, is how these welfare gains are allocated.

Again, it is not possible to answer this question in an entirely general way, but the following Implication does so for the parameter range where introducing the possibility of disclosure increases the equilibrium investigation probability towards non-disclosing firms.

Implication 5 *Suppose that disclosure costs are sufficiently high such that* $p_{NL}^N \leq p_L^N$. *If informational lobbying occurs in equilibrium, then those types of firms who lobby in equilibrium gain from the availability of lobbying, whereas those who don't are made weakly worse off by the availability of informational lobbying. Among the firms who disclose their types, it is those types with the highest private gains from the violation who benefit most from the availability of lobbying.*

According to Implication 5, those types of firms who, in equilibrium, do not engage in informational lobbying are even made worse off than in the absence of this possibility. If non-disclosing firms are investigated more intensely, this imposes additional costs even on compliant firms due to the possibility of type-I errors.

By contrast, the types with the highest gains from violating the regulation, i.e., who would have been undeterred even absent lobbying, are those who benefit most. In practice, this might mean that, if there is any scope for influencing the enforcement agent's decision of whether to reflect disclosure in her investigation strategy, these highest types would be the most eager to do so. If such an influence also comes in the form of lobbying, this insight reinforces our model's result that it will be these highest-gain types who are the most likely to lobby.

5 Application: Enforcement of Bank Regulation

5.1 Aligning the Model with Institutional Facts

In this section, we will apply our model to the case of regulatory enforcement actions against banks, derive some testable predictions of the equilibrium in this case, and use data from regulatory enforcement actions against US banks to test whether these features can be observed in reality. In general, bank regulation aims to curb banks' potentially excessive risk taking incentives, which are caused by a combination of a highly leveraged balance sheet, investors' limited market discipline and the expectation of being too big to fail (e.g. Bhattacharya, Boot, and Thakor (1998)). Therefore, the purpose of a bank violating bank regulation is often to increase the riskiness of its portfolio of assets. Our model can be applied to this setting if banks have different abilities of managing risks, and this ability is the bank's private information. We

show in Appendix L that in a simple example of such a setting, a bank's private benefit from violating regulation is increasing in its ability to manage risks, and so is the social welfare effect of such a violation. Hence, we can apply our model to this context when assuming that $v(g)$ is increasing in g.[13]

When taking our theoretical results to the data, a crucial problem is how to measure banks' abilities to manage risks, which their private gain from violating regulation is based on. Based on previous literature, we argue that this unobservable ability can be proxied by information that we have about the quality of corporate governance in a bank's parent company. Ellul and Yerramilli (2013) show that banks with better governance are better at managing risks. On the other hand, Beltratti and Stulz (2012), Erkens, Hung, and Matos (2012) and Minton, Taillard, and Williamson (2014) have linked certain indicators of good coporate governance to weaker performance during the financial crisis, which, in some cases, is attributed to different risk taking incentives for these banks.

In the US, the relevant regulatory enforcement agency conducts examinations of the banks that they supervise, with the aim to gain important information with regard to the financial condition and performance of the bank. During these examinations, banks are assessed and assigned a composite rating, which is based on six core areas (Capital, Asset, Management, Earnings, Liquidity and Sensitivity to market risk; commonly referred to as CAMELS ratings), and which is used to determine the type (if any) of enforcement action to be imposed. These types of enforcement actions can be classified into formal (publicly disclosed and legally enforceable) and informal ones, where the former vary in severeness, depending on the type of weakness or misconduct identified during the examination process.[14]

The aim of an enforcement action is to correct the imperfections determined during the assessment process and ensure that the bank's financial health recovers as soon as possible. However, receiving a formal enforcement action will also affect a bank's reputation, and some types of enforcement action include a monetary fine. In our model, this corresponds to the parameter T. At the same time, the welfare effect of imposing a regulatory enforcement action against a non-compliant bank may be different than the private effect on the bank. It may be lower due to a negative temporary effect on personal income growth and unemployment

[13]However, note that this monotonic relationship between g and $v(g)$ may not be true in a more general model of bank regulation than the one discussed in Appendix L. In this sense, it is an empirical question whether the evidence will be in line with the results from this case of an increasing $v(g)$, which we will seek to answer in the following.

[14]For a detailed account of the process of regulatory enforcement in US bank regulation see Appendix M.

(Danisewicz, McGowan, Onali, and Schaeck (2018)) or higher due to firms' lower borrowing costs if banks had to lower their rates in order to stay competitive following a reputation loss due to an enforcement action (what Deli, Delis, Hasan, and Liu (2019) label the 'competition-reputation effect'). In terms of our model, this points to a positive but low value for α.

In the following, we will briefly summarise our theory's predictions about lobbying and enforcement in equilibrium when applying it to the case of the enforcement of bank regulation in the way we have just explained, and then compare them with evidence from our dataset of lobbying and regulatory enforcement actions. Recall first that Proposition 5 has shown that it is banks with high private benefit g and low social harm $-v(g)$ from the violation that violate regulation and lobby in equilibrium. As we have argued above that both g and $v(g)$ are associated with a high ability of managing risks, which we are using corporate governance quality to proxy for, this would suggest a positive relationship between corporate governance quality and lobbying. On the other hand, however, if compliant banks lobby, our theory predicts that it will be those with the lowest corporate governance quality. Which of these effects dominates is an empirical question, which we will seek to address by testing the following Prediction:

Prediction 1 *Banks with better corporate governance are more likely to lobby.*

Furthermore, an important motive for lobbying in our theoretical model is for violators to get off the hook. In reality, there may also be other motivations for banks to lobby, and indeed there may also be lobbying by compliant firms in our model, but our Proposition 3 implies that there may be parameter ranges where guilty but not compliant firms lobby but not vice versa, and Implication 5 demonstrates that it's guilty firms who benefit most from lobbying. Hence, based on our theory, we would expect the following Prediction to be supported by our data:

Prediction 2 *Bank Holding Companies are more likely to lobby if their subsidiaries have poor CAMELS ratings.*

Non-compliant banks will only have an incentive to lobby if they are less likely to be punished than in the case where they do not lobby. Therefore, under the optimal enforcement strategy characterized in Section 3.2, $p^1(g) < p^N \equiv p^0(g)$ for all types $g \in G_A(p^N) \cup G_B(p^N)$ that lobby in equilibrium. On the other hand, if a type $g \notin G_A(p^N) \cup G_B(p^N)$, for whom the enforcement agent has not committed to a lower investigation probability when lobbying, deviates from the equilibrium by lobbying, she may see that as a hint that it has violated the regulation and, therefore, investigate it with a higher probability. Hence, we predict:

Prediction 3 *Lobbying high-quality (low-quality) banks are less (more) likely to be punished than non-lobbying high-quality (low-quality) banks.*

Finally, note that in our application, a bank's benefit from violating the regulation is linked to its profit, which is independent of the private information (quality) if it complies with the regulation, and increasing in quality if it violates it. Furthermore, Prediction 1 argues that it is high-quality banks whose BHCs are more likely to lobby. Therefore, lobbying banks can be expected to be more successful for two reasons: a selection effect, because the decision to lobby is correlated with quality, and a punishment effect, because lobbying banks are more likely to be allowed to go ahead with their risky strategy, which they are good at because of their high type.

Prediction 4 *Lobbying high-quality banks perform better than non-lobbying high-quality banks.*

5.2 Sample, data and variable selection

We will now use a dataset of US banks and regulatory enforcement actions against them to test the aforementioned predictions. Recall that regulatory enforcement actions are imposed on banks and tailored around their specific characteristics and, thus, will largely depend on their financial characteristics. However, these banks do not usually lobby by themselves. Instead, their parent Bank Holding Companies lobby on their behalf. As a consequence, we will need to work with two different samples to analyze our research question: (i) the *Bank Holding Company Sample* which consists of 173 large listed US Bank Holding Companies, and (ii) the *Subsidiary sample*, which consists of 684 Commercial and Savings Banks and are subsidiaries of the Bank Holding Companies included in (i).

The data in both samples refer to the years from 2002 until 2017. The choice of the Bank Holding Companies included in our sample, as well as the time-frame, are mainly driven by the availability of the Corporate Governance indicator, which is one of the core variables of interest of our study. Data is collected from the following sources: (i) Financial characteristics and Enforcement Actions are obtained from S&P Market Intelligence (former SNL Financial), (ii) lobbying information is hand collected from the Center of Responsive Politics website, and (iii) corporate governance information is retrieved from Datastream.

The sections below provide an overview of the construction of our working sample, as well as a detailed description of the variables included in our analysis. We also include tables with their descriptive statistics. A full list of the variables can be found in Table 1.

Insert Table 1 about here

Bank Holding Company sample When seeking to explain the lobbying decision of a Bank Holding Company, we will, in line with above predictions, focus on the quality of a Bank Holding Company's corporate governance, while controlling for financial and other characteristics.

All information in regard to lobbying activity is hand collected from the lobbying database and filing archives of the United States Senate and the 'Open Secrets' website of the Center for Responsive Politics (CRP). Information is available from 1998 to date. The Lobbying Disclosure Act of 1995 requires lobbyists to register and report information on their activities to the Senate Office of Public Records (SOPR). The SOPR keeps an archive of these files, which is available to the public. The majority of reports on financial institutions are filed by a bank's parent company (i.e. the Bank Holding or Financial Holding Company). For the purpose of the present analysis, we obtain information on lobbying report files from 2002 to 2017. Then we create a dummy variable, *Lobbying*, which takes '1' if a Bank Holding Company has filed a lobbying report in a given year, and '0' otherwise.

In order to capture the overall quality of a Bank Holding Company's corporate governance systems and processes (*Governance*), we make use of the 'Management Score' indicator provided by Datastream's Asset 4, which is defined to measure a company's commitment and effectiveness towards following best practice corporate governance principles. In essence, this indicator reflects a company's key areas of corporate governance such as board structure, compensation policy, board functions, shareholder rights and its vision and strategy.[15]

Finally, we control for several financial and demographic characteristics. Following empirical precedent (e.g. Gibson, Odabasioglu, and Padovani (2018)), we include a measure of capitalisation with the equity to assets ratio (*Capitalisation*) and performance with return on assets (*Performance*). Furthermore, we take into consideration the Bank Holding Company's age (*Age*) and number of depository subsidiaries (*Number of Depository Institutions*), in order to account for the magnitude and significance of the institution. For the test of Prediction 2, we control for the average profitability (*ROA (mean)*) and non-performing loans (*NPL (mean)*) of each Bank Holding Company's subsidiaries. More precisely, for the average value of performance (*ROA (mean)*), we create a variable that takes the mean return on assets ratio of the subsidiary banks of each Bank Holding company at year t; and for the average value of non-performing loans (*NPL (mean)*), we create a variable that takes the mean non-performing loans ratio of

[15] A full list of questions is provided in Appendix N.

the subsidiary banks of each Bank Holding company at year t. Last, we also control for the natural logarithm of the geographical distance of the Bank Holding Company's headquarter location to Washington, DC, and for the extent of financial sector employment (*Financial Sector Employment*) recorded in the state where the Bank Holding Company operates.

Insert Table 2 about here

Table 2 reports the descriptive statistics of the aforementioned variables. The *Governance* indicator ranges from 0.12 to 99.65, where higher values indicate higher quality of governance. In our sample of Bank Holding Companies, the average score is equal to 48.37, which is lower than the average score among all lobbying banks (53.15). As for the remaining variables it is noteworthy that for the lobbying sample, the average age and number of subsidiary banks is higher. Moreover, the mean distance to DC for the lobbying banks appears to be lower.

Subsidiary level sample In order to identify whether a Commercial or Saving Bank's parent engages in lobbying activities, we follow prior literature (Lambert (2019)) and insert lobbying information for each subsidiary from the Bank Holding Company level. Furthermore, we gathered information on regulatory enforcement actions issued against Commercial and Savings Banks for the time frame between 2002-2017. Data on enforcement actions issued by the three federal regulatory agencies, Federal Reserve Bank (FRB), Federal Deposit Insurance Corporation (FDIC) and the Office of Comptroller of the Currency (OCC), are retrieved from S&P Market Intelligence (prior SNL Financial). These enforcement actions refer to actions taken against Commercial or Savings banks, which are subsidiaries of the Bank Holding Companies in Sample (i). We focus exclusively on severe actions[16] and construct a dummy variable *severe* that takes the value of '1' if a bank received a severe type of regulatory enforcement action in a particular year, and the value of '0' otherwise.

As the CAMELS ratings, which form an integral part of the examination process, are confidential, we follow prior studies (e.g. Lambert (2019), Cole and White (2012), Duchin and Sosyura (2012)) and consider traditional proxies of each of the components. For this purpose,

[16]These are, in order of severity, Deposit Insurance Termination, Cease and Desist orders, Formal Written and Prompt Corrective Action. The reason for this focus is that severe actions are more closely related to safety and soundness issues of banks. In contrast, less severe actions are usually issued against institutional affiliated parties and are, therefore, not related to deficiencies observed over the financial condition of an institution. Moreover, Delis, Staikouras, and Tsoumas (2016) show that less severe actions do not have an impact on a bank's financial condition. A detailed description of each type along with their classification can be found in Appendix M.

we take into account the risk-based capital ratio as a measure of capital adequacy *(Capitalisation)*, and the risk weighted assets as a measure of asset quality *(Asset Quality)*. Moreover, as a measure of earnings/ performance we make use of the Return on Assets ratio *(Performance)* and as a measure of liquidity the liquidity ratio (*liq*). As a proxy for capturing sensitivity to market risk we employ the difference between short-term assets and short term liabilities divided by earning assets *(Sensitivity)*. Finally, we also include the size *(Size)* and age *(Age)* of the bank. It is worth clarifying that no additional proxy accounting for management capability is employed in the analysis, as the core variable of interest of this study, the corporate governance index *(Governance)* captures this element in our setting. Table 3 and 4 report the summary statistics of the enforcement actions and the financial variables, respectively.

Insert Tables 3 and 4 about here

5.3 Empirical Results

Examining BHCs' Lobbying Decision We start by trying to explain a BHC's decision to engage in lobbying activities. To this end, we use the BHC sample to estimate a Probit model with the dependent variable *'lobbying'*. In order to test Prediction 1, the main independent variable of interest is the quality of the BHC's corporate governance *'Governance'*, which serves as a proxy for the unobservable quality of the BHC and its subsidiaries. Furthermore, we control for a number of the BHCs' characteristics including financial characteristics and company demographics, such as age or number of depository institutions held. In order to account for observable and unobservable characteristics across states, we include a set of state dummies. Moreover, in order to address variation across time, we also include a set of year dummies. Column (1) in Table 5 shows the result of the Probit regression with robust standard errors.

Insert Table 5 about here

In line with Prediction 1, BHCs with higher corporate governance quality are more likely to lobby, as indicated by a positive and significant coefficient of the *Governance* variable. With regards to the control variables, we find that companies that are older and have a greater number of depository institutions are more likely to lobby. Furthermore, we control for two additional variables that could be potential drivers of lobbying activity. First, the negative and significant coefficient of distance to Washington, DC confirms prior studies (Lambert (2019); Gibson, Odabasioglu, and Padovani (2018)) arguing that a shorter distance enables lobbyists to

interact more easily with the aforementioned parties. Second, our results indicate that higher importance of the financial sector, as measured by employment therein is associated with higher lobbying activity (see Cunha (2017)).

In a next step, we seek to test more directly Prediction 2 that suggests that large Bank Holding Companies may lobby on behalf of their ailing subsidiaries in order to secure them more favourable supervisory treatment. In order to test how relevant the possibility of an enforcement action against its subsidiaries is for a BHC, we add the average ROA and non-performing loans ratio over the BHC's portfolio of subsidiaries to our control variables, as these variables play an important role in the supervisory process.

In line with Prediction 2, the coefficient for average non-performing loans is positive and that for average ROA negative (Column (2) of Table 5) and significant on the 1% and the 5% level, respectively. All coefficients of variables that were already included in Column (1) remain qualitatively the same.

The result of Column (2) supports the BHC's motive of lobbying to shield their subsidiaries that are at risk of being punished. However, this is consistent with both the informational and the quid-pro-quo views of lobbying. In order to gain more insight into this distinction, the next steps in the analysis will examine in more detail which banks are successful in avoiding punishment via lobbying, and how these successfully lobbying banks perform in the longer term. If the purpose of lobbying was just regulatory capture, we would expect the lobbying success to be largely independent of quality-related variables, and lobbying banks to perform worse in the long run than non-lobbying banks, as Lambert (2019) has found. By contrast, as we have shown in the theoretical model and in Predictions 3 and 4, informational lobbying would be in line with lobbying success and post-lobbying performance depending on a variable related to the bank's individual gains and the social harm of a violation, such as the bank's corporate governance quality.

Examining Lobbying Success The next step of the analysis is to examine the impact of a BHC's lobbying activity on how likely its subsidiaries are to receive a regulatory enforcement action. Following Lambert (2019), we perform this analysis on the subsidiary level and make use of the subsidiary sample described in Section 5.2.

We estimate a Probit model with robust standard errors,[17] with the dependent variable

[17]It would be ideal to perform all estimations of this section using bank fixed effects in order to capture any unobservable bank-level effects. This however, is not feasible in practise as it would create an 'incidental

'Severe', a dummy indicating whether or not a subsidiary has received a regulatory enforcement action of the severe type. The *Lobbying* dummy indicates whether or not a subsidiary's parent company (BHC) has engaged in lobbying in a particular year. We additionally control for the quality of the BHC's corporate governance (*Governance*) as a proxy for the bank's private information on its ability to manage risks.[18] In order to test whether the impact of lobbying on punishment varies with governance quality in line with Prediction 3, we interact both of these variables. We also control for a set of variables that capture the CAMELS components, namely *Capitalisation*, *Asset Quality*, *Performance*, *Liquidity* and *Sensitivity to market risk*. Moreover, we take a bank's *Size* and *Age* into consideration, as well as *GDP* at the state level. Results are reported in Column (1) of Table 6.[19]

Insert Table 6 about here

The *lobbying* dummy, which represents the conditional relationship between lobbying and punishment for subsidiaries of *low-governance* BHCs, is positive and statistically significant at the 1% level. Prediction 3 suggests a negative relationship between lobbying and punishment only for high-quality banks, and the negative coefficient of the interaction term of lobbying and governance is in line with this. Table 7, which depicts the predicted marginal effects of the lobbying parameter for different values of corporate governance quality, confirms that this marginal effect is indeed negative if governance quality is sufficiently high and, thus, supports Prediction 3.[20] The picture is even clearer in Figure 1, which plots the marginal effects.

Insert Table 7 and Figure 1 about here

parameters problem' (see Neyman and Scott (1948); Lancaster (2000)), which would lead to biased coefficients. Nonetheless, we estimate our baseline model using a Linear Probability Model with bank fixed effects as a robustness test and report results in Appendix O.

[18] Although the subsidiary has its own board and governance policies, prior studies (Adams and Mehran (2003)) have highlighted that there could be a potential influence of corporate governance in a parent company on its subsidiaries.

[19] In additional analysis we also estimate an enhanced model, where additional control variables are included in the baseline model. In particular, we follow empirical precedent (e.g., Duchin and Sosyura (2012), Lambert (2019)) and include proxies to capture leverage, deposits to assets ratio and total deposits. Furthermore, given the nature of the core variables of interest reflecting BHC level traits, we also estimate the baseline model by clustering the results at the BHC level. The results remain intact and are reported in Appendix O.

[20] Ai and Norton (2003) outline potential complications regarding the interpretation of interaction terms in non-linear models. Norton, Wang, and Ai (2004) however, provide several alternative solutions in order to address these complications. We use these suggestions to estimate the marginal effects for different values of the Governance measure.

As the *Governance* score increases, the relationship between lobbying and enforcement action likelihood becomes inverse. This result is consistent with Prediction 3 and the informational motive for lobbying, but cannot be explained by the quid-pro-quo view of lobbying alone.

In terms of the remaining control variables, most appear to be in line with prior literature. In particular, we find that banks with low levels of capital and profitability are more likely to be punished. These findings are to be expected, as these financial characteristics are known to be important components of the CAMELS ratings and, thus, to determine whether a bank is at risk of being penalized.[21]

An important concern at this point is that lobbying might be endogenous. There could be two potential sources driving this. First, the BHC's lobbying decision might be correlated with some unobservable variable that also drives the regulator's enforcement decision. Despite controlling for a number of bank-level characteristics, there is still the possibility that our results are driven by omitted variable bias. For instance, the CAMELS ratings are confidential and cannot be fully observed. Although we make use of established in the literature proxies, we are not able to observe the true condition of the bank in this regard. Second, endogeneity may be driven by reverse causality, in the sense that one could argue that a BHC might anticipate that their subsidiaries are at risk of being penalized and accordingly choose to lobby the regulator. In either case, the parameter estimates related to lobbying in Table 6 would be biased.

In order to alleviate endogeneity concerns, we estimate a recursive Bivariate Probit model, given the binary nature of both the dependent and endogenous variables. The core challenge of the identification strategy of this analysis is identifying a suitable instrument that fulfils both the relevance and exclusion criterion. As the decision of whether to lobby is made by the BHC, a strong instrument will most likely be a variable on the BHC level.

Given the results reported in Table 5 and following empirical precedent (Lambert (2019)) we opt to include the natural logarithm of the distance of the BHC's headquarters to Washington, DC. Empirical research (e.g., Igan, Mishra, and Tressel (2012); Gao and Huang (2016); Lambert (2019)) has shown that a firm's proximity to Washington, DC plays an important role when it comes to the lobbying decision making process. The idea is that when a bank is located

[21] We performed a number of robustness checks, in which we excluded certain types of banks or regulators, almost all of which resulted in the interaction term of governance and lobbying to be significantly negative. We also perform additional estimations where we exclude the years of the financial crisis in order to ensure that our results are not driven by the high enforcement activity during those years. In order to strengthen the identification of our model we also estimate the baseline model with a linear probability model with bank fixed effects. Results are reported in Appendix O.

closer to Washington, DC, the cost of lobbying becomes lower and, thus, the incentives to engage in lobbying activities higher. Hence, this candidate instrument fulfils the relevance criterion. We now turn to whether this instrument fulfils the exclusion criterion for our setting. Note that on-site formal examinations are conducted by supervisors whose agencies are not located in Washington, DC. Therefore, the proximity of a bank's headquarters to Capitol Hill is not directly influencing regulatory enforcement, but only indirectly via lobbying. Hence, this candidate instrument fulfils the exclusion criterion, too.

The second-stage results of this estimation is reported in Column (6) of Table 6. In order to obtain diagnostics regarding the validity of the instruments and the overall identification of the equations, we independently re-estimate the model in the first stage in order to obtain the values of the LR- chi-square statistic. The p-value obtained is below 0.001, which confirms the significance of the model. With regards to the results, the sign and significance of the coefficients of the lobbying and governance variables and their interaction in the enforcement equation are consistent with the baseline Probit estimation in Column (1) of Table 6.[22]

Lobbying and performance In order to test Prediction 4, we analyse how lobbying banks in our sample perform some time after the lobbying has occurred.[23] In particular, we seek to explain future bank performance in the short term (i.e. at t+1 years) and long term (i.e. at t+5) years. As a proxy for performance, we use the Return on Assets ratio (ROA) as our dependent variable and estimate a linear regression model with bank fixed effects. Our core variable of interest is the lobbying dummy and its interaction with governance quality, but we also control for bank-level characteristics, such as capitalisation, liquidity, non-performing loans, size and age.

Insert Table 8 about here

The results from this model are presented in Table 8. Our findings in Column (2) suggest that, after 5 years, lobbying banks perform better than non-lobbying ones if they have high

[22]For robustness purposes, we amend our analysis to include two additional instruments relating to the financial situation of the BHC's subsidiaries (the mean ROA and non-performing loans), which Prediction 2 and Table 5 indicate to be an important determinant for its BHC's lobbying decision. The results, as shown in Appendix O, remain intact.

[23]Prior studies have found mixed evidence on the impact of political connections on firm performance: For example, Gropper, Jahera Jr, and Park (2013, 2015) find that banks connected to politicians through important Finance Committees perform better, whereas, focusing on the lobbying context, Lambert (2019) finds that in the short to medium run, lobbying banks perform worse in comparison to non-lobbying banks.

governance quality. This result is in line with Prediction 4 and, again, with the informational view of lobbying but not with a purely quid-pro-quo perspective. These results are robust to correcting for endogeneity treating the lobbying variable as endogenous as in the previous section (Table 8, Columns 3 and 4).[24]

Furthermore, one may question the extent to which governance becomes endogenous. We address this issue in the following ways: First, the specification of the model per se is such that we make use of bank fixed effects in order to control for invariant bank-level heterogeneity, as well as eliminate omitted variable bias (Adams and Mehran (2012)). Second, the control variables are inserted in one (or more) year lags in order to address potential issues related to reverse causality, following prior empirical studies (Anginer, Demirguc-Kunt, Huizinga, and Ma (2016), Gaganis, Lozano-Vivas, Papadimitri, and Pasiouras (2020)).[25]

For subsidiaries of low-governance BHCs, the opposite relationship holds. Another interesting result of Table 8 is that punished banks perform slightly worse (better) in the short (long) run. This suggests that the reputation effect of a regulatory enforcement action might be rather short-lived, whereas in the long run, the benefits of disciplining banks to comply with the regulation seem to dominate.

6 Conclusion

In this paper, we have argued that there may be informational lobbying in the context of regulatory enforcement. In order to show this, we extended a standard model of crime and enforcement, in which potential offenders (firms) are heterogenous with regards to their private gain from an offense ('types'), to include the possibility of offenders using lobbying to disclose their types to the enforcement agent. From the enforcement agent's perspective, lobbying may be beneficial as it allows her to investigate those types of offenders with a lower intensity that have a low return on investigation effort while focussing her costly investigation effort on types that are more worthwhile to investigate. In our model, the availability of lobbying is always

[24]We estimate the baseline model by applying a 2-stage Instrumental Variable analysis. The instruments used for this exercise are the same to those used in the previous section. The diagnostics for over-identification (Hansen J) pass the recommended thresholds.

[25]We also implement a GMM approach, where the lagged dependent variable, the lower (i.e. governance score and lobbying) and upper multiplicative terms (i.e. governance score x lobbying) are set as endogenous variables. These are instrumented with different combinations of their lags in a collapsed form (see Roodman (2009)) or using factors of the instruments (see Kapetanios and Marcellino (2010)). Results remain intact and are presented in Appendix O.

welfare enhancing whenever it is used in equilibrium, as we assume that the enforcement agent's objective is to maximise welfare. Furthermore, non-compliant firms who engage in informational lobbying tend to be those with the highest and compliant lobbying firms those with the lowest gains from the violation.

Then, we demonstrated that these predictions can be used to rationalise some empirical features of lobbying found by previous literature (Lambert (2019)) in the context of enforcement of US banking regulation, e.g. that lobbying banks are less likely to be penalised. Extending Lambert's (2019) empirical analysis, we showed that these features are heterogenous among banks with different quality of corporate governance. Specifically, the negative relationship between lobbying and enforcement found by Lambert (2019) is only confirmed for banks with high corporate governance score, whereas this relationship is reversed if that score is low. When interpreting corporate governance quality as a proxy for a bank's 'type' in the sense of our theoretical model, these results are in line with its predictions and, thus, informational lobbying.

It is important to emphasise that neither our theoretical model nor the empirical exercise have been designed to disprove any other potential motivation for lobbying such as the one based on exchanges of favours. We find empirical evidence that, together with the insights from our theory, is consistent with informational but not with *pure* quid-pro-quo lobbying in US banking regulation.

We sought to formulate our theoretical model in a most general way, which comes at the cost of yielding less specific results, but our application to the enforcement of bank regulation illustrates that it can easily be augmented with more specific assumptions that are tailored to a particular institutional setting. Despite this generality, we still had to make some assumptions to fix ideas or to keep the model tractable. First, our assumption that enforcement agents can perfectly commit to an enforcement strategy beforehand may not be an exact representation of reality in all situations. Note, however, that the need for this assumption is not due to our extension of the model to include lobbying, but rather the fact that investigation and punishment is never optimal ex-post in a model with deterrence as the only purpose of punishment. This conclusion might change, though, if there is a general public that inefficiently exerts pressure on enforcement agents to uniformly investigate violations with the same intensity. In such a case, commitment to a low investigation probability for lobbying, less harmful types of firms may only be possible if the enforcement agent is shielded from that political pressure. Such an argument would then add to existing concerns that more transparency in informational lobbying is not always beneficial (e.g. Minaudier (2022)).

A second potentially debatable assumption is that the only optimisation variable for the enforcement agent in our model is the investigation strategy. In reality, legislators often choose the severity and nature of punishment for certain offenses so as to optimise deterrence. If, like in our model, deterrence is monotonically increasing in the severity of the punishment for any given enforcement probability, previous literature such as Polinsky and Shavell (1979) has argued that it is optimal to set punishment at its maximum possible level in order to save on costly investigation effort. This maximum possible severity of punishment is exogenously given by legal restrictions (such as that the punishment must fit the crime) or economic ones. In this sense, T may be interpreted as the exogenously given maximum severity of the punishment, and α as being implied by the exogenously given nature of punishment for this particular context.

Last, the question arises whether the enforcement agent can do better than our optimal investigation strategy with disclosure. Hypothetically, if she could costlessly observe the firm's type g, she would either tailor deterrence to the specific type as in Proposition 2 (b), or let those types off the hook who are sufficiently difficult to deter and for whom social harm from the violation is sufficiently low. By contrast, when relying on firms to disclose their types, the enforcement agent must take into account incentive compatibility, which we labelled 'implementability' and discussed in Proposition 2. As a result, there will be types for whom the efficient outcome will not be implemented: Types who should be deterred are not, or vice versa, or they are investigated with an inefficiently high probability. This hypothetical discussion is relevant when there is a possibility for the enforcement agent to carry out own costly investigations to learn g. In this case, the enforcement agent can implement the efficient action once she has learnt g, but bears the information costs with certainty. By contrast, when disclosure is left to the firm, disclosure costs are only incurred for actually disclosed types. We briefly analyse this trade-off in Appendix P.

Table 1: Variable description

Variable	Variable code	*Description*	*Source*
Panel A. Bank Holding Company analysis variables			
Lobbying	*lobbying*	Dummy that takes "1" if BHC files a lobbying report in year t, "0" otherwise	Centre of Responsive Politics
Governance	*cgov_bhc*	Index measuring a company's commitment and effectiveness towards following best practice corporate governance policies Higher values indicate higher quality and vice versa.	Datastream
Performance	*roa_bhc*	Income (loss) before applicable income taxes and discontinued operations divided by total assets	Market Intelligence (former SNL)
Capitalisation	*cap_bhc*	Total qualifying capital divided by risk-weighted assets net of allowances and other reductions	Market Intelligence (former SNL)
Number of depository institutions	*depository_number*	Sum of depository institutions owned by BHC	Market Intelligence (former SNL)
Age	*age_bhc*	Natural logarithm of number of years that the bank's parent company is operating	Market Intelligence (former SNL)
Distance to DC	*distance_bhc*	Natural logarithm of lying distance (in km) from BHC's headquarter location to DC	Market Intelligence (former SNL)
Fin. sector employment	*fin_employment*	Natural logarithm of the total number of individuals employed in the financial services and insurance industry at the state level	U.S. Census Bureau
Mean Performance (Subsidiary)	*ROA(mean)*	Average value of ROA,of BHC's subsidiary in year t	Market Intelligence (former SNL)
Mean Non-perf. Loans (Subsidiary)	*NPL (mean)*	Average value of Non performing loans of BHC's subsidiary in year t	Market Intelligence (former SNL)
Panel B. Subsidiary analysis related variables			
Severe Enf. action	*severe*	Dummy that takes "1" if bank received a severe-type regulatory enforcement action in year t, "0" otherwise	Market Intelligence (former SNL)
Capitalisation	*cap*	Total qualifying capital divided by risk-weighted assets net of allowances and other reductions	Market Intelligence (former SNL)
Asset Quality	*asset*	Risk-weighted assets net of allowances and other reductions divided by total assets	Market Intelligence (former SNL)
Performance	*roa*	Income (loss) before applicable income taxes and discontinued operations divided by total assets	Market Intelligence (former SNL)
Liquidity	*liq*	Cash and cash balances plus US treasury securities divided by total assets	Market Intelligence (former SNL)
Sensitivity to market risk	*gap*	Difference between short-term assets and short term liabilities divided by earning assets	Market Intelligence (former SNL)
Non performing loans	*npl*	Non-accrual and restructured loans as a percent of total loans and leases	Market Intelligence (former SNL)
Leverage	*lev*	Tier 1 core capital adjusted by assets	Market Intelligence (former SNL)
Deposits to assets	*deptoassets*	Total deposits to assets	Market Intelligence (former SNL)
Deposits	*totaldep*	Natural logarithm of total deposits	Market Intelligence (former SNL)
Size	*size*	Natural logarithm of total assets	Market Intelligence (former SNL)
Age	*age*	Natural logarithm of number of years that the bank's parent company is operating	Market Intelligence (former SNL)
GDP	*gdpstate*	Gross Domestic Product at the state level	U.S. Census Bureau

Table 2: Summary statistics for Bank Holding Company characteristics

Panel A. Full sample					
Variable	Obs	Mean	Std. Dev.	Min	Max
Governance	437	49.86133	28.58139	0.12	99.65
Capitalisation	437	11.60728	2.513217	6.79	20.74
Performance	437	0.0089794	0.0077188	-0.0600171	0.0364328
Number of depository institutions	437	1.649886	1.186151	1	6
Age	437	114.8192	56.56024	7	218
Fin. Sector employment	437	15.4412	0.6754473	12.89943	16.4873
Distance to DC	437	7.020015	1.082795	5.206618	9.092468
ROA (mean)	437	1.660636	3.120496	-5.325	24.10333
NPL (mean)	437	1.960588	2.297084	0.06	14.91
Panel B. Lobbying sample					
Governance	207	53.22097	28.7796	1.05	99.65
Capitalisation	207	11.26135	2.180461	6.79	19
Performance	207	0.0084713	0.0087376	-0.0600171	0.025473
Number of depository institutions	207	1.956522	1.488807	1	6
Age	207	134.2415	49.92732	14	218
Fin. Sector employment	207	15.2878	0.6634763	12.91844	16.4873
Distance to DC	207	6.911498	1.139134	5.725819	9.092468
ROA (mean)	207	1.176845	1.479539	-5.325	8.21125
NPL (mean)	207	2.497128	2.552587	0.1293333	14.91

Table 2 reports the descriptive statistics of the variables included in the first section of our analysis, which focuses on the lobbying decision of Bank Holding Companies. For a detailed definition of variables see Table 1. The sample period is 2002-2017. Panel A provides the descriptive statistics of the full sample. Panel B, provides the descriptive statistics for Bank Holding Companies engaged in lobbying activities.

Table 3: Summary statistics Enforcement Actions

Year	All Actions	FDIC	FED	OCC
2002	2	0	1	1
2003	4	1	2	1
2004	2	1	1	0
2005	3	0	0	3
2006	1	0	0	1
2007	0	0	0	0
2008	8	3	2	3
2009	14	8	4	2
2010	16	10	3	3
2011	12	3	1	8
2012	9	5	0	4
2013	6	2	1	3
2014	12	3	1	8
2015	8	2	1	5
2016	6	4	1	1
2017	2	0	1	1
Total	105	42	19	44

Table 4: Summary statistics for Subsidiary bank analysys

Panel A. Full sample					
Variable	Obs	Mean	Std. dev.	Min	Max
Capitalisation	2,278	22.72364	51.59737	-1.49	498.08
Asset Quality	2,278	76.29996	17.55355	9.64	250.05
Performance	2,278	1.000544	2.562193	-28.2	30.15
Liquidity	2,278	27.03076	55.48925	0	497.64
Sensitivity to market risk	2,278	17.75279	20.98103	-44.38	97.15
Non-performing loans	2,220	1.913541	3.441841	0	39.72
Leverage	2,278	12.14563	16.1306	-2.33	487.08
Deposits to assets ratio	2,278	73.92908	19.62349	0	99.09
Core deposits (ln)	2,204	13.89594	2.5399	0	20.92076
Size	2,278	14.50469	2.315668	7.898782	21.48444
Age	2,278	67.33714	53.8856	0	217
GDP (State)	2,278	3.957	3.4809	0.2	14.4
Panel B. Punished sample					
Capitalisation	99	12.25727	7.294817	-1.49	43.53
Asset Quality	99	76.48455	11.70301	35.68	111.22
Performance	99	-0.7226263	2.91328	-11.68	4.54
Liquidity	99	19.4696	15.0643	1.42	79.23
Sensitivity to market risk	99	13.95303	21.34001	-34.23	77.8
Non-performing loans	99	7.217879	7.443331	0	27.95
Leverage	99	7.623636	3.837571	-2.33	19.6
Deposits to assets ratio	99	75.80343	18.65371	0.32	97.17
Core deposits (ln)	98	14.56151	3.270762	5.365976	20.83352
Size	99	15.41329	3.068971	10.12607	21.45322
Age	99	77.70707	65.66726	2	203
GDP (state)	99	3.3272	3.4658	0.2	14.2

Table 4 reports the descriptive statistics of the variables included in the second section of our analysis, which examines the probability of a Commercial and Savings banks being punished. These entities are all subsidiaries of the Bank Holding Companies included in the sample of our first section analysis. For a detailed definition of variables see Table 1. The sample period is 2002-2017. Panel A provides the descriptive statistics of the full sample. Panel B, provides the descriptive statistics for banks that receied a regulatory enforcement action.

Table 5: Probability to lobby (Bank Holding Company level)

	(1)	(2)
VARIABLES	dep. var.: Lobbying	dep. var.: Lobbying
Governance	0.0132***	0.0164***
	(0.00307)	(0.00337)
Capitalisation	-0.0491	-0.0973*
	(0.0547)	(0.0591)
Performance	-10.44	-7.487
	(10.07)	(10.56)
Number of dep. Inst	0.225***	0.235***
	(0.0804)	(0.0811)
Age	0.00517*	0.00734***
	(0.00288)	(0.00266)
Fin. Sector employment	9.011**	9.662**
	(3.71)	(3.849)
Distance to DC	-0.244**	-0.285***
	(0.099)	(0.102)
ROA (mean)		-0.114***
		(0.0328)
NPL (mean)		0.0963**
		(0.0486)
Constant	-125.1**	-133.8**
	(52.37)	(54.27)
Observations	437	437
State Dummies	YES	YES
Time dummies	YES	YES
R-sq	0.358	0.379

Table 5 reports the baseline results of a Probit model with robust standard errors. Sample period is 2002-2017. The dependent variable in both (1) and (2) is the lobbying indicator variable. For detailed variable description see Table 1. The ***, ** and * signs denote statistical significance at the 1,5 and 10% level.

Table 6: Probability to receive a regulatory enforcement action (Subsidiary level)

	Baseline model	**Excl. High Cap.**	**Excl. Low Cap.**	**Excl. Large Banks**	**Excl. Small Banks**	**Endogeneity**
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Dep. Var: Severe	Dep. Var: Severe	Dep. Var: Severe	Dep. Var: Severe	Dep. Var: Severe	Dep. Var: Severe
Lobbying	0.687***	0.687***	0.333	0.751***	0.675***	1.3975 ***
	(0.245)	(0.245)	(0.289)	(0.260)	(0.247)	(0.328)
Governance	0.00646**	0.00646**	0.00430	0.00654**	0.00614**	0.006 **
	(0.00290)	(0.00290)	(0.00323)	(0.00291)	(0.00291)	(0.0028)
Lobbying x Governance	-0.0119***	-0.0119***	-0.00886**	-0.0147***	-0.0115***	-0.012***
	(0.00382)	(0.00382)	(0.00421)	(0.00440)	(0.00382)	(0.0037)
Capitalisation	-0.0414***	-0.0414***	-0.00932	-0.0344**	-0.0326**	-0.042 ***
	(0.0145)	(0.0145)	(0.00901)	(0.0154)	(0.0152)	(0.0138)
Asset Quality	-0.00316	-0.00316	-0.00203	-0.00357	-0.00233	-0.003
	(0.00463)	(0.00463)	(0.00365)	(0.00507)	(0.00442)	(0.0046)
Performance	-0.165***	-0.165***	-0.0786**	-0.156***	-0.186***	-0.1513 ***
	(0.0282)	(0.0282)	(0.0314)	(0.0298)	(0.0338)	(0.0271)
Liquidity	0.00236	0.00236	-0.00138	-0.00466	0.00103	0.002
	(0.00540)	(0.00540)	(0.00461)	(0.00679)	(0.00541)	(0.0052)
Sensitivity to market risk	-0.00313	-0.00313	0.000812	-0.00151	-0.00351	-0.003
	(0.00366)	(0.00366)	(0.00371)	(0.00387)	(0.00369)	(0.00354)
Size	0.0152	0.0152	0.0403	-0.0535	0.0216	-0.024
	(0.0386)	(0.0386)	(0.0405)	(0.0463)	(0.0391)	(0.0385)
Age	0.000152	0.000152	0.000897	-0.000519	0.000262	0.0006
	(0.00144)	(0.00144)	(0.00150)	(0.00152)	(0.00144)	(0.0013)
GDP (State)	-0.0588	-0.0588	0.0551	-0.186	-0.0255	0.0594
	(0.302)	(0.302)	(0.325)	(0.284)	(0.306)	(0.3029)
Constant	-1.807**	-1.807**	-2.712***	-0.454	-1.990**	-1.4519
	(0.820)	(0.820)	(0.896)	(0.897)	(0.818)	(0.503)
Method of estimation	Probit	Probit	Probit	Probit	Probit	BiProbit
Observations	2,278	2,244	1,913	2,147	2,214	2,275
Regulator Dummies	Yes	Yes	Yes	Yes	Yes	Yes
State Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-sq	0.263	0.260	0.201	0.269	0.262	
LR-stat						891.67

Table 6 reports the baseline results of a Probit model with robust standard errors (Columns 1-5) and the results obtained by estimating the baseline model using a Bivariate Probit model to address endogeneity (Column 6). Sample period is 2002-2017. The dependent variable across models is the severe enforcement action indicator variable. Column (1) reports the baseline results , whereas Columns (2) - (5) report the results of additional robustness tests performed. Column (6) reports the second stage results of the BiProbit model. The instrument used in the model is 'Distance to DC'. For detailed variable description see Table 1. The ***, ** and * signs denote statistical significance at the 1,5 and 10% level.

Table 7: Average marginal effects for Baseline model in Table 6

Percentile	Governance values	Average Marginal Effects
1	0.12	0.0496211**
		(0.0195157)
5	4.13	0.0461365**
		(0.0182708)
10	7.24	0.0434429**
		(0.0173736)
25	23.39	0.0295384**
		(0.0136926)
50	50	0.0066177
		(0.0113122)
75	79.93	-0.0199438
		(0.0140235)
90	92.21	-0.0313052*
		(0.0167179)
95	95.32	-0.0342387*
		(0.0175476)
99	98	-0.0367867**
		(0.0183109)

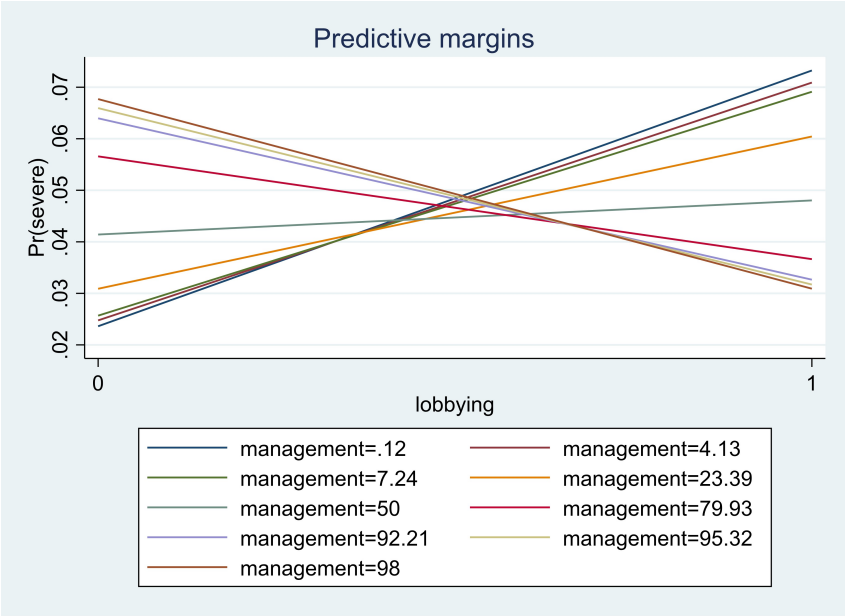
Table 7 reports the average marginal effects of the Baseline model in Table 6, Column (1) obtained by the Delta-method. The marginal effects refer to nine values of the Governance index in the range of 1-98 as observed in the sample. The marginal effects are reported in Column (3). Standard errors are in parentheses. The output post-estimation is based on Stata's 'margins' command (see Williams et al.,2012). The ***, ** and * signs denote statistical significance at the 1,5 and 10% level.

Table 8: Lobbying and performance

	(1)	(2)	(3)	(4)
VARIABLES	Dep. var: ROA t+1	Dep. var: ROA t+5	Dep. var: ROA t+1	Dep. var: ROA t+5
Lobbying	0.203	-0.902**	0.203	-0.9015**
	(0.200)	(0.413)	(0.169)	(0.3569)
Governance	0.00223	-0.0159***	0.0022	-0.0159***
	(0.00262)	(0.00580)	(0.0022)	(0.005)
Lobbying x Governance	0.00181	0.0199***	0.0018	0.0199***
	(0.00346)	(0.00644)	(0.0029)	(0.0055)
Severe	-0.301*	0.335*	-0.3008**	0.3351*
	(0.161)	(0.193)	(0.1366)	(0.1664)
Constant	8.813***	14.13***	9.45**	-23.651
	(1.361)	(2.721)	(2.074)	(14.579)
Method of estimation	OLS	OLS	IV	IV
Observations	2,002	734	1976	722
R-squared	0.182	0.241	0.58	0.66
Bank controls	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES
State dummies	YES	YES	YES	YES

Table 8 reports the results of a linear model examining the impact of lobbying on bank performance estimated with OLS (Columns 1 and 2) and IV (Columns 3 and 4). Sample period is 2002-2017. The dependent variable in all cases is the return on assets ratio.
In Columns 1,3 the dependent variable is the return on assets ratio for year t+1. In Columns 2,4 the dependent variable is the return on assets ratio for year t+5. Columns 3 and 4 report the second stage results of an IV analysis, estimated to address endogeneity concerns in regard to the model estimated in columns 1 and 2, and using 'Distance to DC' as instrument. For detailed variable description see Table 1. The ***, ** and * signs denote statistical significance at the 1,5 and 10% level.

Figure 1: Margins plot - Average margins showcasing the moderating effect of Lobbying on the probability of enforcement for different values of the Governance index



Appendix

A Proof of Proposition 1

The first derivative of the enforcement agent's objective function (5) is

$$W'_{NL}(p^N) = -C'(p^N) - \alpha T \left[1 - (1-\lambda)F(\widetilde{g}(p^N))\right] + \left[(1-\lambda)p^N \alpha T - v(\widetilde{g}(p^N))\right] f(\widetilde{g}(p^N))(1-\lambda)T \tag{16}$$

Consider any parameter γ of the investigation cost function $C(p^N;\gamma)$ such that $\frac{\partial^2 C(p^N\gamma)}{\partial p^N \partial \gamma} > 0$ for every p^N, i.e., increasing γ increases the marginal investigation cost everywhere. Then, $\frac{\partial^2 W_{NL}(p^N)}{\partial p^N \partial \gamma} < 0$, which implies $\frac{dp^N_{NL}}{d\gamma} \leq 0$ due to Theorem 4 of Milgrom and Shannon (1994). In other words, the optimal p^N_{NL} is non-increasing in the marginal investigation costs.

Similarly, decompose the social value of the violation into a part that is variable in g and a constant part, $v(g) = y(g) + V$. Then, again, $\frac{\partial^2 W_{NL}(p^N)}{\partial p^N \partial V} < 0$, which implies $\frac{dp^N_{NL}}{dV} \leq 0$ due to Theorem 4 of Milgrom and Shannon (1994). ■

B Proof of Proposition 2

Part (a): If the enforcement agent wants to induce a firm to violate the regulation and disclose its type, this action is most attractive for the firm if it is let entirely off the hook, $p^1(g) = 0$. Suppose, therefore that the enforcement agent has indeed chosen this level of enforcement probability. In order to compare disclosure with non-disclosure, assume first that $g \in G_D(p^N)$, which implies that g prefers N over O. Then, type g prefers A over N if and only if

$$\Pi(1;g,0) = g - L \geq -\lambda p^N T = \Pi(0;g,p^N),$$

which is equivalent to $g \geq g_A(p^N)$. Now assume that $g \in G_U(p^N)$, which implies that g prefers O over N. Then, type g prefers A over O if and only if

$$\Pi(1;g,0) = g - L \geq g - p^N T = \Pi(0;g,p^N),$$

which is true whenever $p^N \geq \frac{L}{T}$. Furthermore, $g_A(p^N) = L - \lambda p^N T \leq (1-\lambda)p^N T = \widetilde{g}(p^N)$ if and only if $p^N \geq \frac{L}{T}$.

The second claim of Part (a) is that $p^1(g) = 0$ is indeed the optimal level if Action A is supposed to be implemented. Suppose the enforcement agent seeks to implement Action A, and that it is implementable. Then, the enforcement agent chooses $p^1(g)$ so as to maximise

$w(p^1(g); g, 1) = -p^1(g)\alpha T - C(p^1(g)) - L$ subject to

$$g - p^1(g)T - L \geq \max\{-\lambda p^1(g)T - L, -\lambda p^N T, g - p^N T\}.$$

The objective function is monotonically decreasing in $p^1(g)$. Furthermore, the left-hand side of the constraint is monotonically decreasing in, and the last two items in the maximum operator on the right-hand side are independent of $p^1(g)$. Finally, the difference between the left-hand side and the first item in the maximum operator of the right-hand side of the constraint, $g - (1-\lambda)p^1(g)T$, is also monotonically decreasing in $p^1(g)$. Hence, decreasing $p^1(g)$ increases the objective function and, at the same time, makes the constraint slacker. Therefore, it is optimal to set it at its lowest level, $p^1(g) = 0$.

Action B: If the enforcement agent wants to implement Action B, she can make this action most attractive by setting $p^1(g)$ as low as possible (in order to minimise the firm's probability of being punished), but still high enough to achieve deterrence. This is the case if $p^1(g) = \frac{g}{(1-\lambda)T}$, which makes type g indifferent between Actions A and B. Under this investigation probability, type $g \in G_D(p^N)$ prefers B over N if and only if

$$\Pi\left(1; g, \frac{g}{(1-\lambda)T}\right) = -\frac{\lambda g}{1-\lambda} - L \geq -\lambda p^N T = \Pi(0; g, p^N),$$

which is equivalent to $g \leq g_B(p^N)$. On the other hand, type $g \in G_U(p^N)$ prefers B over O if and only if

$$\Pi\left(1; g, \frac{g}{(1-\lambda)T}\right) = -\frac{\lambda g}{1-\lambda} - L \geq g - p^N T = \Pi(0; g, p^N),$$

which is equivalent to $g \leq (1-\lambda)(p^N T - L) < \widetilde{g}(p^N)$, a contradiction to $g \in G_U(p^N)$. The fact $g_B(p^N) < \widetilde{g}(p^N)$ completes the proof.

Again, the investigation probability $p^1(g) = \frac{g}{(1-\lambda)T}$ that makes Action B most attractive for the firm is also the optimal one from the enforcement agent's perspective, given that she wants to implement Action B. The enforcement agent's objective is to choose $p^1(g)$ so as to maximise $w(p^1(g); g, 1) = -\lambda p^1(g)\alpha T - C(p^1(g)) - L$ subject to

$$\begin{aligned} -\lambda p^1(g)T - L &\geq g - p^1(g)T \\ -\lambda p^1(g)T - L &\geq -\lambda p^N T \end{aligned}$$

The objective function is monotonically decreasing in $p^1(g)$. Furthermore, the second of the constraints gets slacker with decreasing $p^1(g)$. However, the first of the constraints, which can be rearranged to $p^1(g) \geq \frac{g}{(1-\lambda)T}$ gets tighter with decreasing $p^1(g)$, i.e., it imposes a lower bound to $p^1(g)$. Hence, if action B is implementable at all (i.e., there is a $p^1(g)$ that satisfies both constraints), then the optimal investigation probability $p^1(g)$ will be given by (8). ■

C Proof of Proposition 3

Part (a): We have already shown above that all types $g \in G_U(p^N)$ will disclose their types if $p^N \geq \widetilde{p}^N$. Therefore, all that remains to show is that, if $p^N < \widetilde{p}^N$, there will not be any disclosure in equilibrium.

Suppose that $p^N < \widetilde{p}^N$. No type $g \in G_U(p^N)$ will disclose its type. If $g \in G_D(p^N)$, then $w_A(g) \geq w_N(p^N)$ if and only if

$$v(g) \geq L - \lambda\alpha p^N T - C(p^N) > (1-\lambda)\alpha p^N T = \alpha\widetilde{g}(p^N) > \alpha g$$

for any $g \in G_D(p^N)$, a contradiction to our Assumption 1.

Furthermore, if $p^N < \widetilde{p}^N$,

$$\begin{aligned} w_B(g) &= -\frac{\lambda\alpha g}{1-\lambda} - C\left(\frac{g}{(1-\lambda)T}\right) - L \\ &< -\frac{\lambda\alpha g}{1-\lambda} - C\left(\frac{g}{(1-\lambda)T}\right) - \alpha p^N T - C(p^N) \\ &< -\frac{\lambda\alpha g}{1-\lambda} - C\left(\frac{g}{(1-\lambda)T}\right) - \lambda\alpha p^N T - C(p^N) \\ &< w_N(p^N). \end{aligned}$$

Hence, whenever $p^N < \widetilde{p}^N$, $G_N(p^N) = G_D(p^N)$ and $G_O(p^N) = G_U(p^N)$, whereas $G_A(p^N) = G_B(p^N) = \emptyset$.

Part (b) is immediately implied by Proposition 2. ■

D Proof of Proposition 4

Let us start with analysing the impact of a change in p^N on the sets of types for whom actions $i \in \{A, B, N, O\}$ are implementable and optimal:

Lemma 1 *If $\widetilde{p}^N < p^{N\prime} < p^{N\prime\prime}$, then $G_B(p^{N\prime}) \subseteq G_B(p^{N\prime\prime})$ and $G_A(p^{N\prime}) \cap G_D(p^{N\prime}) \subseteq G_A(p^{N\prime\prime}) \cap G_D(p^{N\prime\prime})$, but $G_A(p^{N\prime\prime}) \cap G_U(p^{N\prime\prime}) \subseteq G_A(p^{N\prime}) \cap G_U(p^{N\prime})$.*

Proof. Consider some $g \in G_B(p^{N\prime})$. This is equivalent to $0 \leq g \leq g_B(p^{N\prime})$ and $w_B(g) \geq \max\{w_A(g), w_N(p^{N\prime})\}$. As $g_B(p^{N\prime}) < g_B(p^{N\prime\prime})$ and $w_N(p^{N\prime}) > w_N(p^{N\prime\prime})$, it follows that $g \in G_B(p^{N\prime\prime})$.

Similarly, $g \in G_A(p^{N\prime}) \cap G_D(p^{N\prime})$ is equivalent to $0 \leq g_A(p^{N\prime}) \leq g \leq \widetilde{g}(p^{N\prime})$ and $w_A(g) \geq \max\{w_B(g), w_N(p^{N\prime})\}$. As $g_A(p^{N\prime}) > g_A(p^{N\prime\prime})$, $\widetilde{g}(p^{N\prime}) < \widetilde{g}(p^{N\prime\prime})$ and $w_N(p^{N\prime}) > w_N(p^{N\prime\prime})$, it follows that $g \in G_A(p^{N\prime\prime}) \cap G_D(p^{N\prime\prime})$.

Last, if $\widetilde{p}^N < p^N$, then $G_A(p^N) \cap G_D(p^N) = G_D(p^N) = (\widetilde{g}(p^N), \overline{g}]$. As $\widetilde{g}(p^N) = (1-\lambda)p^N T$ is increasing in p^N, the claim follows immediately. ■

In other words, the set of types who would be deterred absent disclosure and for whom disclosure is implementable and socially optimal, monotonically grows with p^N. However, the reverse is true for the set of types who would be undeterred absent disclosure and for whom disclosure is implementable and socially optimal.

The enforcement agent's objective is to choose p^N so as to maximise $W_L(p^N)$ given by (14). Note first that the integration boundaries in (14) depend on whether p^N is above or below $\frac{L}{\lambda T}$: If $p^N \leq \frac{L}{\lambda T}$, then $g_B(p^N) \leq 0 \leq g_A(p^N)$, so that there is no type for whom B is implementable, and A is implementable if and only if $g \geq g_A(p^N)$. In this case, A will be implemented for all g where $g \geq g_A(p^N)$ and $w_A(g) \geq w_N(p^N)$, and N will be implemented otherwise. If, on the other hand, $p^N > \frac{L}{\lambda T}$, then $g_A(p^N) \leq 0 \leq g_B(p^N)$, so that A, B and N are implementable for $g \leq g_B(p^N)$, and only A and N are implementable for $g > g_B(p^N)$.

If the enforcement agent increases p^N, this will affect $W_L(p^N)$ wherever a different action A, B, N or O is implemented as a result of a change in the threshold types $g_A(p^N)$, $g_B(p^N)$ and $\widetilde{g}(p^N)$, and via the changes in $w_N(p^N)$ and $w_O(g;p^N)$ whenever the firm does not disclose. Hence, the first derivative of $W_L(p^N)$ w.r.t. p^N is equal to

$$\begin{aligned} W_L'(p^N) = {} & f(g_A(p^N))\lambda T \max\left\{w_A(g_A(p^N)) - w_N(p^N), 0\right\} \mathbb{1}_{p^N < \frac{L}{\lambda T}} \\ & + f(g_B(p^N))(1-\lambda)T \max\left\{w_B(g_B(p^N)) - \max\left\{w_A(g_B(p^N)), w_N(p^N)\right\}, 0\right\} \mathbb{1}_{p^N > \frac{L}{\lambda T}} \\ & + f(\widetilde{g}(p^N))(1-\lambda)T \max\left\{w_N(p^N) - \max\left\{w_A(\widetilde{g}(p^N)), w_O(\widetilde{g}(p^N), p^N)\right\}, 0\right\} \\ & + w_N'(p^N)\text{Prob}(g \in G_N(p^N)) + \frac{\partial w_O(g;p^N)}{\partial p^N}\text{Prob}(g \in G_O(p^N)). \end{aligned} \tag{17}$$

To see why we can write $\max\left\{w_N(p^N) - \max\left\{w_A(\widetilde{g}(p^N)), w_O(\widetilde{g}(p^N), p^N)\right\}, 0\right\}$ in the third line rather than $\max\left\{w_A(\widetilde{g}(p^N)), w_N(p^N)\right\} - \max\left\{w_A(\widetilde{g}(p^N)), w_O(\widetilde{g}(p^N), p^N)\right\}$, recall that our assumption that $v(g) < \alpha g$ rules out the possibility that $w_N(p^N) < w_A(\widetilde{g}(p^N)) < w_O(\widetilde{g}(p^N); p^N)$.

With (16), the first derivative of the objective function if disclosure is unavailable can be written as

$$\begin{aligned} W_{NL}'(p^N) = {} & (w_N(p^N) - w_O(\widetilde{g}(p^N), p^N))f(\widetilde{g}(p^N))(1-\lambda)T \\ & + w_N'(p^N)F(\widetilde{g}(p^N)) + \frac{\partial w_O(g;p^N)}{\partial p^N}(1 - F(\widetilde{g}(p^N))) \end{aligned} \tag{18}$$

Hence, we have

$$\begin{aligned}
W'_L(p^N) - W'_{NL}(p^N) &= f(g_A(p^N))\lambda T \max\left\{w_A(g_A(p^N)) - w_N(p^N), 0\right\} \mathbb{1}_{p^N < \frac{L}{\lambda T}} \\
&+ f(g_B(p^N))(1-\lambda)T \max\left\{w_B(g_B(p^N)) - \max\left\{w_A(g_B(p^N)), w_N(p^N)\right\}, 0\right\} \mathbb{1}_{p^N > \frac{L}{\lambda T}} \\
&- f(\widetilde{g}(p^N))(1-\lambda)T \left(\min\left\{w_A(\widetilde{g}(p^N)), w_N(p^N)\right\} - \min\left\{w_A(\widetilde{g}(p^N)), w_O(\widetilde{g}(p^N), p^N)\right\}\right) \\
&- w'_N(p^N)\text{Prob}(g \in G_D(p^N) \setminus G_N(p^N)) - \frac{\partial w_O(g; p^N)}{\partial p^N}\text{Prob}(g \in G_U(p^N) \setminus G_O(p^N)).
\end{aligned} \tag{19}$$

All lines of (19) are non-negative, except the third line, which is negative for every $p^N > \widetilde{p}^N$ but approaches zero as p^N approaches $\widetilde{p}^N$ from above, as the proof of Proposition 3 implies that both minima in this line become $w_A(\widetilde{g}(p^N))$. On the other hand, the last line of (19) is bounded away from zero in that range of p^N. Hence, there is some threshold $t > 0$ such that $W'_L(p^N) - W'_{NL}(p^N) \geq 0$ for every $p^N \leq \widetilde{p}^N + t$, which, together with Theorem 4 of Milgrom and Shannon (1994), implies that $p^N_{NL} \leq p^N_L$ for every $p^N_{NL} \in \operatorname{argmax} W_{NL}(p^N)$ and $p^N_L \in \operatorname{argmax} W_L(p^N)$ if $\max\{\operatorname{argmax} W_{NL}(p^N)\}$ is not too far above $\widetilde{p}^N$).

It remains to show that a parameter constellation that implies $p^N_{NL} \leq \widetilde{p}^N + t$ indeed exists: The parameters of the model, excluding L, determine p^N_{NL}. For such a given level of p^N_{NL}, assuming L to be at a sufficiently high level can lift $\widetilde{p}^N$ above $p^N_{NL} - t$ independently (i.e., without affecting p^N_{NL}. ■

E Proof of Proposition 5

Suppose that $v(g)$ is weakly increasing in g and that $G_B(p^N) \neq \emptyset$. Consider some $g' \notin G_B(p^N)$ and $g'' > g'$. Then, $g_B(p^N) < g'$, which implies $g_B(p^N) < g''$, or $w_B(g') < \max\{w_A(g', w_N(p^N)\}$, which implies $w_B(g'') < \max\{w_A(g'', w_N(p^N)\}$ as $w_B(g)$ is decreasing in g and, due to our assumption on the shape of $v(g)$, $w_A(g)$ is non-decreasing in g.

Similarly, suppose that $v(g)$ is weakly increasing in g and that $G_A(p^N) \neq G_U(p^N)$. Consider some $g' \notin G_A(p^N)$ and $g'' < g' \leq g_B(p^N)$. Then, $g' < g_A(p^N)$, which implies $g'' < g_A(p^N)$, or $w_A(g') < \max\{w_B(g', w_N(p^N)\}$, which implies $w_A(g'') < \max\{w_B(g'', w_N(p^N)\}$ as $w_B(g)$ is decreasing in g and, due to our assumption on the shape of $v(g)$, $w_A(g)$ is non-decreasing in g. On the other hand, if $g_B(p^N) < g'$, $w_A(g') < w_N(p^N)$ implies $w_A(g'') < w_N(p^N)$ for the same reason. ■

F Proof of Proposition 6

With Proposition 5, $G_A(p^N) \cap G_D(p^N) \neq \emptyset$ if and only if $w_A(\widetilde{g}(p^N)) > w_N(p^N)$. As the left-hand side of this inequality is increasing and the right-hand side decreasing in p^N, there is a threshold $\widetilde{\widetilde{p}}^N$ such that the inequality is satisfied if and only if $p^N > \widetilde{\widetilde{p}}^N$. This threshold is given by $w_A(\widetilde{g}(\widetilde{\widetilde{p}}^N)) = w_N(\widetilde{\widetilde{p}}^N)$, which is equivalent to (15). ■

G Proof of Implication 1

Suppose that $p^N_{NL} > \widetilde{p}^N$. This implies that, for all $p^N < \widetilde{p}^N$, $W_L(p^N) = W_{NL}(p^N) \leq W_{NL}(p^N_{NL}) \leq W_L(p^N_{NL})$. Hence, $p^N_L > \widetilde{p}^N$, so that Proposition 3 implies that lobbying occurs in equilibrium.

Hence, to prove the Implication, it is sufficient to prove that $p^N_{NL} > \widetilde{p}^N$ for the claimed parameter ranges. First, as in the proof of Proposition 1, write $v(g) = y(g) + V$. Then, the aim is to prove that $p^N_{NL} > \widetilde{p}^N$ for sufficiently low L and V. Recall from Proposition 1 that p^N_{NL} is non-increasing V (and, of course, constant in L). Furthermore, $\widetilde{p}^N$ is increasing in L and constant in V. Finally, the lower Inada condition ensures that $p^N_{NL} > 0$, whereas a sufficiently low L can drive $\widetilde{p}^N$ below any arbitrary positive value, which completes the proof. ■

H Proof of Implication 2

Part (a) is immediately implied by the fact that action B is not implementable for any $\lambda \in \left[0, \frac{L}{T}\right)$. Part (b) is simply reflecting the fact that, if $v(g)$ is sufficiently high for all $g \in [0, g_B(p^N))$, then $w_B(g) < w_A(g)$ for all types for whom action B would have been implementable. ■

I Proof of Implication 3

A firm will violate the regulation if and only if $g \in G_A(p^N) \cup G_O(p^N)$. If $p^N < \widetilde{\widetilde{p}}^N$, then the set $G_A(p^N) \cup G_O(p^N) = [\widetilde{g}(p^N), \overline{g}] = [(1-\lambda)p^N T, \overline{g}]$ is getting smaller as p^N increases. On the other hand, if $p^N > \widetilde{\widetilde{p}}^N$ and $v(g)$ is strictly increasing in g, then the set $G_A(p^N) \cup G_O(p^N) = G_A(p^N) = [\max\{g_A(p_N), \hat{g}_A(p^N), \overline{g}]$, when defining $\hat{g}_A(p^N)$ such that

$$w_A(\hat{g}_A(p^N)) = \max\{w_B(\hat{g}_A(p^N)), w_N(p^N)\} \tag{20}$$

$g_A(p^N) = L - \lambda p^N T$ is clearly decreasing in p^N. As for $\hat{g}_A(p^N)$, note first that it is uniquely defined by (20) whenever $v(g)$ is strictly increasing in g, as $w_A(g)$ is increasing, $w_B(g)$ decreasing

and $w_N(p^N)$ constant in g in that case. Furthermore, $w_A(g)$ and $w_B(g)$ are independent of p^N, while $w_N(p^N)$ is decreasing in p^N. Hence, $\hat{g}_A(p^N)$ is also decreasing in p^N. Finally, if $p^N > \widetilde{\widetilde{p}}^N$ and $v(g)$ is constant in g, then the set $G_A(p^N) \cup G_O(p^N) = G_A(p^N) = [\max\{g_A(p_N), 0\}, \overline{g}]$, the lower endpoint of which is weakly decreasing in p^N. ■

J Proof of Implication 4

If $p^N_{NL} < p^N_L$ and $G_A(p^N_L) = G_U(p^N_L)$, then there are some types $g \in [\widetilde{g}(p^N_{NL}), \widetilde{g}(p^N_L))$ who would have violated the regulation in the equilibrium without disclosure but are deterred in the equilibrium with disclosure. All other types' compliance decisions are unchanged. Hence, deterrence has gone up. This case occurs if the equilibrium investigation probability when disclosure is available, p^N_L, is not too far above the threshold $\widetilde{p}^N$.

On the other hand, if, for instance, $v(g)$ is increasing in g and $\widetilde{\widetilde{p}}^N < p^N_{NL} < p^N_L$, then, due to implication 3, $G_A(p^N_L) \subseteq G_A(p^N_{NL}) \subset G_U(p^N_{NL})$, which means that deterrence has gone down. ■

K Proof of Implication 5

Consider a change from an equilibrium in the absence of the possibility of disclosure and with equilibrium investigation probability p^N_{NL} to an equilibrium with the possibility of disclosure and equilibrium investigation probability towards non-disclosing firms $p^N_L \geq p^N_{NL}$, which implies $\widetilde{g}(p^N_{NL}) \leq \widetilde{g}(p^N_L)$. Then, the set of types in the new equilibrium can be partitioned into the sets $G_B(p^N_L)$, $G_N(p^N_L)$, $G_A(p^N_L) \cap G_D(p^N_{NL})$ and $G_A(p^N_L) \cap G_U(p^N_{NL})$.

The difference in firms' payoffs between the new and the old equilibrium is

- $g - L - (g - p^N_{NL}T) = p^N_{NL}T - L$ if $g \in G_A(p^N_L) \cap G_U(p^N_{NL})$;
- $-\frac{\lambda g}{1-\lambda} - L + \lambda p^N_{NL}T < p^N_{NL}T - L$ if $g \in G_B(p^N)$;
- $g - L + \lambda p^N_{NL}T \leq \widetilde{g}(p^N_{NL}) - L + \lambda p^N_{NL}T = p^N_{NL}T - L$ if $g \in G_A(p^N_L) \cap G_D(p^N_{NL})$;
- $-\lambda(p^N_L - p^N_{NL})T < 0$ if $g \in G_N(p^N_L)$.

The first item is the greatest one, and all items except the last one are positive. ■

L Embedding a Model of Bank Regulation Into Our Model

Assume that a bank decides whether to comply with or violate regulation. If the bank has complied with the regulation, its payoff will be S with certainty. If the bank has not complied, payoff is risky. With probability θ, a high payoff $R > S$ is realised. With probability $1 - \theta$, the bank defaults and gets a payoff of zero, which imposes a negative externality B on society. For instance, such a payoff structure emerges when a bank may or may not comply with capital adequacy rules in Feess and Hege (2011). Suppose that a bank's probability of successfully managing a risky portfolio, θ, is the bank's private information and unobservable to the regulator.

A bank's expected private gain from violating regulation is $g := \theta R - S$. The impact of this violation on social welfare is equal to the bank's private benefit g, less the negative externality that arises if the risky project fails, which happens with probability $1 - \theta = 1 - \frac{g+S}{R}$. Hence,

$$v(g) = g - \left(1 - \frac{g+S}{R}\right) B = \frac{g(R+B) - (R-S)B}{R}. \tag{21}$$

Note that $v(g)$ is increasing in g, $v'(g) > 1$, and $v(g) < g$ for all $g < R - S$, which is satisfied whenever the risky portfolio does not succeed with certainty ($\theta < 1$).

M U.S Banking Supervision and the Classification of regulatory enforcement actions

The U.S. banking sector operates under a dual banking system (i.e., there co-exist federal and state banking systems). There are three main regulatory agencies are responsible for the regulation and supervision of US banks: (i) the Office of the Comptroller of the Currency (OCC) which is in charge of federally chartered banks (national banks), (ii) Federal Reserve Bank (FRB), which supervises state-chartered institutions that are members of the Federal Reserve System and (iii) the Federal Deposit Insurance Corporation (FDIC), which is responsible for federally insured depository institutions, which includes FED chartered banks that are not members of the Federal Reserve System, as well as state-chartered thrift institutions. For banks that are chartered on both a federal and state level, supervisory responsibilities are allocated amid the three regulatory agencies. An indispensable task of the regulatory agencies is to monitor the safety and soundness conditions of the banks they supervise by conducting

on-site and off-site examinations.[26]

Full scope "on-site" examinations are carried out by the regulatory agency in charge at least once a year. Depending on the information obtained through the above process, the agency assigns a rating which reveals the financial condition and performance of the bank. The system is commonly referred to as the CAMELS rating system and is strictly confidential (although the literature has come up with traditional proxies to capture each of the components of this rating). After the assessment procedure a composite rating ranging from 1 (low risk) to 5 (high risk) is assigned on each bank by its supervisor. When the regulators identify weaknesses (especially for higher CAMELS ratings that signal higher risk) the on-site examinations can become more regular depending on the needs and correction measures that ought to be taken into consideration. "Off-site" audits form a complementary element to the CAMELS ratings system and are implemented in order to monitor supervised institutions. In this case, information obtained by prior examinations and financial information acquired by the Quarterly Reports of Condition and Income (Call reports) is assessed.

Both aforementioned mechanisms are useful in identifying early warning signs and models, which aid to identify institutions in need that require additional supervisory attention. Importantly, the information derived by on-site and off-site exams in combination with the CAMELS ratings assigned to each depository institution play a key role I determining the corrective action (enforcement action) imposed on a bank. There are two types of enforcement actions: (i) informal enforcement actions and (ii) formal enforcement actions. The former, are voluntary commitments formed by the bank's management, board of directors or trustees when the level of misconduct is less severe. These actions are not publicly disclosed or legally enforceable and their main objective is to correct weaknesses identified during the supervisory process and reassure conformity with laws and regulations. The latter, are imposed in cases where misconduct is severe or where previously imposed informal actions have not been adequate or effective. These types of actions are publicly disclosed and legally enforceable. The table below enlists the different types of formal enforcement actions.

[26]For a detailed discussion and overview of the supervisory process in the U.S. Banking Sector please see OCC (2018).

ENFORCEMENT ACTIONS ISSUED AGAINST BANKS	
A.1. SEVERE (ordered from most severe to less severe):	
Deposit Insurance Termination /Threat	Decision to threat to suspend or terminate a bank's deposit insurance scheme by the FDIC, when unsound and unsafe banking practices are detected or when violations of laws and regulations have taken place. Deposit Insurance Termination can be imposed if a bank has neglected previous enforcement actions issued against the bank.
Cease and Desist Order	Banks that receive Cease and Desist orders are required to follow specific actions outlined by their primary supervisor. C&D orders can be enforced by law, in the federal banking system. Typical reasons or the issuance of C&D orders are the engagement in unsafe and unsound activities, violations of laws and regulations. A C&D may impose specific orders to stop the bank engaging in specific banking practices or may outline a particular strategy in order to improve asset quality, promote growth, decrease risk, etc.
Formal written agreement	The institutions subject to this type of action, enter into an agreement with their primary regulator to take particular actions or to follow particular proscriptions in written agreement. Unlike the C&D orders, although FAs are also legally enforceable, they are however, not enforceable through the federal court. FAs can nonetheless lead to the issuance of Civil Money Penalties, when they are ignored. Reasons that FAs are imposed are unsound practises, mismanagement policies, or "insider" abuse. FAs can lead to more severe types of enforcement actions if not taken into consideration.
Prompt Corrective Action	Prompt Corrective Actions are issued usually when undercapitalization issues are detected. These actions order banks on taking remedial actions in order to overcome the deficiencies in their level of capital. Among the corrective measures outlined, in some cases there may be dismissal of management, restrictions on executive payments, asset growth, rates paid on deposits or even prohibition on certain activities, such as approval for acquisition deals from the regulatory authorities.
A.2. LESS SEVERE TYPE	
Civil Money Penalty (CMP)	Monetary penalties against banking institutions that engage in unsafe or unsound banking practices, violations of laws or failure to comply with an order issued previously.
Call report penalty (CR-P)	Monetary penalties against banking institutions that fail to file Call Reports on time or in accordance to the general outline or even for misreporting information on Call Report files.

N Governance Index Categories

Board function

(1) Does the company have a policy for maintaining effective board functions?

(2) Average overall attendance percentage of board meetings as reported by the company?

(3) Does the company have a succession plan for executive management in the event of unforeseen circumstances?

(4) Does the board or board committees have the authority to hire external advisers or consultants without management's approval?

(5) Percentage of independent board members on the audit committee as stipulated by the company,

(6) Does the company report that all audit committee members are non-executives?

(7) Percentage of independent board members on the compensation committee as stipulated by the company

(8) Does the company report that all compensation committee members are non-executives?

(9) Does the CEO simultaneously chair the board or has the chairman of the board been the CEO of the company?

(10) Percentage of non-executive board members on the nomination committee

(11) Percentage of nomination committee members who are significant shareholders (more than 5%)

(12) Does the company publish information about the attendance of the individual board members at board meetings?

Board structure

(1) Does the company have a policy for maintaining a well-balanced membership of the board?

(2) Total number of board members which are in excess of ten or below eight,

(3) Does the company describe the professional experience or skills of every board member? OR Does the company provide information about the age of individual board members?

(4) Percentage of female on the board,

(5) Percentage of board members who have either an industry specific background or a strong financial background,

(6) Average number of years each board member has been on the board,

(7) Percentage of non-executive board members,

(8) Percentage of independent board members as reported by the company,

(9) Does the CEO simultaneously chair the board or has the chairman of the board been the CEO of the company?

(10) Average number of other corporate affiliations for the board member,

(11) Are all board member individually subject to re-election (no classified or staggered board structure)?

Compensation policy

(1) Does the company have a policy for performance-oriented compensation that attracts and retain the senior executives and board members?

(2) Does the company have the necessary internal improvement and information tools for the board members to develop appropriate compensation/remuneration to attract and retain key executives?

(3) Is the CEO's compensation linked to total shareholder return (TSR)?

(4) The total compensation paid to all senior executives (if total aggregate is reported by the company,

(5) Does the company require that shareholder approval is obtained prior to the adoption of any stock based compensation plans?

(6) Does the company provide information about the total individual compensation of all executives and board members?

(7) Highest remuneration package within the company in US dollars,

(8) Is the management and board members remuneration partly linked to objectives or targets which are more than two years forward looking?

(9) Is the senior executive's compensation linked to CSR/H&S/Sustainability targets?

O Further Analysis results

	OLS with FE	Enhanced Model	BHC cluster	Excl. financial crisis	Excl. OCC	Excl. FED	Excl. FDIC	Endogeneity
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Dep. Var: Severe	Dep. Var: Severe	Dep. Var: Severe	Dep. Var: Severe	Dep. Var: Severe	Dep. Var: Severe	Dep. Var: Severe	Dep. Var: Severe
Lobbying	0.0559**	0.616**	0.687**	0.687***	0.815***	0.793***	0.453	1.6512 ***
	(0.0267)	(0.248)	(0.267)	(0.245)	(0.303)	(0.280)	(0.346)	(0.309)
Governance	0.000900***	0.00748**	0.00646***	0.00646**	0.00413	0.00956***	0.00629	0.007 *
	(0.000310)	(0.00296)	(0.00229)	(0.00290)	(0.00367)	(0.00321)	(0.00429)	(0.0028)
Lobbying x Governance	-0.00155***	-0.0125***	-0.0119***	-0.0119***	-0.0210***	-0.0122***	-0.0107**	-0.012***
	(0.000383)	(0.00392)	(0.00391)	(0.00382)	(0.00601)	(0.00412)	(0.00508)	(0.0037)
Capitalisation	-0.000277	0.00695	-0.0414***	-0.0414***	-0.0504**	-0.0454***	-0.0317*	-0.0401 ***
	(0.000319)	(0.0157)	(0.0154)	(0.0145)	(0.0208)	(0.0147)	(0.0169)	(0.0129)
Asset Quality	-0.000805	0.00952	-0.00316	-0.00316	-0.00224	-0.00591	-0.00547	-0.001
	(0.000493)	(0.00607)	(0.00592)	(0.00463)	(0.0117)	(0.00505)	(0.00478)	(0.0042)
Performance	-0.00617***	-0.169***	-0.165***	-0.165***	-0.211***	-0.171***	-0.147***	-0.1412 ***
	(0.00201)	(0.0360)	(0.0278)	(0.0282)	(0.0393)	(0.0299)	(0.0382)	(0.0264)
Liquidity	-0.000158	0.00126	0.00236	0.00236	0.00667	0.00106	0.00166	0.002
	(0.000219)	(0.00654)	(0.00500)	(0.00540)	(0.0107)	(0.00560)	(0.00598)	(0.0048)
Sensitivity to Market risk	-0.000505	-0.0008	-0.00313	-0.00313	-0.00187	-0.000714	-0.00478	-0.0034
	(0.000384)	(0.0038)	(0.00389)	(0.00366)	(0.00547)	(0.00394)	(0.00434)	(0.0035)
Size	-0.0136	0.172	0.0152	0.0152	-0.0190	0.0549	0.0529	-0.042
	(0.0124)	(0.105)	(0.0411)	(0.0386)	(0.0645)	(0.0405)	(0.0509)	(0.0369)
Age	0.00476**	0.00112	0.000152	0.000152	0.00349	-0.00268*	0.000791	0.0009
	(0.00234)	(0.00155)	(0.00138)	(0.00144)	(0.00238)	(0.00153)	(0.00227)	(0.0013)
GDP (state)	-0.0106	-0.114	-0.0588	-0.0588	-0.645	-0.00211	0.404	0.1380
	(0.0294)	(0.326)	(0.263)	(0.302)	(0.511)	(0.341)	(0.435)	(0.2909)
Leverage		-0.130***						
		(0.0296)						
Deposit to assets		-0.00301						
		(0.00689)						
Total Deposits		-0.163**						
		(0.0804)						
Constant	-0.0201	-1.296	-1.807*	-1.807**	-1.347	-2.172**	-3.484***	-2.2041***
	(0.191)	(1.045)	(0.961)	(0.820)	(1.505)	(0.969)	(1.189)	(0.752)
Method of Estimation	OLS	Probit	Probit	Probit	Probit	Probit	Probit	Bi Probit
Observations	2,663	2,204	2,278	2,278	1,178	1,675	1,066	2,275
R-squared	0.0563	0.280	0.263	0.263	0.327	0.298	0.208	
Firm FE	Yes							
Regulator Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LR-stat								891.67

The table reports the results of a set of additional tests performed for our baseline regression using our subsidiary sample. In particular, we report the coefficients for a linear probability model with Fixed Effects (Column 1), an enhanced model specification (Column 2), a model with clustering on the BHC level (Column 3), a model excluding the financial crises years (Column 4) and a set of models where we exclude each regulatory agency (Columns 5-7). Finally, we report the output of an Biprobit model using additional instruments (mean roa and mean npl) in Column 8. For detailed variable description see Table 1. The ***, ** and * signs denote statistical significance at the 1,5 and 10% level.

	(1)	(2)
VARIABLES	Dep. Var: ROA t+1	Dep. Var: ROA t+5
ROA t-1	0.514***	0.4883***
	(0.0447)	(0.1172)
Lobbying	0.0974	-1.7827 ***
	(0.3112)	(0.6639)
Governance	0.0015	-0.0302***
	(0.0038)	(0.0088)
Lobbying x Governance	0.0013	0.031***
	(0.0049)	(0.0089)
Severe	-0.3354 *	0.3343*
	(0.1629)	(0.1937)
Constant	0.3815	0.2169
	(0.4000)	(0.5631)
Method of estimation	GMM	GMM
Observations	1457	732
Bank controls	YES	YES
Time dummies	YES	YES
State dummies	YES	YES

The table reports the coefficient estimates and standard errors in parentheses when a Generalized Methods of Moments (GMM) model is estimated for the two alternative versions of the performance measure (Roa in t+1 and ROA in t+5). The dependent variable is ROAt+1 (Column 1) and ROA t+5 (Column 2). The lagged dependent variables are treated as endogenous variables. For detailed variable description see Table 1. The ***, ** and * signs denote statistical significance at the 1,5 and 10% level.

P Lobbying vs Investigation of g

In this Appendix, we briefly sketch an extension of our model that includes the possibility of the enforcement agent to spend I to learn g by herself. The timing of the game is the same as in the main model, except for time 1, when we also allow for the enforcement agent to spend I to learn g with certainty. In order to keep this extension comparable with the main model, we assume that the enforcement agent does not observe anything between time 0 and her decision whether to spend I. Furthermore, to fix ideas, we assume that the firm can only disclose its type after it has learned whether the enforcement agent has spent I. Of course, if she has done so, there is no point for the firm to spend L to disclose its type.

When committing to an investigation strategy, the enforcement agent anticipates whether she will spend I or whether she will rely on some types being disclosed by the firm. Let first assume that the enforcement agent anticipates not to spend I. Then, she will only learn g if the firm discloses it. Hence, the optimal investigation strategy is to investigate with a probability equal to the p_L^N discussed in Subsection 3.2, with expected welfare $W_L(p_L^N)$ given by (14).

Assume now that the enforcement agent anticipates to spend I indeed and, thus, to learn g. If the enforcement agent wants to deter type g, the analysis in the proof of Proposition 2 implies that the optimal enforcement probability is $p_D(g) = \frac{g}{(1-\lambda)T}$, which results in expected welfare $-\frac{\lambda\alpha g}{1-\lambda} - C\left(\frac{g}{(1-\lambda)T}\right) - I = w_B(g) + L - I$. If the enforcement agent does not want to deter type g, the analysis in the proof of Proposition 2 implies that the optimal enforcement probability is $p_U(g) = 0$, which results in welfare $v(g) - I = w_A(g) + L - I$. Hence, expected welfare under the optimal investigation policy given that the enforcement agent can be written as

$$\begin{aligned} W_I &= \int_0^{\overline{g}} \max\left\{v(g), -\frac{\lambda\alpha g}{1-\lambda} - C\left(\frac{g}{(1-\lambda)T}\right)\right\} f(g)dg - I \\ &= L - I + \int_0^{\overline{g}} \max\{w_A(g), w_B(g)\} f(g)dg. \end{aligned}$$

Note that, if it wasn't for the information cost I, this would be the best the enforcement agent could ever achieve ex ante.

In other words, define $\overline{W} := L + \int_0^{\overline{g}} \max\{w_A(g), w_B(g)\} f(g)dg$ as the first-best investigation strategy that would be implemented if the enforcement agent could costlessly observe types g. Then, the enforcement agent chooses to investigate the information on g by herself if and only if

$$I \leq \overline{W} - W_L(p_L^N). \tag{22}$$

Intuitively, the trade-off is the following: When investigating g by herself, she will incur the information cost I with certainty, whereas when relying on the firm to disclose its type (Subsection 3.2), the disclosure costs L are only incurred by those types who are actually disclosed. However, in this latter case, the enforcement agent creates an outside option for the firm by defining an investigation strategy p^N towards those firms that do not disclose their types. This prevents the socially optimal action from being implementable for some types. The condition (22) trades these effects off against each other.

References

Adams, R. B., and H. Mehran (2003): "Is corporate governance different for bank holding companies?," *Available at SSRN 387561*.

——— (2012): "Bank board structure and performance: Evidence for large bank holding companies," *Journal of Financial Intermediation*, 21(2), 243–267.

Agarwal, S., G. Amromin, I. Ben-David, and S. Dinc (2018): "The politics of foreclosures," *The Journal of Finance*, 73(6), 2677–2717.

Agarwal, S., D. Lucca, A. Seru, and F. Trebbi (2014): "Inconsistent regulators: Evidence from banking," *The Quarterly Journal of Economics*, 129(2), 889–938.

Ai, C., and E. C. Norton (2003): "Interaction terms in logit and probit models," *Economics Letters*, 80(1), 123–129.

Anginer, D., A. Demirguc-Kunt, H. Huizinga, and K. Ma (2016): "Corporate governance and bank capitalization strategies," *Journal of Financial Intermediation*, 26, 1–27.

Asai, K. (2022): "Bank lobbying as a financial safety net: Evidence from the post-crisis US banking sector," *Review of Corporate Finance Studies*, forthcoming.

Becker, G. S. (1968): "Crime and Punishment: An Economic Approach," *Journal of Political Economy*, 76(2), 169–217.

Beltratti, A., and R. M. Stulz (2012): "The credit crisis around the globe: Why did some banks perform better?," *Journal of Financial Economics*, 105(1), 1–17.

Bhattacharya, S., A. W. Boot, and A. V. Thakor (1998): "The economics of bank regulation," *Journal of Money, Credit and Banking*, 30(4), 745–770.

Boyer, P. C., and J. Ponce (2012): "Regulatory capture and banking supervision reform," *Journal of Financial Stability*, 8(3), 206–217.

Brasher, H., and D. Lowery (2006): "The corporate context of lobbying activity," *Business and Politics*, 8(1), 1–23.

Büchel, B., E. Feess, and G. Mühlheusser (2020): "Optimal law enforcement with sophisticated and naïve offenders," *Journal of Economic Behavior & Organization*, 177, 836–857.

Claessens, S., E. Feijen, and L. Laeven (2008): "Political connections and preferential access to finance: The role of campaign contributions," *Journal of Financial Economics*, 88(3), 554–580.

Cole, R. A., and L. J. White (2012): "Déjà vu all over again: The causes of US commercial bank failures this time around," *Journal of Financial Services Research*, 42(1-2), 5–29.

Correia, M. M. (2014): "Political connections and SEC enforcement," *Journal of Accounting and Economics*, 57(2), 241–262.

Cunha, J. R. (2017): *The Making of Financial Regulation - Voting on the U.S. Congress.* mimeo.

Damania, R., P. G. Fredriksson, and M. Mani (2004): "The persistence of corruption and regulatory compliance failures: theory and evidence," *Public Choice*, 121(3-4), 363–390.

Danisewicz, P., D. McGowan, E. Onali, and K. Schaeck (2018): "The real effects of banking supervision: Evidence from enforcement actions," *Journal of Financial Intermediation*, 35, 86–101.

Deli, Y. D., M. D. Delis, I. Hasan, and L. Liu (2019): "Enforcement of banking regulation and the cost of borrowing," *Journal of Banking & Finance*, 101, 147–160.

Delis, M. D., P. K. Staikouras, and C. Tsoumas (2016): "Formal enforcement actions and bank behavior," *Management Science*, 63(4), 959–987.

Duchin, R., and D. Sosyura (2012): "The politics of government investment," *Journal of Financial Economics*, 106(1), 24–48.

Ellul, A., and V. Yerramilli (2013): "Stronger risk controls, lower risk: Evidence from US bank holding companies," *Journal of Finance*, 68(5), 1757–1803.

Erkens, D. H., M. Hung, and P. Matos (2012): "Corporate governance in the 2007–2008 financial crisis: Evidence from financial institutions worldwide," *Journal of Corporate Finance*, 18(2), 389–411.

Faccio, M., R. W. Masulis, and J. J. McConnell (2006): "Political connections and corporate bailouts," *Journal of Finance*, 61(6), 2597–2635.

Feess, E., and U. Hege (2011): "The Basel Accord and the value of bank differentiation," *Review of Finance*, 16(4), 1043–1092.

Gaganis, C., A. Lozano-Vivas, P. Papadimitri, and F. Pasiouras (2020): "Macroprudential policies, corporate governance and bank risk: Cross-country evidence," *Journal of Economic Behavior & Organization*, 169, 126–142.

Gao, M., and J. Huang (2016): "Capitalizing on Capitol Hill: Informed trading by hedge fund managers," *Journal of Financial Economics*, 121(3), 521–545.

Gibson, R., A. Odabasioglu, and M. Padovani (2018): "The Determinants of Banks' Lobbying Activities before and during the 2007-2009 financial crisis," *Available at SSRN 1785435*.

Gropper, D. M., J. S. Jahera Jr, and J. C. Park (2013): "Does it help to have friends in high places? Bank stock performance and congressional committee chairmanships," *Journal of Banking & Finance*, 37(6), 1986–1999.

——— (2015): "Political power, economic freedom and Congress: Effects on bank performance," *Journal of Banking & Finance*, 60, 76–92.

Grossman, G. M., and E. Helpman (1994): "Protection for Sale," *The American Economic Review*, 84(4), 833–850.

——— (2001): *Special interest politics*. MIT press.

Hansen, W. L., and N. J. Mitchell (2000): "Disaggregating and explaining corporate political activity: Domestic and foreign corporations in national politics," *American Political Science Review*, 94(4), 891–903.

Harstad, B., and J. Svensson (2011): "Bribes, lobbying, and development," *American Political Science Review*, 105(1), 46–63.

Hedlund, J. (2017): "Bayesian persuasion by a privately informed sender," *Journal of Economic Theory*, 167, 229–268.

Hill, M. D., G. W. Kelly, G. B. Lockhart, and R. A. Van Ness (2013): "Determinants and effects of corporate lobbying," *Financial Management*, 42(4), 931–957.

Igan, D., and P. Mishra (2014): "Wall street, capitol hill, and K street: Political influence and financial regulation," *Journal of Law and Economics*, 57(4), 1063–1084.

Igan, D., P. Mishra, and T. Tressel (2012): "A fistful of dollars: lobbying and the financial crisis," *NBER Macroeconomics Annual*, 26(1), 195–230.

Kamenica, E., and M. Gentzkow (2011): "Bayesian persuasion," *American Economic Review*, 101(6), 2590–2615.

Kapetanios, G., and M. Marcellino (2010): "Factor-GMM estimation with large sets of possibly weak instruments," *Computational Statistics & Data Analysis*, 54(11), 2655–2675.

Kroszner, R. S., and P. E. Strahan (1999): "What drives deregulation? Economics and politics of the relaxation of bank branching restrictions," *Quarterly Journal of Economics*, 114(4), 1437–1467.

Laffont, J.-J., and J. Tirole (1991): "The politics of government decision-making: A theory of regulatory capture," *Quarterly Journal of Economics*, 106(4), 1089–1127.

Lambert, T. (2019): "Lobbying on Regulatory Enforcement Actions: Evidence from U.S. Commercial and Savings Banks," *Management Science*, 65(6), 2545–2572.

Lancaster, T. (2000): "The incidental parameter problem since 1948," *Journal of Econometrics*, 95(2), 391–413.

Malik, A. S. (1990): "Avoidance, screening and optimum enforcement," *RAND Journal of Economics*, 21(3), 341–353.

Mathur, I., M. Singh, F. Thompson, and A. Nejadmalayeri (2013): "Corporate governance and lobbying strategies," *Journal of Business Research*, 66(4), 547–553.

Milgrom, P., and C. Shannon (1994): "Monotone Comparative Statics," *Econometrica*, 62(1), 157–180.

Minaudier, C. (2022): "The value of confidential policy information: persuasion, transparency, and influence," *Journal of Law, Economics, & Organization*, 38(2), 570–612.

Minton, B. A., J. P. Taillard, and R. Williamson (2014): "Financial expertise of the board, risk taking, and performance: Evidence from bank holding companies," *Journal of Financial and Quantitative Analysis*, 49(2), 351–380.

Neyman, J., and E. L. Scott (1948): "Consistent estimates based on partially consistent observations," *Econometrica*, pp. 1–32.

Norton, E. C., H. Wang, and C. Ai (2004): "Computing interaction effects and standard errors in logit and probit models," *Stata Journal*, 4(2), 154–167.

OCC (2018): "Comptroller's Handbook – Bank Supervision Process," `https://www.occ.gov/publications-and-resources/publications/comptrollers-handbook/files/bank-supervision-process/pub-ch-bank-supervision-process.pdf`, Accessed: 2022-10-25.

Polinsky, A. M., and S. Shavell (1979): "The optimal tradeoff between the probability and magnitude of fines," *American Economic Review*, 69(5), 880–891.

——— (2001): "Corruption and optimal law enforcement," *Journal of Public Economics*, 81(1), 1–24.

——— (2007): "The theory of public enforcement of law," in *Handbook of law and economics*, ed. by A. M. Polinsky, and S. Shavell, pp. 403–454. Elsevier.

Potters, J., and F. Van Winden (1992): "Lobbying and asymmetric information," *Public Choice*, 74(3), 269–292.

Roodman, D. (2009): "A note on the theme of too many instruments," *Oxford Bulletin of Economics and statistics*, 71(1), 135–158.

Townsend, R. M. (1979): "Optimal contracts and competitive markets with costly state verification," *Journal of Economic Theory*, 21(2), 265–293.

Wu, W., S. A. Johan, and O. M. Rui (2016): "Institutional investors, political connections, and the incidence of regulatory enforcement against corporate fraud," *Journal of Business Ethics*, 134(4), 709–726.

Yu, F., and X. Yu (2011): "Corporate lobbying and fraud detection," *Journal of Financial and Quantitative Analysis*, 46(6), 1865–1891.

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