

Firm regulatory compliance and board oversight: Does sending reports to Colombian credit unions work?

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Oversight institutions and technology in the Global South

- In developing countries, the technical and enforcement capacity of oversight institutions is limited.
- The increase in availability of computing and programming resources (human and machines) may increase their technical standards. The question is whether this availability leads to improved enforcement.
- We study this question in the context of the overseeing institution for Credit Unions in Colombia.
- We randomized two dimensions in the delivery of personalized reports to each supervised firm (N 4,600): its content and recipients. With that, we answer:
 - ▶ Does an informative framing increase compliance? And a deterrent framing?
 - ▶ Does sending the e-mail to the firm's Board (with respect to the manager only) increase compliance?

Credit unions and soft regulations

- The credit union sector (aka “the solidary economy”) is large in Colombia
 - ▶ 7.2 million affiliates by 2024 (one-third of the working population)
 - ▶ Around 4,500 firms and 3.6% of Colombian GDP in assets
- Similar to traditional banks, but they...
 - ▶ are non-profit and member-owned
 - ▶ can only take deposits from members (usually workers with some affiliation), who are the firm's owners
 - ▶ address financial inclusion: credits for borrowers excluded from banks
 - ▶ are under the scrutiny of a different supervision institution, *SuperSolidaria*, which has less sanctioning instruments
- A dangerous recipe: more inclusive financial institutions and regulatory institutions with “fewer teeth”
 - ▶ We focus on the compliance with a soft regulation: periodic financial reports (affiliates and assets)

What we do (and find)

- We study a specific regulatory (soft) compliance rule among credit unions and cooperatives: providing timely financial reports
- The data analytics office at the *SuperSolidaria* started producing personalized reports: one with summary statistics and one with compliance to indicators
- We randomized the e-mail carrying the reports and their recipients
 - ▶ **Message:** informative, deterrent (alerts), and control
 - ▶ **Recipients:** manager or manager + Governance Board
- We find that messages increase compliance (i.e, reporting), especially when they are also sent to the Board, but...
 - ▶ Among firms without Board information, the deterrent message does not work

Contribution: Deterrence and soft regulation

- Deterrence appears as the main mechanism (Allingham and Sandmo, 1972) when sending reminders for tax compliance
 - ▶ Deterrence is more effective than appealing to tax morale or peers' behavior (Castro and Scartascini, 2015; Bott et al., 2020; De Neve et al., 2021)
- Costly deterrent strategies, such as announced visits to firms (UK) are very effective (Boning et al., 2020)
 - ▶ They worked in Chile as well (Pomeranz, 2015), although in close countries like Ecuador non-credible enforcement limited deterrence (Carrillo et al., 2017; Pomeranz and Vila-Belda, 2019)
 - ▶ Still, low enforcement capacity can be overcome by raising the salience of sanctions (e.g., prison announcements in Dominican Rep.) (Holz et al., 2023)
 - ▶ In Latin America, deterrence combined with (public or private) benefits increases tax revenue (Naritomi, 2019; Carrillo et al., 2021)
- We compare deterrent vs. informative messages in the context of soft regulation (and lower costs than filing taxes)

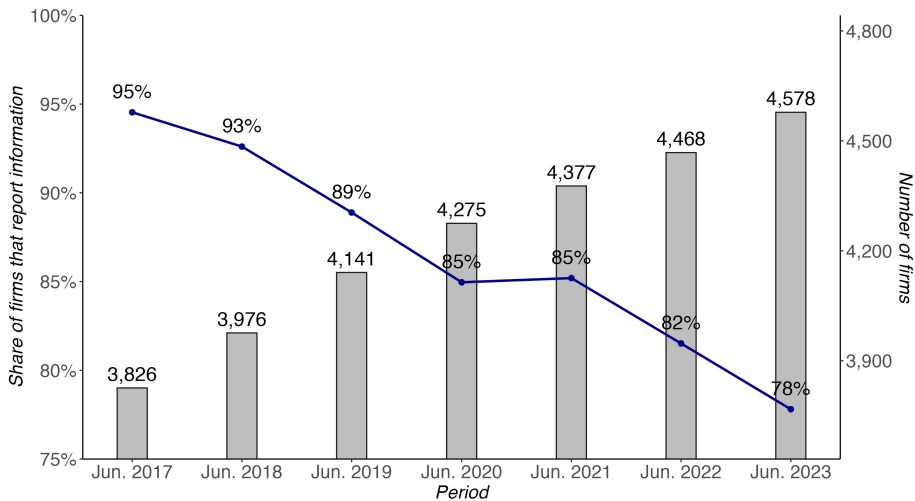
Contribution: Board's Governance

- Most evidence comes after a major change in US regulation (post Enron and WorldCom), requiring more independent boards
 - ▶ Independent boards reduce internal control issues (Goh, 2009) and earnings management (Chen et al., 2015)
 - ▶ Boards' expertise reduces tax avoidance (Armstrong et al., 2015)
- Board composition (i.e., gender quotas) has little effect on other women in the company (Bertrand et al., 2019)
 - ▶ Though it may increase the companies' attention to gender equality issues (Latura and Weeks, 2023)
- We study whether sending the reports to the Governing Board, not only to the manager, increases compliance.

Roadmap:

- 1 Background and Study Design
- 2 Data and Empirical Specification
- 3 Results
- 4 Discussion
- 5 References

Context: More firms and less compliance



Why targeting the Governing Board?

- In Colombia's solidary economy (credit unions and cooperatives), the Board of Directors is the permanent governance body.
 - ▶ Implements strategic decisions from the General Assembly
 - ▶ Oversees key functions: policy setting, planning, financial supervision, and management oversight.
- Board members are co-owners, elected by the cooperative's members, and directly accountable to them.
 - ▶ This structure fosters enforcement of internal control and democratic accountability.
- Yet 67% of firms do not accurately report the contact information of their Governance Board.

Experimental Design: Message structure

Message variations in purple and green

Dear [Manager Name] [and Board Members],

[Line introducing the Analytics office and use of their latest report info]

[Picture: informative/report]

[Line on information/report sheet + URL link]

[Line on report/information sheet + URL link]

If you have any doubts about the authenticity of this email, you may contact [name of team member], a member of the Data Analytics Group, at [email address].

Experimental Design: Message content

Message variations in purple and green

Dear [Manager Name] [and Board Members],

At the Superintendency we created the Data Analytics office, and one its purposes is to create relevant information for your institution. We present important statistics based on your latest information report.

[Picture: informative/report]

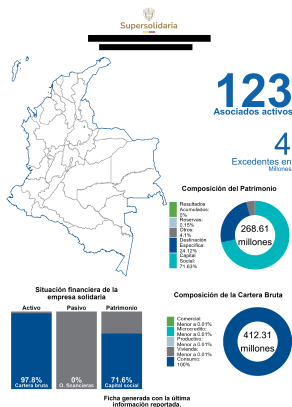
We have also prepared an **information sheet** that includes more statistical data about your entity and compares it with other entities in the sector. You can access the sheet by clicking here.

Additionally, we have prepared a **report** on the status of certain financial and management indicators for your entity. You can access the report by clicking here.

If you have any doubts about the authenticity of this email, you may contact [name of team member], a member of the Data Analytics Group, at [email address].

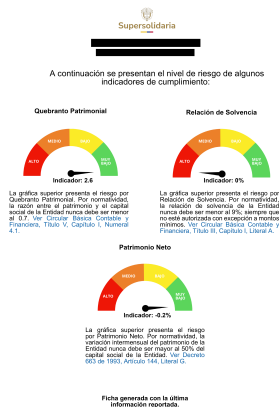
Experimental Design: Message content by treatment arm

(a) Informative



Line on information sheet...
Line on report sheet

(b) Deterrence (report)




Line on report sheet...
Line on information sheet

Experimental Design: Mail Notification


Conozca estadísticas de su entidad: [REDACTED]  

[REDACTED] - Superintendencia de Economía Solidaria.  Recibidos x

 para mí ▾    

Estimado(a) [REDACTED],

En la Superintendencia de la Economía Solidaria, hemos creado el Grupo de Analítica de Datos y uno de sus propósitos es compartir información relevante para su entidad. A continuación, presentamos un **reporte** con el estado de algunos indicadores financieros y de gestión para su entidad. [Pueden acceder al reporte haciendo click aquí.](#)


Supersolidaria

[REDACTED]

A continuación se presentan el nivel de riesgo de algunos indicadores de cumplimiento:

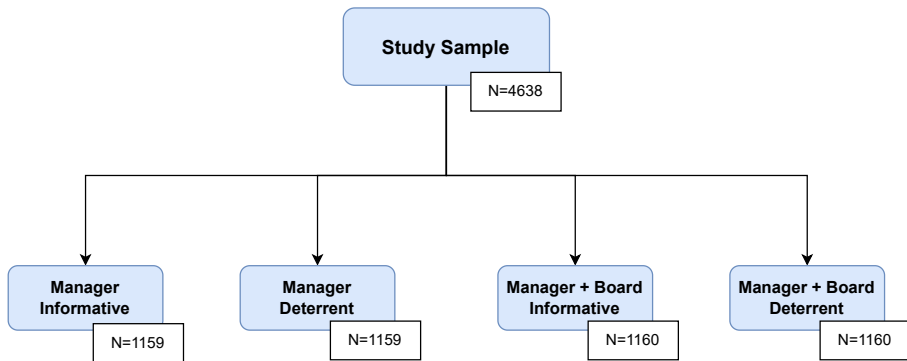
Quebranto Patrimonial



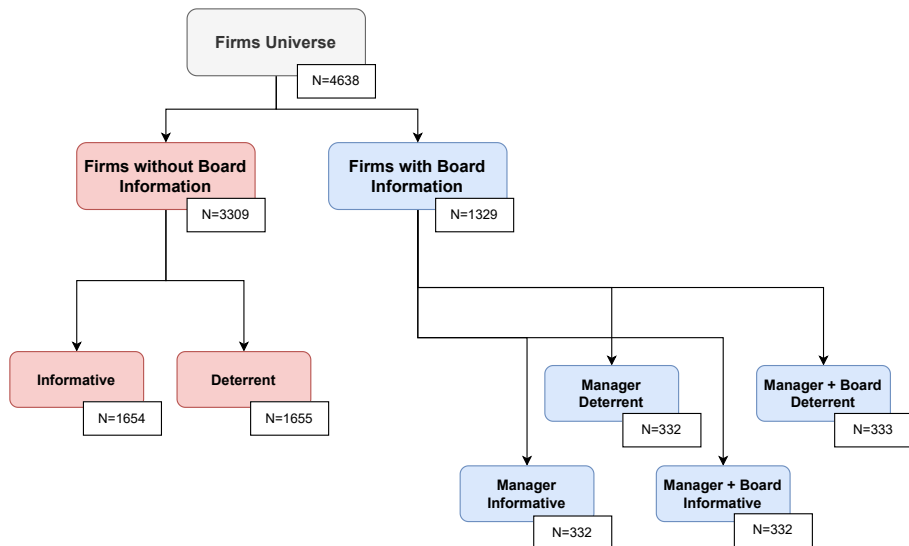
Relación de Solvencia



Experimental design: Originally intended



Design: Launched under foreseen restrictions



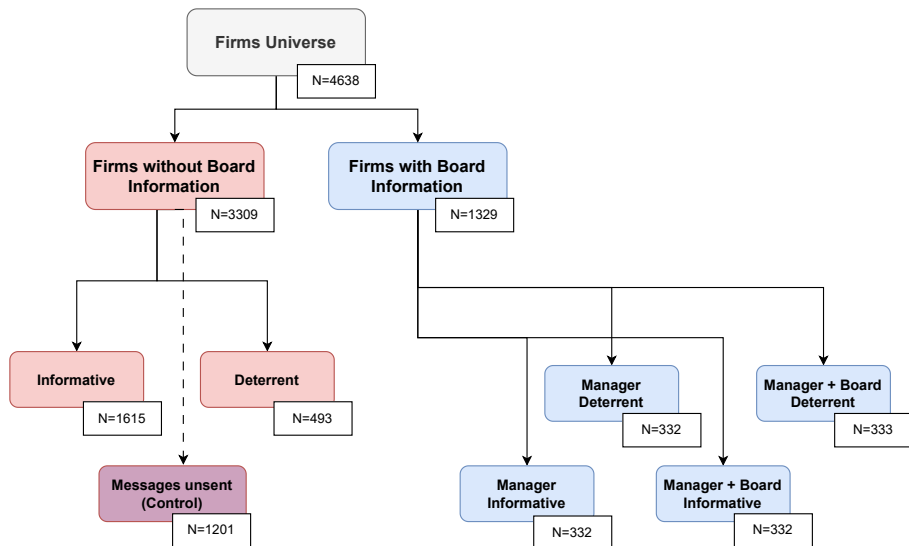
Differences between firms with/out Board information

	No (1)	Yes (2)
Panel A: Number of Regulatory Alerts.		
Prudential Alerts	2.277 (0.051)	-1.783*** (0.067)
Governance Warnings	155.312 (3.826)	-48.788*** (6.252)
Financial Risk Alerts	30.675 (6.227)	51.555 (49.345)
Panel B: Firm size.		
N. Employees (Log)	1.518 (0.019)	0.329*** (0.039)
N. Associates (Log)	5.343 (0.031)	0.119** (0.059)
Total Assets (Log)	20.734 (0.043)	0.376*** (0.077)
Equity Value (Log)	18.696 (0.124)	0.857*** (0.226)
Gross Income (Log)	18.628 (0.087)	0.581*** (0.164)
Panel C: Report Information Compliance.		
Reported in Dec 2023	0.762 (0.007)	0.048*** (0.013)
Share of Missed Reports (2019–2023)	0.172 (0.005)	-0.032*** (0.009)
Number of firms	3,309	1,329

■ Firms with available Board information:

- ▶ Are larger in associates, assets, and employees
- ▶ Have received fewer alerts and warnings
- ▶ Have a better history of information compliance

Design: Actual with unforeseen restrictions



Design: the unexpected control group

- 8,200 messages scheduled during four working days
- On day 2, before exceeding the daily limit, we were blocked
 - ▶ We detected this issue some weeks later.

Date	Board Info	Treatment Arm	Mails Sent	
			Yes	No
2024-07-31	No	Deterrence	493	0
2024-07-31	No	Information	492	0
2024-07-31	Yes	Information	3	0
2024-08-01	Yes	Deterrence	249	0
2024-08-01	Yes	Deterrence + Board	1,449	0
2024-08-01	Yes	Information	0	1
2024-08-01	No	Information	0	40
2024-08-01	No	Deterrence	0	1,161
2024-08-02	Yes	Deterrence	83	0
2024-08-02	Yes	Information	1	0
2024-08-02	Yes	Information + Board	1,398	0
2024-08-05	No	Information	1,123	0
2024-08-05	Yes	Information	327	0

Experimental Design: Baseline randomization checks

	No Board Info			Board Info			
	No Mail (1)	Information (2)	Deterrence (3)	Information Manager (4)	Deterrence Manager (5)	Information +Board (6)	Deterrence +Board (7)
Panel A: Number of Regulatory Alerts.							
Prudential Alerts	2.223 (0.086)	0.039 (0.112)	0.233 (0.16)	0.458 (0.081)	0.06 (0.123)	0 (0.121)	0.083 (0.12)
Governance Warnings	147.126 (6.248)	16.357* (8.514)	1.365 (10.365)	112.877 (13.31)	-12.816 (15.848)	-8.09 (15.63)	-4.51 (15.84)
Financial Risk Alerts	33.866 (12.803)	-1.203 (15.357)	-17.481 (12.904)	223.783 (193.464)	-207.696 (193.467)	-162.181 (195.939)	-196.174 (193.511)
Panel B: Firm size.							
N. Employees (Log)	1.517 (0.032)	0.013 (0.042)	-0.037 (0.057)	1.813 (0.067)	-0.125 (0.091)	0.093 (0.098)	0.166* (0.099)
N. Associates (Log)	5.216 (0.053)	0.217*** (0.069)	0.143 (0.097)	5.429 (0.1)	-0.055 (0.14)	0.081 (0.144)	0.108 (0.142)
Total Assets (log)	20.664 (0.072)	0.14 (0.094)	0.01 (0.14)	21.025 (0.133)	-0.096 (0.181)	0.278 (0.18)	0.16 (0.189)
Equity Value (Log)	18.367 (0.227)	0.582** (0.281)	0.298 (0.385)	19.334 (0.4)	-0.25 (0.581)	0.874* (0.499)	0.25 (0.549)
Gross Income (log)	18.628 (0.146)	0.01 (0.192)	-0.03 (0.263)	19.115 (0.286)	-0.394 (0.418)	0.521 (0.381)	0.25 (0.395)
Panel C: Report Information Compliance.							
Reported in Dec 2023	0.759 (0.012)	0.005 (0.016)	0.005 (0.023)	0.798 (0.022)	0.003 (0.031)	0.036 (0.03)	0.01 (0.031)
Share of Missed Reports (2019-2023)	0.172 (0.009)	0.001 (0.012)	-0.003 (0.016)	0.156 (0.016)	-0.007 (0.023)	-0.038* (0.021)	-0.019 (0.022)
Number of firms	1,201	1,615	493	332	332	332	333

Experimental Design: Summary

- Two separate interventions, based on Board info availability.
- **Group 1 (3,309 firms):** Only manager contact available.
 - ▶ Randomized into: Information, Deterrence, or Control (unsent email).
- **Group 2 (1,329 firms):** Manager and Board contact available. We employ a 2×2 design:
 - ▶ **Message:** Informative vs. Deterrent
 - ▶ **Recipient:** Manager vs. Manager + Board

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Data

■ Data sources:

- ▶ Administrative records from the Superintendence of the Solidary Economy (2019–2024).
- ▶ Firm-level financial statements, compliance reports, and contact directories.

■ Key variables:

- ▶ *Reporting Compliance*: Binary indicator for whether the firm submitted required reports.
- ▶ *Reporting Consistency*: Share of unchanged account values across periods (proxy for under-compliance).
- ▶ *Reported Assets*

Empirical Strategy

■ Main specification (ITT): Two-way fixed effects model:

$$\text{Reporting}_{it} = \alpha_i + \lambda_t + \sum_j \phi_j \cdot \text{Treatment}_i^{(j)} \times \text{Post}_t + \epsilon_{it}$$

- ▶ Outcome: Binary indicator for compliance with reporting duties.
- ▶ Includes firm (α_i) and year (λ_t) fixed effects.
- ▶ Standard errors clustered at the firm level.

■ Instrumental variable strategy (LATE):

- ▶ Uses assignment to message as an instrument for email opening.
- ▶ Estimates causal effect for *compliers*:

$$\text{Reporting}_{it} = \alpha_i + \lambda_t + \sum_j \phi_j^{\text{LATE}} \cdot \widehat{\text{Open}_i^{(j)}} \times \text{Post}_t + \nu_{it}$$

Roadmap:

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Reporting compliance: Firms **without** Board information

	<i>ITT</i>		<i>LATE</i>	
	(1)	(2)	(3)	(4)
Mail x Post	0.009 (0.011)		0.070*** (0.025)	
Information x Post		0.012 (0.012)		0.087*** (0.025)
Deterrence x Post		-0.004 (0.016)		0.041 (0.029)
Dependent variable (share)	0.82	0.82	0.82	0.82
Observations	22,242	22,242	22,242	22,242
Number of firms	3,309	3,309	3,309	3,309

Notes: The dependent variable is a binary indicator equal to 1 if the firm submitted its information in a given period, and 0 otherwise. Firm and month fixed effects included in all regressions. Standard errors clustered at the firm level are shown in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Reporting compliance: Firms **with** Board information

	<i>ITT</i>		<i>LATE</i>	
	(1)	(2)	(3)	(4)
Manager and BD x Post	0.016 (0.016)		0.066*** (0.022)	
Deterrence to Manager x Post		-0.009 (0.024)		0.084** (0.038)
Information to Manager and BD x Post		0.015 (0.022)		0.107*** (0.036)
Deterrence to Manager and BD x Post		0.009 (0.023)		0.108*** (0.037)
[<i>p</i> –] Diff Coeffs.: Info-(M+BD) vs. Deter-(M)		[0.280]		[0.387]
[<i>p</i> –] Diff Coeffs.: Deter-(M+BD) vs. Deter-(M)		[0.433]		[0.385]
[<i>p</i> –] Diff Coeffs.: Deter-(M+BD) vs. Info-(M+BD)		[0.790]		[0.981]
Dependent variable (share)	0.86	0.86	0.86	0.86
Observations	8,866	8,866	8,866	8,866
Number of firms	1,328	1,328	1,328	1,328

Notes: Dependent variable is a binary indicator on whether the firm submitted its information in a given period (=1). Firm and month fixed effects included in all regressions. Robust standard errors, clustered at the firm level, are shown in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Other outcomes: Report's quality and reported assets

Conditional on filing the report, are firms reacting to feeling more observed?

- Are firms reporting the same data from the previous report? (52% did this in the 22'-23' period)
 - ▶ No Board info: (LATE) 3-4 pp reduction in this behavior, driven by informative message (smaller effect for the deterrent message) **w/o Board Info**
 - ▶ Board info: (LATE) 2 pp reduction when sent to the Board **with Board Info**
- Reported assets
 - ▶ No Board info: (LATE) Additional 53-66% of reported assets **w/o Board Info**
 - ▶ Board info: (LATE) Additional 90-146% of reported assets **with Board Info**

Heterogeneous effects: firm size or past non-compliance?

- Are these firms understaffed, making it difficult to deal with reports? Or is it about their history of non-compliance?
- We compute heterogeneous effects for the following dichotomic variables
 - ▶ **Large staff:** above 70th percentile in the distribution of reported employees
 - ▶ **Warnings:** at least one structural financial warning
 - ▶ **Requirement:** formally required to report to SuperSolidaria

Heterogeneous effects: firm size or past non-compliance?

Firms **without** Board info

	(1)	(2)	(3)
Mail	0.051* (0.027)	0.063** (0.027)	0.083*** (0.025)
Mail x Large Staff	0.065*** (0.019)		
Mail x Warnings		0.012 (0.020)	
Mail x Requirement			-0.081** (0.032)
Dependent variable (share)	0.82	0.82	0.82
Observations	22,242	22,242	22,242
Number of firms	3,309	3,309	3,309

Notes: Robust standard errors, clustered at the firm level, are shown in parentheses. firm and month fixed effects included in all regressions.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Heterogeneous effects: firm size or past non-compliance?

Firms **with** Board info

	(1)	(2)	(3)
Manager and BD	0.011 (0.027)	0.064*** (0.023)	0.066*** (0.022)
Manager and BD x Large Staff	0.130*** (0.022)		
Manager and BD x Warnings		0.012 (0.038)	
Manager and BD x Requirement			-0.020 (0.063)
Dependent variable (share)	0.86	0.86	0.86
Observations	8,866	8,866	8,866
Number of firms	1,328	1,328	1,328

Notes: Robust standard errors, clustered at the firm level, are shown in parentheses.

Firm and month fixed effects included in all regressions. *** $p < 0.01$; ** $p < 0.05$; *

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Summary of results

Firms **without** board information that **opened** the e-mail

- Mails work (wrt no mail). But the effect is driven by the informative message.
- The deterrent message has no effect. Same story for info update and reported assets.
- Effects partly explained by firm size, but firms with requirements do not react.

Firms **with** board information that **opened** the e-mail

- Sending the message to the Board works (wrt to only the manager). Everything works better (and roughly equally) compared to the informative message to Manager only.
- This is also true for info update and reported assets.
- Effects only explained by firm size, not by previous alerts.

Policy implications

- There is an issue with the credibility of the oversight institution for Credit Unions and cooperatives
 - ▶ Firms previously alerted do not react to deterrent messages
- Improving monitoring through custom reports is not enough. Who receives the reports (i.e., the Board) matters.
- In this institutional setting, the internal control from the Governing Board is important. The priority should be to update the firm's Board directories.

Thanks!

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Submitted same data: Firms **without** Board information

Back

	<i>ITT</i>		<i>LATE</i>	
	(1)	(2)	(3)	(4)
Mail x Post	-0.013*** (0.005)		-0.033*** (0.009)	
Information x Post		-0.014*** (0.005)		-0.038*** (0.009)
Deterrence x Post		-0.010 (0.007)		-0.023* (0.012)
Dependent variable (share)	0.49	0.49	0.49	0.49
Observations	2,378	2,378	2,378	2,378
Number of firms	2,378	2,378	2,378	2,378

Notes: Robust standard errors, clustered at the firm level, are shown in parentheses. Firm and month fixed effects included in all regressions. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Submitted same data: Firms **with** Board information

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	<i>ITT</i>		<i>LATE</i>	
	(1)	(2)	(3)	(4)
Manager and BD × Post	-0.010 (0.006)		-0.022*** (0.008)	
Deterrence to Manager × Post		-0.005 (0.010)		-0.035** (0.014)
Information to Manager and BD × Post		-0.013 (0.009)		-0.040*** (0.013)
Deterrence to Manager and BD × Post		-0.011 (0.009)		-0.040*** (0.013)
Dependent variable (share)	0.47	0.47	0.47	0.47
Observations	1,008	1,008	1,008	1,008
Number of firms	1,008	1,008	1,008	1,008

Notes: Robust standard errors, clustered at the firm level, are shown in parentheses. Firm and month fixed effects included in all regressions. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Reported assets: Firms **without** Board information

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	<i>ITT</i>		<i>LATE</i>	
	(1)	(2)	(3)	(4)
Mail x Post	0.125 (0.095)		0.537*** (0.208)	
Information x Post		0.142 (0.100)		0.660*** (0.221)
Deterrence x Post		0.070 (0.138)		0.322 (0.235)
Dependent variable (asinh)	21.24	21.24	21.24	21.24
Observations	2,378	2,378	2,378	2,378
Number of firms	2,378	2,378	2,378	2,378

Notes: Robust standard errors, clustered at the firm level, are shown in parentheses. Firm and month fixed effects included in all regressions. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Reported assets: Firms **with** Board information

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	<i>ITT</i>		<i>LATE</i>	
	(1)	(2)	(3)	(4)
Manager and BD x Post	0.304** (0.142)		0.906*** (0.188)	
Deterrence to Manager x Post		0.192 (0.207)		1.32*** (0.308)
Information to Manager and BD x Post		0.477** (0.207)		1.64*** (0.304)
Deterrence to Manager and BD x Post		0.317 (0.231)		1.46*** (0.329)
Dependent variable (asinh)	21.6	21.6	21.6	21.6
Observations	1,008	1,008	1,008	1,008
Number of firms	1,008	1,008	1,008	1,008

Notes: Robust standard errors, clustered at the firm level, are shown in parentheses. Firm and month fixed effects included in all regressions. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.