Journal of Banking and Finance 143 (2022) 106572

Contents lists available at ScienceDirect

Journal of Banking and Finance

journal homepage: www.elsevier.com/locate/jbf

What you don't know won't hurt you: Market monitoring and bank supervisors' preference for private information

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ARTICLE INFO

Article history:
Received 4 September 2020
Accepted 5 June 2022
Available online 7 June 2022

JEL classification:
G12
G14
G21
G28
M41
M48

Keywords:
Market discipline
Market monitoring
Risk disclosures
COREP
FINREP
SSM
Banking union

ABSTRACT

We exploit cross-country variation in banks' confidential reporting requirements under COREP, the common European supervisory risk reporting framework, as an indicator for banking supervisors' preference for private information. Our results suggest that a stronger preference for confidential reporting is associated with significantly lower trading volume, return volatility, and absolute returns around banks' earnings announcements. These findings are independent of the level of countries' stock market development and supervisors' resources and legal power, and are consistent with the idea that investors perceive banks' public reporting to be less informative when supervisors have a strong private informational advantage. Our study adds to the literature on the influence of bank supervisors' institutional characteristics on market discipline, and highlights the role of private supervisory knowledge in shaping investors' monitoring incentives.

1. Introduction

With an increasingly complex banking system, rising cost of supervision, and fear of regulatory capture, market discipline has recently become popular as a potential complement to traditional prudential oversight (Beck et al., 2007; Delis and Staikouras, 2011; Demirgüc-Kunt et al., 2008; Tadesse, 2006). The concept of market discipline is based on the idea that investors have incentives and the ability to monitor banks' risk position, and that they react by requiring higher returns or withdrawing funds when perceiving inappropriately high risk. Managers, in turn, are expected to adjust their risk-taking to avoid funding problems, excessive cost of capital, or supervisory intervention.[1] Examples of regulatory policies to foster market discipline are, e.g., the third pillar of Basel II, which requires detailed risk disclosures (Bischof et al., 2022), various public stress tests in the U.S. and Europe (Flannery et al., 2017), or the European Central Bank's loan level reporting initiative (Ertan et al., 2017).

Numerous empirical studies are concerned with the presence of market monitoring in general (Flannery and Nikolova, 2004; Flannery, 1998; Gilbert, 1990). More recently, attention has shifted to the role of institutional features such as government safety nets or deposit insurance in shaping investors' monitoring incentives (Demirgüc-Kunt and Huizinga, 2004; Hadad et al., 2011). In this paper, we focus on the supervisory preference for private information as a further institutional determinant of market discipline. Despite public commitments to transparency regarding both bank risk and supervisory action, some supervisors still prefer a traditional supervisory approach based on confidential information received through private regulatory reporting channels. The appeal of such an approach is that it allows discreet preemptive interventions that reduce the risk of bank runs and potential systemic contagion (Cordella and Yeyati, 2003; Gallemore, 2022). However, where investors observe that a competent supervisor possesses and acts on superior private information, they can be less certain about the

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[1] A distinction can be made between *direct* market discipline, where investors directly influence bank behavior, and *indirect* market discipline, where supervisors use market-based signals to trigger regulatory action.

https://doi.org/10.1016/j.jbankfin.2022.106572

implications of public risk information, and become aware of their secondary role in monitoring bank risk. Consequently, a supervisory preference for extensive confidential reporting likely reduces the perceived relevance of public information to market participants.

Comparing supervisors' reliance on private information across jurisdictions is difficult due to the sheer volume, complexity, and partial unobservability of regulatory reporting requirements. In this study, we exploit the harmonization of supervisory reporting systems in preparation of the European Banking Union as a novel setting to measure and compare the extent of confidential reporting. In 2006, the Committee of European Banking Supervisors (CEBS), the predecessor of the current European Banking Authority (EBA), finalized two frameworks for supervisory reporting purposes: COREP (common reporting) focuses on banks' risk exposures and business activities, while FINREP (financial reporting) captures banks' financial statements under IFRS. The goal of these reporting frameworks was to increase comparability across countries by requiring all European banks to provide supervisory information in the same fixed-format tables. However, while the reporting templates under COREP and FINREP were identical, national supervisors had discretion to limit the number of applicable reporting tables and the extent to which the respective tables needed to be filled in. This initially lead to considerable variation in the scope of regulatory reporting requirements, which persisted until 2014 when, in the context of the introduction of the Single Supervisory Mechanism, the Capital Requirements Directive IV (CRD IV) and Capital Requirements Regulation (CRR) eliminated discretion in reporting requirements and mandated full COREP/FINREP reporting in all EU countries.

We use the variation in reporting requirements as a signal about supervisory reliance on private information and the supervisory attitude towards transparency and market discipline. Based on a score that reflects the extent of mandated confidential risk reporting under COREP in a given country, we assess whether this supervisory preference is associated with the strength of the stock market reaction to banks' earnings announcements as an indicator of the relevance of public information to investors. We focus on stock-based indicators (abnormal trading volume, abnormal return volatility, and absolute cumulative abnormal returns) for three reasons: First, while the monitoring incentives of debtholders might often be suppressed as they are protected by the regulatory capital buffer and institutional safety nets such as deposit insurance or (implicit) government bail-out guarantees, no such mechanisms exist for stockholders. Second, stock market data is readily available, comparable, and moves fast enough to capture immediate market reactions to information events. Third, trading volume, return volatility, and absolute returns conceptually do not depend on whether the newly disclosed information is positive or negative, but should monotonously increase in the general information content (e.g., Landsman et al., 2012).

Controlling for a wide array of firm and reporting characteristics, we find that the market reaction to banks' earnings announcements is significantly attenuated for banks whose supervisors exhibit a preference for extensive confidential regulatory reporting. These results are in line with our prediction that bank investors take into account supervisors' private level of information when processing public disclosures.

In addition, we analyze how other supervisory characteristics affect the relationship between confidential supervisory information and the intensity of market monitoring. For instance, bank investors can more reasonably expect the supervisor to take preemptive action when it not only possesses the necessary information, but also has the ability to appropriately act on this information. While we do not observe a significant moderating effect, our central results are robust to the inclusion of different measures of supervisory power, indicating that supervisory power and the supervisory preference for private information are distinct factors in shaping monitoring incentives.

As our measure of confidential supervisory information reflects time-invariant differences in the COREP reporting requirements on the country level, our findings might potentially be affected by omitted correlated variables. We perform four robustness tests to address this concern. First, we control for different measures of general stock market development, but do not find any effect on our main inferences. Second, we perform a series of placebo tests on three different samples of matched industrial firms – for which the banking supervisor is irrelevant – and find no association between the stock market reaction to these firms' earnings announcements and our score measuring the intensity of supervisory reporting, corroborating the validity of our results for the banking sample. Third, we compute the Oster (2019) delta to assess the likelihood of omitted correlated variables. We document that any unobserved control variables would need to be several times more important than those observable controls included in our regression models to remove the significant association between the supervisory preference for private information and the strength of market monitoring. Fourth, we employ an instrumental variable approach using three alternative sets of instrumental variables (countries' legal origin, countries' overall cultural heritage, and national banking regulators' supervisory culture) which corroborates our baseline results. Taken together, these results make it unlikely that our core findings can be fully explained by potential omitted correlated variables, and support the notion that private supervisory knowledge plays a role in shaping incentives for market monitoring.

Our study sheds light on the intricate determinants of the monitoring equilibrium between banks, supervisors, and investors. It contributes to the literature on market discipline by providing evidence on the effect of institutional characteristics and supervisory attitude on market monitoring and the usage of banks' financial reporting information. Extant research has focused mostly on how deposit insurance shapes depositors' incentives to monitor banks' risk taking, and provides consistent evidence that insured investors are less responsive to risk information (Billet et al., 1998; Boyle et al., 2015; Demirgüc-Kunt and Huizinga, 2004; Goldberg and Hudgins, 2002; Hadad et al., 2011; Karas et al., 2013; Martinez Peria and Schmukler, 2001). Generalizing the logic that market monitoring is attenuated where investors are shielded from bank risk, we extend this stream of literature by studying the consequences of private supervisory information as an implicit form of investor protection. As such, this paper is also related to the literature on the value of supervisory information production. DeYoung et al. (2001) and Berger and Davies (1998) find that the confidential CAMEL scores from supervisory bank examinations in the U.S. produce novel and value-relevant information which is only later reflected in banks' subordinated debt spreads and stock prices. While these results hint at the superiority of supervisory information, Berger et al. (2000) provide evidence that market and supervisory assessments of bank risk complement each other. Our findings suggest that market participants incorporate the likelihood of superior supervisory knowledge in their own assessment of public bank reports.

By highlighting differences in supervisory preferences for private information, our study also speaks to research on the broader supervisory culture. For instance, international survey evidence by Barth et al. (2004) indicates that, in line with our argument, bank supervisors prefer either a transparent and private-sector oriented strategy to regulation and supervision, or follow a more opaque approach that relies on intervention and government control. Demirgüc-Kunt et al. (2008) find that banks are more stable when being supervised by banking supervisors that are com-

pliant with the Basel Core Principles on information provision, while there is no robust relationship for the other Core Principles. Carretta et al. (2015) distinguish between six supervisory cultures based on a textual analysis of official supervisory communication, and show that this cultural classification is associated with banks' risk taking and financial stability. We add to this limited literature by providing evidence on confidential information exchange as a particular aspect of supervisory culture, and by studying its association with investor attention to public information as a prerequisite for market monitoring.

2. Institutional setting and hypothesis development

2.1. Supervisory reporting in Europe

Other than financial statements and other public disclosures, banks need to privately report extensive additional information to their supervisors. The purpose of these confidential reports is to allow supervisory authorities to detect and discreetly resolve latent problems before they become public knowledge and potentially trigger adverse market reactions. The specific reporting requirements are determined by the responsible supervisory institution. In Europe, in the past this led to an uncoordinated parallel structure of national reporting systems.

In order to harmonize these supervisory reporting practices and to facilitate the exchange of information among regulatory authorities, from 2006, the European Union introduced a common supervisory reporting framework as part of the first Capital Requirements Directive (CRD I, 2006/48/EC and 2006/49/EC).[2] This framework provides two sets of standardized reporting templates that need to be filled in periodically by supervised firms: the Financial Reporting Framework (FINREP) and the Common Reporting Framework (COREP). While FINREP asks for information on financial statements, off-balance sheet activities and financial instruments that is also mostly available to the public, COREP requires confidential disclosures on capital adequacy, group solvency, and credit, market and operational risk, which correspond to details of the calculation of regulatory capital requirements (Committee of European Banking Supervisors, 2005; 2006a).

However, national supervisors, who retained the sole responsibility for the supervision of banks in their respective jurisdiction, originally could decide on the scope of application of COREP and FINREP by dropping or requiring only partial application of certain templates (2006/48/EC, art. 13). Notwithstanding an overall convergence of supervisory reporting, this resulted in substantial cross-country variation in actual COREP/FINREP reporting requirements (Committee of European Banking Supervisors, 2007). We exploit this variation in the extent of implementing an otherwise similar reporting regulation to calculate our measure of supervisory reporting preferences as described in Section 3.1. While supervisors had discretion in determining the actual extent of application of the reporting frameworks, the Guidelines on Common Reporting (Committee of European Banking Supervisors, 2006b) formalized the role of FINREP/COREP as the sole reporting channels, and supervisors were strongly discouraged from requesting information covered by FINREP/COREP through other reporting frameworks.

With the adoption of the second Capital Requirements Directive (CRD II) in 2009, the EU mandated the Committee of European Banking Supervisors (CEBS), the predecessor of the European Banking Authority (EBA), to develop guidelines for a more uniform reporting system by 2012 (2009/111/EC). The updated framework still allowed for supervisory discretion. For FINREP, to reduce the regulatory reporting burden it introduced a 'maximum data model', which stipulates that in general supervisors could only require less information than required in the FINREP guidelines, but not more details about information items covered by FINREP. There were no significant changes for COREP, and prior differences in its application persisted (2009/83/EC, 2009/27/EC).

The implementation of the fourth Capital Requirements Directive (CRD IV, 2013/36/EU and 2013/575/EU) for all EU banks and the simultaneous introduction of the Single Supervisory Mechanism (SSM) and the Single Resolution Mechanism (SRM) (2013/1024/EU and 2014/468/EU) in the Eurozone in 2014 substantially changed the supervisory structure in Europe towards the current, centrally integrated system. Under the SSM, from November 2014, the national supervisory authorities yielded the primary responsibility for the prudential supervision of Eurozone credit institutions to the European Central Bank. The ECB now directly supervises the most 'significant' systemically important institutions (111 in 2022), and it closely monitors the supervision of the remaining banks by national authorities. The EBA is responsible for compiling unified supervisory policies for the implementation of the CRD IV package in a 'European Single Rulebook'. This Single Rulebook contains relevant regulations on supervisory reporting in the "Regulatory Technical Standards" (RTS, 2013/36/EU) and the "Implementation of Technical Standards" (ITS, 2014/680/EU). Most importantly, the ITS eliminated the national supervisors' discretion in applying COREP and FINREP and instead mandated uniform reporting requirements for all banks in the European Union (680/2014/EU, 1024/2013/EU, 575/2013/EU). The reporting templates were updated to reflect the new Basel III capital requirements, and their full application became obligatory for all national supervisors who participate in the SSM.

2.2. Hypothesis development

Sufficient public information is a necessary condition for market discipline, and market discipline becomes more effective when the timeliness, quality, relevance, comparability, consistency, and accessibility of information increases (Blum, 1999; Nier and Baumann, 2006; Tadesse, 2006). While in an idealized model investors bear the sole responsibility for monitoring banks' risk profile, in reality their behavior is shaped by expectations about supervisory interventions. For instance, government guarantees and deposit insurance can effectively remove any monitoring incentives for certain groups of investors. Individual bank supervisors can have different preferences regarding the transparency of supervised institutions. Some supervisors might favor an opaque banking system, where investors are unaware of distressed banks and need to rely on the supervisor's knowledge and competence. Alternatively, in a fully transparent banking system supervisors can – at the risk of investor overreactions – utilize market forces to disincentivize excessive risk-taking and to exploit market prices as an additional source of information about bank risk.

The differential level of informedness across investors and supervisors is determined by public reporting requirements and the amount of additional information that is privately revealed to the supervisor. When supervisors act on a superior set of confidential information, they can likely detect financial distress earlier than when it becomes publicly visible and take the corresponding supervisory action discreetly. As such, the implications of the public set of information both for banks' solvency and potential supervisory interventions become less predictable. Without private information, the supervisor will choose an average policy conditional on the set of public information. In contrast, with private information, the supervisor has a more precise understanding of the condition of a bank, and will choose an adjusted policy. For instance,

[2] Not all countries implemented the reporting framework in 2006. Where a supervisor did not have the necessary IT infrastructure in place at the time of adoption, it was granted a later adoption date or a roll-out phase (Committee of European Banking Supervisors, 2006a).

in the presence of confidential supervisory information, when observing a seemingly adverse signal, market participants cannot infer whether this indicates a deterioration of a bank's business and an impending supervisory action, or whether the supervisor has already taken action (or the signal is per se misleading) and the bank is on the course of recovery. As such, there is a higher level of uncertainty regarding potential supervisory policy choices conditional on the set of public information, such that, ceteris paribus, public information becomes less useful to market participants. Therefore, a supervisory preference for extensive private information and the confidential resolution of distress attenuates incentives for market monitoring and information-based trading. Vice versa, where the regulatory design provides the supervisor with a smaller informational advantage, investors have stronger incentives to react to public information. In fact, by not obtaining a private informational advantage, the supervisor can actively signal that he relies on investors to monitor banks, both to exert direct market discipline and to produce informative market signals that can be used as supervisory inputs (Flannery, 2001).[3]

The introduction of COREP in the European Union in 2006 provides a convenient setting to measure such supervisory preferences, as the risk reporting requirements under COREP are confidential and represent the supervisor's private informational advantage. The extent to which the harmonized reporting requirements were implemented on the country level can be measured and compared in a straightforward way, and variation in these implementation choices are driven by differences in supervisory policies and traditions, which include the attitude towards market discipline as a supervisory tool (Committee of European Banking Supervisors, 2007). At the same time, the public reporting requirements under IFRS and the third pillar of Basel II are uniform across European banks. Against this background, our main hypothesis reads as follows:

Hypothesis 1. The market reaction to banks' public accounting information is less pronounced in countries whose national supervisors display a preference for private information through extensive COREP reporting requirements.

This primary hypothesis is based on the premise that the COREP reporting requirements reflect investors' perception of the likelihood that the national supervisor acts on private information. Such expectations intuitively rely on the supervisor's actual ability to process complex risk information and, where necessary, to take appropriate action.[4] In particular, where supervisory resources and enforcement powers are restricted, extensive private reporting requirements per se cannot unambiguously be interpreted as an informational advantage. The moderating role of such supervisory characteristics suggest that the effect of private supervisory information on monitoring incentives could be nonlinear, depending on the interaction with the level of general supervisory competence. This reasoning leads to the following additional hypothesis:

Hypothesis 2. The association between the extent of COREP reporting requirements and the market reaction to banks' public accounting information depends on the level of supervisory resources and enforcement powers.

[3] This is not the only potential channel through which the supervisor's private information can affect the usefulness of the set of public information. In particular, to the extent the supervisor engages in the enforcement of public disclosure rules, private information could be used as a resource that allows to elicit higher quality public disclosures (e.g., through more timely loss recognition), thus increasing their usefulness to investors. As this potential mechanism implies opposite predictions to our core hypothesis, it is ultimately an empirical question which effect prevails.

[4] This argument implies an alternative interpretation of our main hypothesis: Through the extent of the COREP requirements, supervisors reveal their ability to make use of private risk information.

3. Research design and data

3.1. Measuring private supervisory information

The supervisory reporting framework in the EU consists of two components: FINREP (financial reporting) and COREP (common reporting). The information covered by FINREP has a large overlap with banks' public financial statements, while COREP is more granular and mostly covers publicly unobservable information on banks' risk position. As such, COREP reporting constitutes a relevant channel of private information between banks and supervisors, which makes it a suitable indicator of supervisors' informational advantage.

COREP comprises 18 reporting tables that cover different aspects of bank risk and that are related to the calculation of the regulatory capital requirements under Basel II: solvency, credit risk including securitizations, market risk, and operational risk (see Table 1 for an overview). All tables have to be reported using either the digital reporting formats XBRL or XML, or Microsoft Excel.

From 2006–2014, national banking supervisors were allowed to decide which of the suggested tables had to be reported by banks under their supervision. We use the extent to which national banking supervisors used their discretion in the application of COREP to proxy for the supervisory preference for private information. Specifically, we calculate *PRIV_INFO* as a score that is defined as the number of COREP tables that are required to be submitted to the national banking supervisor either fully or partially as indicated on the website of the EBA (European Banking Authority, 2014).[5] We choose this straightforward definition to avoid arbitrary weighting decisions, as it is not possible to exactly observe what is understood as "partial" application of specific COREP tables on the individual country level. As a robustness check, we replicate our analyses using an alternative definition of the *PRIV_INFO* score that weighs "partially" required tables at 50 percent. The results are presented in Table A.2 of the Appendix, and all our results are robust and even more pronounced using this weighted score. Since the COREP requirements did not change over the sample period, *PRIV_INFO* is time-invariant. As such, our results are based on cross-sectional differences in the extent of confidential supervisory reporting on the country level.

As an additional dimension of private supervisory information, we include the frequency of confidential risk reporting. National supervisors could decide whether to require the submission of the COREP tables at the monthly, quarterly or semi-annual level, with more frequent reporting indicating a higher level of private information. To capture variation in the required reporting frequency, we include *DFREQ* as a dummy variable that takes the value of one when banks had to submit the COREP tables at least quarterly, and zero when the required reporting frequency was only semi-annual.

3.2. Measuring market monitoring

Market discipline refers to the mechanism through which market participants and debtors affect the risk-taking behavior of banks' management. There are different levels of market discipline: 'market monitoring' and 'market influencing' (Flannery, 2001). Where investors have incentives and the ability to monitor a bank's

[5] The Guidelines on Common Reporting (Committee of European Banking Supervisors, 2006b) ask that COREP information should not be required outside the COREP reporting tables. However, national banking supervisors regularly ask for additional private risk information that is not covered by COREP. As such, *PRIV_INFO* captures a substantial portion of banks' confidential supervisory risk reporting, but generally does not provide complete coverage. The resulting measurement error would work against finding an association of *PRIV_INFO* and our measures of market monitoring.

Table 1
Common Reporting (COREP) Framework Content.
This table presents an overview of all 18 tables that comprise the Common Reporting (COREP) Framework from 2006 – 2013 in the EU.

No.	Abbreviation	Description
	Competent Authority (CA) and Group Solvency	
1	CA Solvency	Competent Authority Ratio Overview
2	GROUP Solvency	Group Solvency Details
	Credit Risk	
3	CR SA	Credit and counterparty credit risks and free deliveries: Standardised Approach to Capital Requirements
4	CR IRB	Credit and counterparty credit risks and free deliveries: Internal Rating Based Approach to Capital Requirements
5	CR EQU IRB	Credit risk: Equity: Internal Rating Based Approaches to Capital Requirements
6	CR SEC SA	Credit risk: Securitisation: Standardised Approach to Capital Requirements
7	CR SEC IRB	Credit risk: Securitisation: Internal Rating Based Approach to Capital Requirements
8	CR SEC Details	Credit risk: Detailed information on securitisations by originators and sponsors
9	CR TB SETT	Settlement/Delivery Risk in the Trading Book
	Market Risk	
10	MKR SA TDI	Market Risk: Standardised Approach for Position Risks in Traded Debt Instruments
11	MKR SA EQU	Market Risk: Standardised Approach for Position Risks in Equities
12	MKR SA FX	Market Risk: Standardised Approaches for Foreign Exchange Risk
13	MKR SA COM	Market Risk: Standardised Approaches for Commodities
14	MKR IM	Market Risk: Internal model
15	MKR IM Details	Market Risk: Internal Model Details
	Operational Risk	
16	OPR	Operational Risk
17	OPR Details	Operational Risk: Gross Losses by Business Lines and Event Types in the last year
18	OPR LOSS Details	Operational Risk: Major Operational Risk Losses recorded in the last year or which are still open

risk position and they perceive it as inappropriately high, they react by requiring higher returns or withdrawing funds (the market monitoring phase). In turn, managers are expected to adjust their risk-taking behavior in an attempt to avoid liquidity problems, higher cost of capital, or supervisory interventions (the market influencing phase). This study is concerned with the monitoring aspect of market discipline. When market participants have less incentives to price potentially risk-relevant information, the market reaction to the release of this information is attenuated. We expect that a strong private information channel between banks and their supervisor implies superior supervisory information, and reduces investors' incentives to monitor bank risk.

While market discipline can be exerted by both banks' debt and equity investors, we focus on shareholders. As equity is being held as a buffer against unexpected losses, shareholders are sensitive to changes in banks' risk profile (Caldwell, 2007). Extant research supports our presumption that equity holders represent a relevant source of market discipline. For instance, equity holders have been shown to be able to predict rating changes (Billet et al., 1998; Curry et al., 2008) and supervisory interventions (Jordan et al., 2000). Equity markets are also particularly well-suited for empirical research on market discipline. Compared to debt markets, equity markets are larger, more accessible, and more liquid, which suggests that stock prices reflect changes in banks' risk profile more efficiently and completely (Saunders, 2001; Stephanou, 2010). Moreover, debt instruments are heterogeneous across banks and over time, which makes the analysis of short-term market reactions significantly more complex than for banks' stock.

Specifically, we investigate the information content of earnings announcements to shareholders as reflected in short-term trading volume, returns, and return volatility around the announcement date (Bamber et al., 2011; Beaver, 1968; Kim and Verrecchia, 1991; Landsman et al., 2012). We focus on earnings announcements because this is the event covering most new information about changes in a bank's condition (Ball and Shivakumar, 2008).[6]

[6] An alternative information event is the publication of the annual report. However, we were unable to recover the exact publication dates of annual reports for most of the banks in our sample, which makes inferences from a small-window event study less reliable. Against this backdrop, we obtain similar results when we proxy for the annual report publication dates using the compilation dates from the annual reports' pdf file properties (untabulated).

We hypothesize that the information content of public information is lower, and therefore the market reaction attenuated, where investors perceive their knowledge as being inferior to that of the supervisor.

We perform a series of event studies around banks' earnings announcement dates to capture this relationship. In particular, we define the event window as days $t = -1, 0, +1$ and the estimation window as days $t - 30$ to $t - 10$ and $t + 10$ to $t + 30$, where $t = 0$ is the earnings announcement date on I/B/E/S. Following Landsman et al. (2012), we then calculate abnormal trading volume (*AVOL*) as:

$$AVOL_{it} = ln\left(\frac{\bar{V}_{it}}{V_i}\right), \tag{1}$$

which is the average trading volume in the event window, $\bar{V}_{it}$, divided by average trading volume in the estimation window V_i. Trading volume is scaled by shares outstanding. Since this ratio is heavily skewed, we take its natural logarithm.

Correspondingly, we define abnormal return variability (*AVAR*) as:

$$AVAR_{it} = ln\left(\frac{\bar{e^2}_{it}}{\sigma_i^2}\right), \tag{2}$$

which is the average of the squared daily abnormal returns, e_{it}^2, in the event window, divided by the variance of the daily abnormal returns in the estimation window, σ_i^2. Daily returns are adjusted for expected returns from a simple market model of the form $E[R_{it}] = \hat{\alpha}_i + \hat{\beta}_i R_{mt}$, with the coefficients $\hat{\alpha}_i$ and $\hat{\beta}_i$ being estimated over the estimation window and where R_{mt} is the value-weighted index return of the stock market of the country of a bank's primary listing. We again take the natural log of the ratio.

Finally, we calculate absolute absolute cumulative abnormal returns (*CAR*) as:

$$CAR_{it} = \left|\sum_{t=-1}^{+1} (R_{it} - E[R_{it}])\right|, \tag{3}$$

which is the absolute of the sum of the difference between observed daily return, R_{it}, and the expected daily return, $E[R_{it}]$ over the event window. Expected daily returns are based on the same market model $E[R_{it}] = \hat{\alpha}_i + \hat{\beta}_i R_{mt}$, with the coefficients $\hat{\alpha}_i$

and $\hat{\beta}_i$ being estimated over the estimation window. In line with Flannery et al. (2017), we use absolute abnormal returns as we are interested in the magnitude, but not the direction, of the market reaction as a measure of market monitoring.

3.3. Research design

If market monitoring is attenuated by a supervisory preference for private information, the stock market reaction to the publication of risk-relevant information should be reduced because equity investors perceive the public information as less meaningful. Against this backdrop, we estimate the following regression model to capture the relationship between *PRIV_INFO*, the level of a country's private reporting requirements, and each of the three dependent variables (*AVOL, AVAR, CAR*):

$$y_{it} = \beta_1 PRIV\_INFO_j + \beta_2 DFREQ_j + BankControls_{it} + ExchangeControls_i + CountryControls_{jt} + YearFixedEffects_t + \varepsilon_{it} \quad (4)$$

The estimated coefficient for *PRIV_INFO* captures the average effect of private supervisory knowledge on the intensity of market monitoring for supervised banks.[7] We include *DFREQ* to capture the required frequency of confidential reporting, and a set of control variables based on prior literature to isolate the effect of the preference for private supervisory information from potentially confounding determinants of market monitoring and the stock market reaction (Berger, 1995; Demirgüc-Kunt and Huizinga, 2004; Flannery and Thakor, 2006; Nier and Baumann, 2006). As *Bank Controls* we include the following variables: *SIZE* is the log of total assets in thousands. *LEV* is leverage calculated as total debt divided by total assets. *ROA* is return on assets as net income divided by total assets. *DLOSS* is a loss dummy that takes the value of '1' if the reported EPS are negative, and '0' otherwise. *UE* is unexpected earnings defined as the absolute difference between the median forecasted EPS and reported EPS. *REPLAG* captures the reporting reporting lag and is calculated as the number of trading days between the I/B/E/S earnings announcement date and the fiscal year-end. *DIV* measures the diversification of a bank's earnings and is calculated as net interest income divided by earnings before interest and taxes. *RISK* measures the riskiness of a bank's loan portfolio and is calculated as the amount of non-performing loans scaled by total assets. All of the bank-level controls are taken from Datastream and I/B/E/S.

We use the following two variables as *Exchange Controls: DCROSS* is a cross-listing dummy that takes the value of '1' if a bank's equity is cross-listed on multiple exchanges, and '0' otherwise, and *DEXCH* is a dummy variable that takes the value of '1' if a bank's equity is not listed on a major European exchange (but instead on one of the smaller secondary exchanges), and '0' otherwise. Finally, as *Country Control* we include *GDP* as the annual precentage GDP growth rate to control for the overall economic cycle in a given country. We include year-fixed effects and cluster the standard errors at the bank-level.[8] The year-fixed effects subsume the intercept. We truncate all dependent variables and continuous time-variant control variables at the 1 and 99 percent levels.

3.4. Sample and data

Our sample period spans 2006–2014. During this period, national banking supervisors had discretion in applying the COREP/FINREP frameworks, allowing us to use the *PRIV_INFO* score to capture cross-sectional differences in the supervisory preference for private information. Because not all countries adopted COREP/FINREP in 2006, we drop bank-year observations before the year of COREP implementation in a given country.[9]

We start our sample selection with all firms included in any of the Datastream Financial Industry indices covering European countries that adopted the COREP reporting framework. We include all bank-year observations with an earnings announcement within 300 days from the fiscal year end, and require observations to have data for all dependent and independent variables used throughout the analysis. This requirement removes financial institutions other than banks (such as, e.g., trading and holding companies), because they lack data on regulatory Tier 1 capital (for the calculation of *DMEDT1* used in the supervisory power analysis in Section 4) and (non-)interest income. To remove banks with illiquid stock from the sample, we require each firm to have a non-zero stock trading volume and non-zero stock returns for at least 80 percent of trading days during the estimation window and at least two out of the three trading days during the event window.

Table 2 gives an overview of the sample selection procedure. We start with 290 financial institutions with publicly traded equity in the EU. Dropping all observations with missing data for any of the dependent and independent variables yields 498 bank-year observations from 94 banks and across 19 countries over the sample period from 2006–2014.

We provide an overview of supervisory reporting requirements under the COREP framework together with the sample composition across countries in Table 3. Using an unweighted count of fully and partially required reporting tables, most countries display relatively high values of *PRIV_INFO*. Denmark has the lowest score (6 out of 18), while sample countries with the highest supervisory preference for private information are Bulgaria, Cyprus, Hungary, Ireland and Poland. Seven out of nineteen sample countries require the COREP tables to be filled out only semi-annually, and two out of nineteen sample countries require the COREP tables to be filled out on a monthly basis. Reflective of the distribution of banking assets and public banks in the EU, most of the observations in the sample are from France (93), Italy (88), Spain (40) and the UK (40). Summary statistics and correlation coefficients for all variables used throughout the analysis are presented in Tables 4 and 5.

4. Results

4.1. Private supervisory information and market monitoring

We begin with describing the baseline results on the relationship between the supervisory preference for private information and the market reaction to public reporting events. Assuming that private supervisory information reduces the perceived usefulness of public reports, we expect that higher values for *PRIV_INFO* are associated with lower abnormal trading volume, abnormal return volatility, and absolute cumulative abnormal returns around the banks' earnings announcements.

Table 6 shows the cross-sectional results for the OLS regressions of the three market monitoring variables on the supervisory preference for private information. Moving from left to right, we start with only including the *PRIV_INFO* and *DFREQ* variables in Model

[7] For individual banks, the strength of this effect might vary depending on the perceived relevance of the supervisor's informational advantage driven by, e.g., a bank's overall transparency and the ambiguity of its public information.

[8] Because the supervisory preference score *PRIV_INFO* is time-invariant, it is not possible to include bank-fixed effects.

[9] The sample period ends in 2015, when a significant portion of our sample banks became subject to ECB supervision under the SSM. While the introduction of the SSM represents a switch in supervisory reporting preferences that is itself in line with our research question, it would be difficult to disentangle this effect from the simultaneous changes in supervisory powers and the shift in resolution expectations under the Single Resolution Mechanism.

Table 2
Sample Selection.
This table reconciles the total number of banks (bank-year observations) from all EU countries that adopted COREP in the sample period 2006 – 2014, with the banks (bank-year observations) used in the analyses. We exclude observations with missing data in the following categories: bank fundamental data, return data, and trading volume data. Our final sample comprises 498 bank-year observations from 94 banks.

	Banks	Bank-Year Observations
European banks with publicly traded equity	290	2610
Missing data:		
-(Sufficient) Return and trading volume data	–110	–1381
-Bank fundamental data	–78	–625
Sample:		
-Financial year-end before COREP implementation	–8	–106
Final sample	**94**	**498**

Table 3
COREP Implementation by Country.
This table presents an overview of the application of the COREP reporting framework, and an overview of the sample composition per year for every country in the final sample. *PRIV_INFO*, the supervisory preference for private information, is calculated as the sum of all fully (*Full*) and partially (*Partial*) filled out COREP tables required by the national banking supervisor (out of 18). *Rep. Freq.*, or the reporting frequency, is the frequency with which banks are required to fill out and submit the COREP tables to the national banking supervisor. *Impl. Date*, or the implementation date, is the starting date of the implementation of the COREP/FINREP reporting frameworks in a country.

	COREP Overview per Country					Sample Overview per Country									
	PRIV_INFO	*Full*	*Partial*	Rep. Freq.	Impl. Date	Total	2006	2007	2008	2009	2010	2011	2012	2013	2014
Austria	17	8	9	Monthly	01/01/2008	6	0	0	1	1	1	1	1	0	1
Belgium	17	13	4	Quarterly	31/03/2007	11	0	2	1	2	2	1	1	1	1
Bulgaria	18	18	0	Semi-annually	31/03/2007	3	0	0	1	1	1	0	0	0	0
Cyprus	18	18	0	Semi-annually	31/12/2006	9	1	2	2	2	1	1	0	0	0
Denmark	6	1	5	Quarterly	30/06/2007	27	0	4	3	3	3	3	4	4	3
Finland	17	8	9	Quarterly	31/03/2007	11	0	1	1	1	2	2	2	1	1
France	17	5	12	Quarterly	01/01/2007	93	0	9	10	12	12	14	12	13	11
Germany	10	3	7	Quarterly	01/01/2007	36	0	5	4	7	5	5	4	3	3
Greece	16	16	0	Monthly	01/04/2007	9	0	0	3	2	3	0	0	0	1
Hungary	18	13	5	Semi-annually	01/01/2008	13	0	0	2	2	2	2	2	1	2
Ireland	18	18	0	Quarterly	31/03/2007	3	0	1	0	1	1	0	0	0	0
Italy	16	0	16	Semi-annually	01/01/2008	88	0	0	13	16	14	14	13	8	10
Netherlands	16	16	0	Quarterly	01/01/2007	15	0	4	2	1	0	2	3	2	1
Poland	18	17	1	Quarterly	30/06/2007	50	0	2	3	5	5	6	9	9	11
Portugal	16	15	1	Semi-annually	30/06/2007	14	0	2	2	2	2	1	2	1	2
Romania	16	5	11	Semi-annually	01/01/2008	7	0	0	0	2	1	0	0	2	2
Spain	17	12	5	Semi-annually	30/06/2008	40	0	0	6	6	6	5	6	6	5
Sweden	14	2	12	Quarterly	31/03/2007	23	0	3	3	3	3	3	2	3	3
United Kingdom	16	2	14	Quarterly	30/09/2008	40	0	0	3	4	5	7	7	7	7
						498	1	35	60	73	69	68	68	61	63

(1). Next, we include the bank-level control variables as additional potential determinants of the market reaction in Model (2) and add country and exchange-level control variables in Model (3).

The tenor of the results is very similar across the table. The supervisory preference for private information has a consistently significant negative association with abnormal trading volume (*AVOL*) and abnormal return volatility (*AVAR*), while the negative coefficient is only marginally significant in the regression using absolute absolute cumulative abnormal returns (*CAR*) as dependent variable. After including the bank-level and country/exchange-level control variables in Models (2) and (3), the coefficients only slightly change in magnitude.

A one standard deviation increase in *PRIV_INFO* is associated with a decrease in *AVOL, AVAR* and *CAR* of about 0.048, 0.108, or 0.003, respectively.[10] For *AVOL*, this implies a reduction in the ratio of event-period trading volume to benchmark period trading volume by about 5 percent. Similarly, for *AVAR* it implies a reduction in the ratio of event-period to benchmark period abnormal return volatility by about 10 percent, and for *CAR* it implies a reduction of absolute cumulative event-period abnormal returns of 0.3 percentage points (against a mean value of *CAR* of 5.2 percent). The magnitude of these coefficients is economically plausible, and suggests that there is a meaningful relationship between the level of confidential supervisory knowledge and the strength of the market reaction to banks' public information releases.[11] At the same time, we find no consistent relationship between the required reporting frequency (*DFREQ*) and the market monitoring variables. Taken together, the results suggest that the strength of the market reaction to banks' public information reflects the level of supervisory informedness. Where the supervisor displays a preference for a private information channel with supervised banks, markets react less to public reports, pointing at a potential anticipatory substitution effect of market monitoring and public enforcement.

4.2. The role of supervisory power

Where the supervisory preference for private information is high, we argue that market participants likely react less to banks' public information as they expect the supervisor to be better informed and to be able to take preemptive corrective action if necessary. However, investors can only expect the supervisory authori-

[10] We calculate these factors by multiplying the regression coefficients from Table 6 by 2.998, the sample standard deviation of *PRIV_INFO*.

[11] For comparison, Landsman et al. (2012) report an increase of *AVOL* (*AVAR*) by 0.11 (0.18) for an international sample of financial and non-financial firms following the switch from national GAAP systems to IFRS, which represents an important change in financial reporting practices.

Table 4
Descriptive Statistics.
This table presents the descriptive statistics for all variables used in the analyses. See Table A.1 in the Appendix for a detailed description of each variable.

Variable	Mean	S.D.	1%	Q1	Median	Q3	99%
AVOL	0.192	0.506	-1.090	-0.134	0.210	0.521	1.396
AVAR	0.243	1.111	-2.659	-0.485	0.295	1.087	2.323
CAR	0.052	0.035	0.009	0.028	0.044	0.067	0.186
PRIV_INFO	15.568	2.998	6.000	16.000	16.000	17.000	18.000
DFREQ	0.641	0.480	0.000	0.000	1.000	1.000	1.000
OSPOWER	8.746	2.032	5.000	7.000	8.000	10.000	14.500
NUMSUP	0.288	0.463	0.022	0.028	0.128	0.169	1.402
DMEDT1	0.536	0.499	0.000	0.000	1.000	1.000	1.000
SIZE	18.008	1.935	14.120	16.357	17.673	19.468	21.434
LEV	-0.926	0.041	-0.978	-0.954	-0.935	-0.907	-0.742
ROA	0.004	0.009	-0.017	0.002	0.004	0.008	0.026
DLOSS	0.122	0.328	0.000	0.000	0.000	0.000	1.000
UE	-0.109	0.628	-2.168	-0.088	-0.015	0.008	0.281
REPLAG	56.414	20.885	23.000	40.000	54.000	71.000	113.120
DIV	1.574	1.706	-3.076	0.911	1.387	1.918	7.300
RISK	0.030	0.037	0.000	0.004	0.016	0.041	0.175
DCROSS	0.275	0.447	0.000	0.000	0.000	1.000	1.000
GDP	0.004	0.027	-0.056	-0.011	0.007	0.020	0.060
STMKTCAP	3.956	0.516	2.430	3.508	4.155	4.387	4.741
IPO	2.921	1.187	0.336	2.175	2.797	3.658	5.091
NUMEST	3.248	0.382	2.009	3.057	3.318	3.529	3.891
INVESTOR_RIGHTS	2.466	1.330	0.000	1.000	3.000	3.000	5.000
COLLECTIVISM	0.019	0.003	0.016	0.016	0.018	0.022	0.022
MASCULINITY	0.012	0.001	0.009	0.012	0.012	0.013	0.014
NORMATIVE	0.014	0.002	0.011	0.014	0.014	0.016	0.017
POWER_DISTANCE	0.027	0.003	0.019	0.025	0.027	0.028	0.032
UNC_AVOIDANCE	0.035	0.004	0.028	0.031	0.037	0.038	0.042
INDULGENCE	0.007	0.001	0.004	0.006	0.007	0.008	0.009

ties to act preemptively where they not only possess the necessary information, but also the factual ability to act appropriately on this information. Against this background, it seems plausible that a potential effect of the supervisory preference for private information on the strength of market reactions is conditional on the level of perceived supervisory power and ability.

To test this second hypothesis, in the next step of the analysis, we therefore add additional control variables to capture supervisory power, and also test the moderating effect of supervisory power on the association between the supervisory preference for private information and the strength of market monitoring. We estimate the following regression for each of the three dependent variables (*AVOL, AVAR, CAR*):

$$\begin{aligned} y_{it} = {} & \beta_1 PRIV\_INFO_j + \beta_2 DFREQ_j + \beta_3 POWER_j \\ & + \beta_4 PRIV\_INFO_j \times POWER_j + BankControls_{it} \\ & + ExchangeControls_i + CountryControls_{jt} \\ & + YearFixedEffects_t + \varepsilon_{it} \end{aligned} \quad (5)$$

As supervisory power is an abstract construct, we use three different proxies for *POWER*: First, *OSPOWER* is the official supervisory power score from Barth et al. (2004, 2013).[12] A higher score indicates a stronger supervisor in terms of legal power. Second, *NUMSUP* measures the economic resources power of the supervisor in the spirit of Jackson and Roe (2009), and is calculated as the country's average number of supervisory staff in the sample period divided the country's average total bank assets.[13] Third, *DMEDT1* captures the likelihood of a supervisory intervention as indicated by capital deficiencies, and is a dummy variable that is equal to '1' if a bank's regulatory Tier 1 capital ratio is lower than the median value of all banks in a particular year, and '0' otherwise. The rationale behind this variable is that for safe, well-capitalized banks, the perceived likelihood of and legal opportunity for supervisory interventions is low, which makes any supervisory informational advantage less relevant. *OSPOWER* and *NUMSUP* are time-invariant, while *DMEDT1* is calculated on the bank-year level. We include year-fixed effects and cluster the standard errors at the bank-level. The year-fixed effects subsume the intercept. We truncate all dependent variables and continuous time-variant control variables at the 1 and 99 percent levels.

Table 7 presents the results. Panel A shows the estimates of the regression of stock market reactions to bank's earnings announcements on the supervisory preference for private information, using the different proxies for supervisory power as control variables. Panel B shows the estimates of the regression including an additional interaction term of the supervisory preference for private information and the different proxies for supervisory power.

Panel A reveals that in Models (1) and (2), the supervisor's legal power (*OSPOWER*) and (only for abnormal trading volatility) its economic resources (*NUMSUP*) independently have a significant negative association with the market reaction to banks' earnings announcements. This is consistent with the argument that a stronger supervisor reduces the market participants' incentives to monitor bank risk, and with strong supervisory institutions preferring a more opaque approach towards bank supervision (Barth et al., 2004). However, the baseline inferences regarding *PRIV_INFO*, the supervisory preference for private information, remain mostly robust to the inclusion of the additional variables both with respect to the significance and magnitude of the coefficients, indicating that the supervisory preference for private information measures a different aspect of supervisory characteristics than merely supervisory power. In Model (3), where we include *DMEDT1* to measure the likelihood of supervisory involvement, the results for *PRIV_INFO* again remain robust, while *DMEDT1* itself is

[12] The World Bank's 'Bank Regulation and Supervision Survey' underlying Barth et al. (2004, 2013) was performed in 2003, 2007, 2011, and 2019. We take the average of the scores of 2007 and 2011, the two years during our sample period. Calculating an equally-weighted average score over 2003, 2007 and 2011 yields similar results, as does taking the response of 2003.

[13] Again, we take the average values from the World Bank's 2007 and 2011 'Bank Regulation and Supervision Surveys', or the last available value if either year is missing.

Table 5
Correlation Matrix.
This table presents Pearson (Spearman) correlations for all variables used in the analyses below (above) the diagonal. See Table A.1 in the Appendix for a detailed description of each variable.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	*AVOL*		0.45	0.29	-0.19	0.15	-0.14	-0.16	0.18	0.16	-0.13	-0.02	0.07	-0.17	-0.06	-0.16	0.01	0.26	0.10	0.08	0.11	-0.16	-0.13	-0.10	-0.09	0.14	0.17
2	*AVAR*	0.41		0.69	-0.16	0.09	-0.09	-0.03	0.17	0.22	-0.16	-0.07	0.03	-0.10	-0.04	-0.01	0.02	0.18	0.06	-0.02	0.09	-0.09	-0.06	-0.05	-0.16	0.01	0.09
3	*CAR*	0.24	0.58		-0.16	0.06	-0.04	0.05	0.21	0.21	-0.30	-0.23	-0.16	-0.03	-0.14	0.05	0.01	0.05	0.02	-0.03	-0.05	-0.02	-0.10	-0.14	-0.28	-0.14	-0.07
4	*PRIV_INFO*	-0.13	-0.13	-0.12		-0.01	0.45	0.13	-0.14	-0.24	0.40	0.30	0.06	-0.09	0.00	0.12	0.18	-0.24	0.08	-0.07	0.43	0.06	0.06	0.12	0.61	0.03	0.39
5	*DFREQ*	0.13	0.09	0.09	-0.24		-0.05	-0.35	0.19	0.11	-0.18	0.05	0.19	-0.14	0.00	-0.39	0.35	0.35	0.52	0.00	0.22	-0.58	-0.59	-0.58	-0.10	0.55	0.68
6	*OSPOWER*	-0.12	-0.11	-0.04	0.11	-0.26		0.14	-0.16	-0.07	0.04	0.10	-0.12	-0.29	0.09	0.01	0.08	-0.16	-0.40	0.15	0.39	-0.15	-0.03	-0.02	0.08	-0.07	0.08
7	*NUMSUP*	-0.18	-0.10	-0.08	0.30	0.00	0.22		-0.14	-0.32	0.18	0.16	-0.11	0.10	-0.05	0.32	0.10	-0.67	-0.21	-0.57	-0.42	0.28	0.28	-0.07	-0.42	-0.47	-0.66
8	*DMEDT1*	0.17	0.16	0.19	-0.05	0.19	-0.20	-0.25		0.48	-0.61	-0.27	-0.01	-0.07	-0.14	-0.18	0.08	0.34	0.14	0.18	0.08	-0.25	-0.17	-0.28	0.02	0.23	0.24
9	*SIZE*	0.14	0.22	0.20	-0.12	0.14	-0.10	-0.39	0.47		-0.59	-0.45	-0.25	-0.12	0.02	0.10	-0.08	0.42	0.14	0.26	0.22	-0.34	-0.19	-0.17	-0.01	0.08	0.19
10	*LEV*	-0.09	-0.16	-0.25	0.31	-0.13	0.02	0.30	-0.55	-0.56		0.52	0.23	0.07	0.06	0.13	0.03	-0.32	0.02	-0.26	0.01	0.34	0.25	0.39	0.19	-0.20	-0.04
11	*ROA*	0.04	0.01	-0.20	0.11	0.06	0.02	0.32	-0.18	-0.25	0.31		0.61	-0.10	-0.20	-0.21	0.23	-0.12	0.10	-0.21	0.17	-0.04	-0.01	0.12	0.13	0.13	0.16
12	*UE*	0.03	0.04	-0.29	-0.02	0.04	-0.10	0.04	-0.06	-0.08	0.13	0.55		-0.15	-0.12	-0.23	0.29	0.17	0.27	-0.02	0.24	-0.21	-0.18	-0.07	0.04	0.22	0.29
13	*REPLAG*	-0.17	-0.11	0.01	0.07	-0.16	-0.19	0.05	-0.07	-0.13	0.08	-0.08	-0.16		-0.03	0.11	-0.08	-0.29	0.03	-0.25	-0.38	0.26	0.11	-0.03	-0.05	-0.21	-0.15
14	*DIV*	-0.10	-0.04	-0.15	-0.08	0.06	0.08	0.08	-0.09	-0.01	-0.04	0.02	0.16	-0.05		0.27	-0.08	-0.10	0.05	0.00	0.00	0.12	0.17	0.15	0.04	-0.09	-0.04
15	*RISK*	-0.19	-0.08	-0.01	0.20	-0.44	0.04	0.19	-0.18	-0.04	0.05	-0.21	-0.17	0.12	0.08		-0.16	-0.31	-0.13	-0.15	-0.15	0.44	0.40	0.34	-0.01	-0.54	-0.40
16	*GDP*	-0.04	-0.03	-0.02	0.04	0.30	-0.01	0.27	0.05	-0.05	0.03	0.16	0.06	-0.08	-0.01	-0.12		-0.05	0.28	-0.21	0.13	-0.32	-0.31	-0.29	-0.06	0.25	0.30
17	*STMKTCAP*	0.23	0.18	0.09	-0.10	0.48	-0.23	-0.61	0.31	0.42	-0.21	-0.08	0.07	-0.36	-0.06	-0.38	0.02		0.17	0.38	0.82	-0.63	-0.32	-0.11	0.17	0.44	0.86
18	*IPO*	0.09	0.09	0.07	0.05	0.49	-0.59	-0.01	0.16	0.23	0.03	0.08	0.11	-0.02	-0.01	-0.16	0.20	0.40		-0.16	0.18	-0.56	-0.43	-0.36	0.17	0.53	0.50
19	*NUMEST*	0.11	0.00	0.00	-0.22	0.06	-0.02	-0.71	0.18	0.27	-0.18	-0.23	-0.01	-0.17	-0.05	-0.10	-0.21	0.44	0.01		0.02	0.07	0.21	0.05	0.52	0.35	0.02
20	*INVESTOR_RIGHTS*	0.11	0.11	0.01	0.30	0.22	0.23	-0.41	0.08	0.25	0.01	0.11	0.02	-0.36	0.02	-0.23	0.14	0.80	0.30	-0.22		-0.58	-0.26	0.03	0.21	0.23	0.69
21	*COLLECTIVISM*	-0.10	-0.05	-0.06	-0.01	-0.57	-0.05	0.29	-0.22	-0.34	0.20	-0.05	-0.03	0.24	0.03	0.45	-0.27	-0.56	-0.50	0.21	-0.58		0.73	0.63	0.06	-0.52	-0.58
22	*MASCULINITY*	-0.08	-0.05	-0.15	0.06	-0.42	-0.14	0.14	-0.12	-0.18	0.21	0.05	0.01	0.13	0.06	0.33	-0.21	-0.22	-0.18	0.15	-0.17	0.63		0.73	0.47	-0.15	-0.39
23	*NORMATIVE*	-0.07	-0.02	-0.14	0.02	-0.64	-0.07	-0.01	-0.27	-0.18	0.28	0.06	0.03	0.07	0.03	0.41	-0.25	-0.18	-0.21	-0.06	-0.07	0.67	0.70		0.36	-0.18	-0.25
24	*POWER_DISTANCE*	-0.10	-0.11	-0.19	0.42	-0.27	-0.14	-0.12	0.03	0.04	0.22	0.08	0.00	0.04	-0.03	0.18	-0.10	0.09	0.19	0.26	0.14	0.12	0.74	0.36		0.52	0.29
25	*UNC_AVOIDANCE*	0.09	0.00	-0.09	-0.27	0.46	-0.19	-0.35	0.21	0.10	-0.08	0.11	0.05	-0.22	-0.04	-0.39	0.21	0.42	0.37	0.26	0.19	-0.46	0.17	-0.21	0.45		0.51
26	*INDULGENCE*	0.15	0.09	0.00	0.15	0.74	-0.15	-0.56	0.25	0.24	-0.04	0.14	0.10	-0.20	0.01	-0.45	0.28	0.88	0.55	-0.03	0.64	-0.58	-0.12	-0.35	0.25	0.54	

Table 6
Private Supervisory Information and Market Monitoring.
The table shows OLS regression coefficients and (in parentheses) standard errors for the regressions of the three market monitoring variables – abnormal trading volume (*AVOL*), abnormal return volatility (*AVAR*), and absolute cumulative abnormal returns (*CAR*) – on *PRIV_INFO*, the supervisory preference for private information. *PRIV_INFO* is calculated as the sum of all fully and partially filled out COREP tables required by the national banking supervisor (out of 18). *DFREQ*, the COREP reporting frequency dummy, is equal to '1' if reporting frequency is at least quarterly, and '0' if the reporting frequency is less than quarterly. See Table A.1 in the Appendix for a detailed description of the other variables. Standard errors are clustered on the bank level. ***, **, * denotes statistical significance at the 1%, 5%, 10% level respectively (two-tailed).

	(1)			(2)			(3)		
	AVOL	*AVAR*	*CAR*	*AVOL*	*AVAR*	*CAR*	*AVOL*	*AVAR*	*CAR*
PRIV_INFO	-0.019**	-0.042**	-0.001	-0.017**	-0.037**	-0.001*	-0.016**	-0.036**	-0.001
	(0.009)	(0.018)	(0.001)	(0.008)	(0.016)	(0.001)	(0.008)	(0.017)	(0.001)
DFREQ	0.106**	0.129	0.006	0.001	-0.009	0.008*	0.016	0.000	0.011**
	(0.047)	(0.126)	(0.004)	(0.048)	(0.121)	(0.004)	(0.052)	(0.133)	(0.005)
SIZE				0.024	0.106***	0.002	0.022	0.105**	0.001
				(0.016)	(0.037)	(0.001)	(0.018)	(0.042)	(0.001)
LEV				-0.459	-1.562	-0.110**	-0.490	-1.567	-0.123**
				(0.901)	(1.787)	(0.054)	(0.909)	(1.801)	(0.057)
ROA				5.768	14.693	0.267	6.090	14.935	0.302
				(5.246)	(9.263)	(0.381)	(5.412)	(9.467)	(0.388)
DLOSS				0.083	0.289	0.016**	0.085	0.290	0.017**
				(0.097)	(0.215)	(0.007)	(0.098)	(0.216)	(0.008)
UE				-0.011	0.025	-0.013***	-0.012	0.024	-0.013***
				(0.047)	(0.069)	(0.003)	(0.047)	(0.070)	(0.003)
REPLAG				-0.003***	-0.003	0.000	-0.003***	-0.003	0.000
				(0.001)	(0.003)	(0.000)	(0.001)	(0.003)	(0.000)
DIV				-0.037**	-0.041	-0.002***	-0.037**	-0.041	-0.002**
				(0.017)	(0.037)	(0.001)	(0.016)	(0.037)	(0.001)
RISK				-2.317***	-1.589	0.074	-2.304***	-1.601	0.087*
				(0.687)	(1.495)	(0.050)	(0.691)	(1.528)	(0.052)
DCROSS							0.012	-0.001	0.006
							(0.044)	(0.116)	(0.004)
DEXCH							0.000	0.000	0.000
							(0.000)	(0.000)	(0.000)
GDP							-0.841	-0.568	-0.126
							(1.349)	(3.022)	(0.082)
Adj. R^2	0.008	-0.001	0.002	0.068	0.047	0.153	0.065	0.043	0.159
N	498	498	498	498	498	498	498	498	498
Banks	94	94	94	94	94	94	94	94	94
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

significantly positively associated with abnormal trading volume. This finding is plausible in that investor have themselves stronger incentives for market monitoring the closer a bank is to potential financial distress.

Against this backdrop, the evidence is inconclusive when we turn to the potential moderating role of supervisory power on the association between the supervisory preference for private information and market monitoring in Panel B of Table 7. The baseline results for *PRIV_INFO* still mostly persist. However, none of the interaction terms are significant, while the main effects of the variables capturing supervisory power lose their significance as well. Likely these findings are affected by high levels of multicollinearity in the fully interacted models (variance inflation factors (untabulated) are greater than 100 for all three models). Also, the baseline effect of having access to confidential information might plausibly be constant to the extent that supervisors are being perceived as competent in processing private information across all levels of supervisory power observed in our European sample. Overall, the results consistently point at the independently important role of the private supervisory information in shaping monitoring incentives.

4.3. Robustness and endogeneity concerns

Because *PRIV_INFO*, our measure of national supervisors' preference for confidential information exchange, is time-invariant and measured at the country-level, our findings are potentially affected by other, correlated characteristics of countries and their financial markets. To address concerns about such omitted variables, we perform a series of robustness tests. First, we explicitly control for different measures of the level of countries' financial market sophistication. Second, we perform a placebo test using a matched sample of non-banks. Third, we calculate the Oster (2019) delta to gauge the potential impact of omitted correlated variables in general. Fourth, we use alternative sets of instrumental variables to isolate the portion of *PRIV_INFO* plausibly reflecting cross-country variation in the emphasis on non-public prudential supervision. While these additional tests do not allow us to rule out endogeneity concerns with certainty, taken together they help to support the notion that private supervisory knowledge shapes incentives for market monitoring.

4.3.1. The role of market sophistication

Instead of measuring differences in the inherent preference for private information, the COREP reporting requirements reflected in *PRIV_INFO* potentially pick up cross-country differences in capital market characteristics. Supervisors in countries with less sophisticated capital markets might prefer a stronger private information channel exactly because they can rely less on markets to incorporate risk information efficiently and effectively, possibly introducing a reverse causality bias in our research design. To address this problem, we first include stock market size, the number of new stock market entrants, and analyst activity as additional variables to control for different aspects of stock market sophistication (see, e.g., Glaeser et al., 2001). We then estimate the following model for each of the three dependent variables (*AVOL, AVAR, CAR*):

$$\begin{aligned} y_{it} = {} & \beta_1 PRIV\_INFO_j + \beta_2 DFREQ_j + \beta_3 STMKTCAP_j \\ & + \beta_4 IPO_j + \beta_5 NUMEST_j + BankControls_{it} \\ & + ExchangeControls_i + CountryControls_j \\ & + YearFixedEffects_t + \varepsilon_i \end{aligned} \quad (6)$$

Table 7
The Role of Supervisory Power.
The table shows OLS regression coefficients and (in parentheses) standard errors for the regressions of the three market monitoring variables – abnormal trading volume (*AVOL*), abnormal return volatility (*AVAR*), and absolute cumulative abnormal returns (*CAR*) – on variables measuring the supervisory preference for private information, the supervisory power (Panel A), and their interactions (Panel B). *PRIV_INFO*, the supervisory preference for private information, is calculated as the sum of all fully and partially filled out COREP tables required by the national banking supervisor (out of 18). *DFREQ*, the COREP reporting frequency dummy, is equal to '1' if the reporting frequency is at least quarterly, and '0' if the reporting frequency is less than quarterly. *OSPOWER*, the supervisory legal power, is calculated as in Barth et al. (2004). *NUMSUP*, the supervisory resources, is calculated as the average number of staff employees with supervisory duties employed by the national banking supervisor over the sample period divided by average total bank assets over the sample period. *DMEDT1*, the likelihood of supervisory intervention, is defined as a dummy variable which is equal to '1' if a bank's T1-capital ratio is lower than the median value of all banks in a particular year, and '0' otherwise. See Table A.1 in the Appendix for a detailed description of the other variables. Standard errors are clustered on the bank level. ***, **, * denotes statistical significance at the 1%, 5%, 10% level respectively (two-tailed).

Panel A: Supervisory Power as Control Variable

	(1)			(2)			(3)		
	AVOL	*AVAR*	*CAR*	*AVOL*	*AVAR*	*CAR*	*AVOL*	*AVAR*	*CAR*
PRIV_INFO	-0.015*	-0.035*	-0.001	-0.012	-0.039**	-0.001	-0.017**	-0.038*	0.000
	(0.008)	(0.019)	(0.001)	(0.008)	(0.019)	(0.001)	(0.008)	(0.020)	(0.001)
DFREQ	-0.030	-0.114	0.009*	0.029	-0.011	0.011**	-0.029	-0.042	0.012**
	(0.057)	(0.141)	(0.005)	(0.058)	(0.145)	(0.005)	(0.066)	(0.165)	(0.005)
OSPOWER	-0.035***	-0.072***	-0.001*						
	(0.011)	(0.025)	(0.001)						
NUMSUP				-0.172***	0.009	0.004			
				(0.056)	(0.132)	(0.004)			
DMEDT1							0.145***	0.066	0.004
							(0.052)	(0.128)	(0.004)
Adj. R^2	0.076	0.053	0.158	0.073	0.039	0.157	0.056	0.036	0.177
N	498	498	498	486	486	486	424	424	424
Banks	94	94	94	93	93	93	84	84	84
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Supervisory Power as Interaction Variable

	(1)			(2)			(3)		
	AVOL	*AVAR*	*CAR*	*AVOL*	*AVAR*	*CAR*	*AVOL*	*AVAR*	*CAR*
PRIV_INFO	-0.036	0.002	0.002	-0.010	-0.042**	-0.001*	-0.022*	-0.053***	-0.001
	(0.060)	(0.165)	(0.004)	(0.010)	(0.019)	(0.001)	(0.012)	(0.020)	(0.001)
DFREQ	-0.020	-0.104	0.009*	0.034	-0.017	0.011**	-0.030	-0.045	0.012**
	(0.058)	(0.141)	(0.005)	(0.060)	(0.150)	(0.005)	(0.066)	(0.166)	(0.005)
OSPOWER	-0.071	0.000	0.005						
	(0.103)	(0.273)	(0.007)						
PRIV_INFO × *OSPOWER*	0.002	-0.004	0.000						
	(0.006)	(0.017)	(0.000)						
NUMSUP				0.315	-0.671	-0.046			
				(0.833)	(1.696)	(0.058)			
PRIV_INFO × *NUMSUP*				-0.027	0.038	0.003			
				(0.047)	(0.096)	(0.003)			
DMEDT1							-0.017	-0.438	-0.019
							(0.207)	(0.560)	(0.021)
PRIV_INFO × *DMEDT1*							0.011	0.033	0.002
							(0.013)	(0.036)	(0.001)
Adj. R^2	0.074	0.050	0.155	0.071	0.037	0.156	0.055	0.035	0.179
N	498	498	498	486	486	486	424	424	424
Banks	94	94	94	93	93	93	84	84	84
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

STMKTCAP is a country's average total stock market capitalization over the sample period scaled by average total GDP (Beck et al., 2000). *IPO* is a country's average number of IPOs per year over the sample period. Because this variable is highly skewed, we take its natural log. *NUMEST* is calculated as a country's average total number of EPS forecasts per year in the sample period, scaled by the average number of listed companies. We include year-fixed effects and cluster the standard errors at the bank-level. The year-fixed effects subsume the intercept. We truncate all dependent variables and continuous time-variant control variables at the 1 and 99 percent levels.

Table 8 presents the results for the analysis including these controls for stock market sophistication. While individually significant in some specifications, controlling for market size in Model (1), the number of IPOs in Model (2), or the number of analyst forecasts in Model (3) does not affect the significant negative association between the supervisory preference for private information (*PRIV_INFO*) and the dependent variables capturing the strength of market monitoring. Moreover, controlling for all variables of stock market sophistication simultaneously, the negative association between *PRIV_INFO* and the measures of market monitoring appears to be even stronger than in our baseline tests.

Taken together, these findings suggest that the observed relationship between our measure of the supervisory preference for private information and market monitoring is not simply reflective of the level of stock market sophistication.

4.3.2. Placebo test

It is possible that the three proposed measures of stock market sophistication only incompletely capture the potential market-wide determinants of the strength of the market reaction to banks' public information. To alleviate this concern, we alternatively per-

Table 8
The Role of Market Sophistication.
The table shows OLS regression coefficients and (in parentheses) standard errors for the regressions of the three market monitoring variables – abnormal trading volume (*AVOL*), abnormal return volatility (*AVAR*), and absolute cumulative abnormal returns (*CAR*) – on *PRIV_INFO*, the supervisory preference for private information and additional controls for the level of stock market sophistication. Total stock market capitalization (*STMKTCAP*) is calculated as the country's total stock market capitalization divided by its total GDP. Number of IPOs (*IPO*) is calculated as the natural log of the average number of IPOs per year in the country in the sample period. Number of analyst estimates (*NUMEST*) is calculated as the country's average of the total number of EPS forecasts per year in the sample period divided by the average number of listed companies in the sample period. *PRIV_INFO* is calculated as the sum of all fully and partially filled out COREP tables required by the national banking supervisor (out of 18). *DFREQ*, the COREP reporting frequency dummy, is equal to "1" if reporting frequency is at least quarterly, and "0" if the reporting frequency is less than quarterly. See Table A.1 in the Appendix for a detailed description of the other variables. Standard errors are clustered on the bank level. ***, **, * denotes statistical significance at the 1%, 5%, 10% level respectively (two-tailed).

	(1)			(2)			(3)			(4)		
	AVOL	*AVAR*	*CAR*	*AVOL*	*AVAR*	*CAR*	*AVOL*	*AVAR*	*CAR*	*AVOL*	*AVAR*	*CAR*
PRIV_INFO	-0.019**	-0.042**	-0.001	-0.017**	-0.041**	-0.001	-0.017**	-0.043**	-0.001*	-0.019**	-0.050***	-0.001*
	(0.008)	(0.017)	(0.001)	(0.008)	(0.019)	(0.001)	(0.008)	(0.018)	(0.001)	(0.008)	(0.017)	(0.001)
DFREQ	-0.040	-0.092	0.010**	0.007	-0.057	0.006	0.017	0.007	0.011**	-0.037	-0.121	0.007
	(0.067)	(0.156)	(0.005)	(0.068)	(0.161)	(0.005)	(0.058)	(0.143)	(0.005)	(0.070)	(0.163)	(0.005)
STMKTCAP	0.139**	0.180	0.000							0.146**	0.309**	0.001
	(0.060)	(0.139)	(0.004)							(0.065)	(0.149)	(0.005)
IPO				0.010	0.037	0.004*				-0.004	0.004	0.004*
				(0.022)	(0.054)	(0.002)				(0.023)	(0.056)	(0.002)
NUMEST							0.035	-0.319**	-0.010**	-0.017	-0.428***	-0.011**
							(0.060)	(0.139)	(0.005)	(0.050)	(0.126)	(0.005)
Adj. R^2	0.069	0.043	0.154	0.060	0.040	0.164	0.060	0.049	0.164	0.066	0.054	0.171
N	498	498	498	498	498	498	498	498	498	498	498	498
Banks	94	94	94	94	94	94	94	94	94	94	94	94
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

form a placebo test using three different matched samples of non-banking firms. As the characteristics of banking supervision are irrelevant to shareholders of non-banks, we expect the supervisory preference for private information to be unrelated to market behavior for the matched industrial firms.

From all listed firms in the 19 sample countries, we construct three placebo samples by matching industrial firms to the original sample banks on (1) size (as measured by market capitalization) and year, (2) size, year and country, and (3) size and the initial sample year (holding the placebo sample composition constant over the sample period).[14] When we use the initial matching year as matching criterion, we match a bank with the industrial firm that is the best match in terms of size in the year that the bank enters the sample, and we keep this match constant throughout the remainder of the sample period. We estimate the following variation of the baseline regression model in Eq. (4) for each of the three dependent variables (*AVOL, AVAR, CAR*) on all three placebo samples:[15]

$$\begin{aligned} y_{it} = {} & \beta_1 PRIV\_INFO_j + \beta_2 DFREQ_j + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 ROA_{it} \\ & + \beta_6 DLOSS_{it} + \beta_7 UE_{it} + \beta_8 REPLAG_{it} + \beta_9 DCROSS_i \\ & + \beta_{10} DEXCH_i + \beta_{11} GDP_{jt} + YearFixedEffects_t \\ & + IndustryFixedEffects_i + \varepsilon_{it} \end{aligned} \quad (7)$$

We include year-fixed effects and industry-fixed effects on the level of one-digit SIC codes and cluster the standard-errors at the firm-level. The fixed effects subsume the intercept. We truncate all dependent variables and continuous time-variant control variables at the 1 and 99 percent levels.

Table 9 shows the results of the placebo tests. In line with our expectations, we do not observe a significant association of the supervisory preference for private information *PRIV_INFO* with the dependent variables measuring the strength of market monitoring in any of the matched samples. These results further alleviate concerns that our findings regarding the effect of bank supervisors private information on the level of market monitoring for banks are simply driven by the level of overall stock market development.

4.3.3. Oster delta

In order to gauge the susceptibility of our findings to unobservable factors more generally, we calculate the Oster (2019) delta. Oster (2019) develops a method for estimating the importance of unobserved factors relative to those observed variables included in the model that would be required to eliminate the significant association between *PRIV_INFO* and the different market monitoring variables. Using the recommendations by Oster (2019), in particular using an R^2_{max} of 1.3 times the R^2 from Equation (4) for the regression including the hypothetical unobserved determinants, we find an Oster (2019) delta of 4.274 for the regression with *AVOL* as the dependent variable, of 3.694 for *AVAR*, and of 2.058 for *CAR*.[16]

All these deltas significantly exceed one, the suggested benchmark by Oster (2019). The findings suggest that in order to overturn our results regarding the association of *PRIV_INFO* and the market monitoring variables, any potential unobserved variables would have to be several times more important than the observed characteristics we employ as control variables in terms of their impact on the magnitude of the coefficient of *PRIV_INFO* relative to a univariate regression. As our specifications already include several commonly used first-order determinants of the market reaction to information releases (such as size, unexpected earnings, loss incidence, or the reporting lag), it is unclear whether such unobserved variables exist. We therefore believe that it is unlikely that our results can be fully explained by omitted correlated variables.

[14] We match the industrial sample with the bank sample on market capitalization with a 10 percent caliper width. The results are robust if we match the industrial sample with the bank sample on total assets, return on assets, and leverage simultaneously.

[15] As the data to calculate the variables *DIV* and *RISK* is only available for banks, these variables are dropped from the regression model. We obtain similar results when additionally including the stock market characteristics *STMKTCAP, IPO* and *NUMEST* from the preceding test.

[16] To estimate the delta, we use the Stata package `psacalc`. Including the full set of market sophistication controls as in Equation (4) yields Oster (2019) deltas of 4.243, 6.769 and 3.638 for the regressions with *AVOL, AVAR* and *CAR* as dependent variables, respectively.

Table 9
Placebo Test.
The table shows OLS regression coefficients and (in parentheses) standard errors for the regressions of the three market monitoring variables – abnormal trading volume (*AVOL*), abnormal return volatility (*AVAR*), and cumulative abnormal returns (*CAR*) – on *PRIV_INFO*, the supervisory preference for private information, using three different matched samples of industrial (i.e., non-bank) firms in the sample countries. In Model (1), the industrial firms are matched with banks on size (i.e., market capitalization) and year. In Model (2), the industrial firms are matched with banks on size, year and country. In Model (3), the industrial firms are matched with banks on size in the first year that a bank enters the sample and keeping the match constant for the following years. *PRIV_INFO* is calculated as the sum of all fully and partially filled out COREP tables required by the national banking supervisor (out of 18). *DFREQ*, the COREP reporting frequency dummy, is equal to "1" if the reporting frequency is at least quarterly, and "0" if the reporting frequency is less than quarterly. See Table A.1 in the Appendix for a detailed description of the other variables. Standard errors are clustered on the firm level. ***, **, * denotes statistical significance at the 1%, 5%, 10% level respectively (two-tailed).

Match on:	(1) Size, Year			(2) Size, Year, Country			(3) Size, First Year		
	AVOL	*AVAR*	*CAR*	*AVOL*	*AVAR*	*CAR*	*AVOL*	*AVAR*	*CAR*
PRIV_INFO	-0.012	-0.019	0.000	-0.015	-0.001	0.000	-0.004	0.008	0.000
	(0.011)	(0.019)	(0.001)	(0.009)	(0.018)	(0.001)	(0.010)	(0.019)	(0.001)
DFREQ	0.175*	0.621***	0.023***	0.145**	0.433***	0.018***	0.038	0.064	0.007
	(0.095)	(0.189)	(0.006)	(0.067)	(0.135)	(0.005)	(0.093)	(0.178)	(0.006)
Adj. R^2	-0.003	0.027	0.084	0.016	0.000	0.044	-0.007	0.074	0.094
N	491	491	491	469	469	469	424	424	424
Companies	402	402	402	259	259	259	93	93	93
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

4.3.4. Instrumental variable approach

To further address the concern that our results can be explained by unobserved variation in economic characteristics or financial systems across countries, we employ an instrumental variable approach using, alternatively, three plausible determinants of the supervisory preference for private information: a country's legal origin, a country's overall cultural heritage, and a country's culture of banking supervision.

First, the legal origin of a country determines the legal rights of investors and the quality of law enforcement. Laws and regulations of civil law countries are shaped in a centralized manner and rely heavily on legal scholars, whereas laws and regulations of common law countries are shaped by judges who settle specific disputes. Overall, the legal and regulatory institutions in civil law countries are less market oriented, and we expect that supervisors in civil law countries are less inclined to foster market discipline through a transparent banking system as well. Following La Porta et al. (1998) we classify a country as having an 'English', 'French', 'German' or 'Scandinavian' legal origin. The first is classified as a 'common law' system, whereas the latter three are classified as different types of 'civil law' systems. Because prior literature (La Porta et al., 2000; Leuz et al., 2003) finds that the legal origin affects outside investors rights, which might also influence how investors react to news, we control for country-level outside investor rights in both stages of the regression.

Second, the overall cultural heritage determines the functioning of a country's institutions. In particular, it influences the legal system, the role of regulating institutions, and a country's attitude towards finance, which drives its regulatory style and how much resources are allocated for the regulation of the financial system (see, e.g., La Porta et al., 1998; 2000; Stulz and Williamson, 2003; Nennova, 2003). Taken together, we therefore expect that a country's culture impacts the supervisory preference for private information. We follow Stulz and Williamson (2003) and measure a country's culture based on its principal religion: 'Catholic', 'Protestant' or 'Greek Orthodox'.

Third, the specific culture of banking supervision affects how banking supervisors operate (Kellerman et al., 2013). For instance, Carretta et al. (2015) find that supervisory culture affects bank stability through how it influences the supervisory process. Against this backdrop, we expect that differences in banking supervisory culture directly shape the supervisory preference for private information. We follow Carretta et al. (2015) in their measurement of supervisory culture along the six cultural dimensions established by Hofstede (1984): "individualism vs. collectivism", "masculinity vs. femininity", "long-term orientation vs. short-term orientation", "power distance", "uncertainty avoidance", and "indulgence vs. restraint'. More specifically, we use the mean score of all of these dimensions over the 1999–2011 sample period from Carretta et al. (2015), who estimate supervisory culture using a textual analysis of public speeches of the deans of national supervision authorities.[17]

We present the first-stage and second-stage results of the instrumental variable regressions for the three sets of instruments in Panel A, B, and C of Table 10, respectively.[18] In Panel A, we find that countries with a French legal origin, which have the lowest level of legal rights for investors, have the highest average value of *PRIV_INFO*. Countries with a Scandinavian legal origin, while also having relatively low legal rights for investors, have the lowest average *PRIV_INFO* score. In the second stage, we examine whether the legal origin-induced supervisory preference for private information is associated with the strength of market monitoring. In line with our main results, we find that abnormal return volatility (*AVAR*) and cumulative abnormal absolute returns (*CAR*) around the earnings announcement are significantly lower for higher levels of *PRIV_INFO*.

In Panel B of Table 10, we first establish that the supervisory preference for private information is associated with a country's overall cultural heritage, and find that countries with Catholicism or Greek Orthodox Christianity as their principal religion have the highest average level of *PRIV_INFO*, while Protestant countries display a significantly lower level. In the second stage, we again confirm our prior results and find a highly significant negative associa-

[17] The average scores can be extracted from Figure 1 in Carretta et al. (2015).

[18] F-statistics from a Montiel and Pflueger (2013) robust test for weak instruments consistently exceed 10, the threshold suggested by Staiger and Stock (1997), and indicate that none of the sets of instruments are weak. For three out of the seven specifications with a significant coefficient for *PRIV_INFO* in the second stage, a significant Hansen J-statistic suggests that the overidentification restriction might not hold within the respective set of instruments. While this could be the result of parameter heterogeneity (Angrist and Pischke, 2009, p. 166), it highlights that the exogeneity assumption of our instruments is not unambiguous, and that the results from Table 10 should be interpreted in conjunction with the other robustness tests.

Table 10
Instrumental Variable Approach.
This table presents 2SLS regression coefficients and (in parentheses) standard errors for the first and second stages of three alternative instrumental variable regressions. In Panel A, we use dummy variables that indicate a country's legal origin (*LEGAL_ORIGIN*) from La Porta et al. (1998) as instrumental variables, and control for outside investors' rights (*INVESTOR_RIGHTS*) from Leuz et al. (2003). A country's legal origin is either 'English', 'French', 'German' or 'Scandinavian'. In Panel B, we use dummy variables that indicate a country's cultural heritage (*COUNTRY_CULTURE*) from Stulz and Williamson (2003) as instrumental variables. A country's cultural heritage is captured by its principal religion and is either 'Catholic', 'Greek Orthodox' or 'Protestant'. In Panel C, we use as instrumental variables the banking supervisory culture measured along the six cultural dimensions of Hofstede (1984): 'individualism vs. collectivism' (*COLLECTIVISM*), 'masculinity vs. femininity' (*MASCULINITY*), 'long-term orientation vs. short-term orientation' (*NORMATIVE*), 'power distance index' (*POWER_DISTANCE*), 'uncertainty avoidance' (*UNC_AVOIDANCE*), and 'indulgence vs. restraint' (*INDULGENCE*). The variables are taken from Carretta et al. (2015) and are based on public speeches by the deans of the national supervisory authorities. All cultural dimensions are continuous variables. *PRIV_INFO*, the supervisory preference for private information, is calculated as the sum of all fully and partially filled out COREP tables required by the national banking supervisor (out of 18). See Table A.1 in the Appendix for a detailed description of the other variables. Standard errors are clustered on the bank level. We also report F-statistics for the Montiel and Pflueger (2013) robust test for weak instruments, and Hansen J-statistics for overidentification restriction tests. ***, **, * denotes statistical significance at the 1%, 5%, 10% level respectively (two-tailed).

Panel A: Legal Origin as Instrumental Variable

		1st Stage	2nd Stage		
		PRIV_INFO	*AVOL*	*AVAR*	*CAR*
PRIV_INFO			-0.017	-0.099***	-0.003***
			(0.013)	(0.033)	(0.001)
INVESTOR_RIGHTS		0.780***	0.010	0.132**	0.004
		(0.254)	(0.023)	(0.056)	(0.002)
LEGAL_ORIGIN	Constant (English)	10.013***			
		(3.194)			
	French	2.717**			
		(0.606)			
	German	-1.717			
		(1.533)			
	Scandinavian	-2.967**			
		(1.384)			
Adj. R^2		0.656	0.141	0.077	0.286
F-stat.		13.515**			
Hansen J-stat.			7.368**	6.124*	7.688**
N		410	410	410	410
Banks		74	74	74	74
Controls		Yes	Yes	Yes	Yes
Year FE		Yes	Yes	Yes	Yes

Panel B: Country Culture as Instrumental Variable

		1st Stage	2nd Stage		
		PRIV_INFO	*AVOL*	*AVAR*	*CAR*
PRIV_INFO			-0.037***	-0.108***	-0.003***
			(0.013)	(0.033)	(0.001)
COUNTRY_CULTURE	Constant (Catholic)	18.782***			
		(2.853)			
	Greek Orthodox	0.642			
		(0.456)			
	Protestant	-4.865***			
		(0.830)			
Adj. R^2		0.552	0.120	0.071	0.227
F-stat.		28.738***			
Hansen J-stat.			1.577	0.973	0.554
N		498	498	498	498
Banks		94	94	94	94
Controls		Yes	Yes	Yes	Yes
Year FE		Yes	Yes	Yes	Yes

Panel C: Banking Supervisory Culture as Instrumental Variable

	1st Stage	2nd Stage		
	PRIV_INFO	*AVOL*	*AVAR*	*CAR*
PRIV_INFO		-0.022*	-0.062***	-0.001
		(0.012)	(0.019)	(0.001)
COLLECTIVISM	455.353*			
	(248.736)			
MASCULINITY	-2362.120***			
	(535.607)			
NORMATIVE	-309.980			
	(213.798)			
POWER_DISTANCE	1629.123***			
	(214.087)			
UNC_AVOIDANCE	-566.505***			
	(70.546)			
INDULGENCE	-185.022			
	(612.407)			
Adj. R^2	0.827	0.137	0.094	0.298
F-stat.	21.357***			
Hansen J-stat.		8.461	11.905**	14.379**
N	414	414	414	414
Banks	74	74	74	74
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

tion of *PRIV_INFO* and all three dependent variables, which is even more pronounced than the baseline findings in Table 6.

Finally, in Panel C of Table 10, we present the results from using countries' more specific culture of banking supervision as an instrument. In the first stage, we find that four of the six dimensions of culture defined by Hofstede (1984) are significantly associated with the supervisory preference for private information. In particular, supervisors who score higher on the dimensions of collectivism and power distance have a higher preference for private information. In contrast, supervisors who score higher on the dimensions of masculinity and uncertainty avoidance have a lower preference for private information. In the second stage, we confirm that abnormal volume (*AVOL*) and abnormal return volatility (*AVAR*) are significantly lower for higher levels of *PRIV_INFO*. As in Table 6, the negative effect on cumulative abnormal absolute returns (*CAR*) is not significant.

Taken together, our results from the alternative robustness checks corroborate the link between a supervisory preference for private information and the intensity of market monitoring. While our setting and data do not allow us to conclusively rule out endogeneity concerns, it appears unlikely that this relationship can be fully explained by other unobserved country characteristics.

5. Conclusion

From 2006 to 2014, national banking supervisors in the EU could choose the extent to which they implemented the EU-wide common reporting (COREP) framework on privately reported supervisory risk information. We use the resulting variation in supervisory reporting requirements as a signal about individual supervisors' reliance on private information and the underlying supervisory attitude towards bank transparency and market discipline. Based on a private information score that measures the country-level confidential reporting requirements under COREP, we assess whether the supervisory preference for private information is associated with the strength of market monitoring by bank investors. In particular, we examine whether the stock market reaction to banks' earnings announcements, as an established indicator of the relevance of public information to investors, varies with the level of private supervisory information.

Our findings suggest that external monitoring by bank investors does reflect variation in the supervisors' private informational advantage. The market reaction to banks' earnings announcements is significantly attenuated for banks located in countries whose supervisors rely more on confidential information. We also examine whether the observed relationship is determined by the supervisory resources to act on the private information, i.e., the supervisory 'power'. We find that our results are robust to the inclusion of measures of supervisory power, emphasizing the role of private information as a distinct characteristic of the supervisory approach, but do not observe a significant moderating effect.

Our study contributes to the literature on market discipline by providing evidence on the effect of institutional characteristics and the supervisory attitude on market monitoring and the usage of banks' financial reporting information (Billet et al., 1998; Boyle et al., 2015; Demirgüc-Kunt and Huizinga, 2004; Goldberg and Hudgins, 2002; Hadad et al., 2011; Karas et al., 2013; Martinez Peria and Schmukler, 2001). Our study is also related to the literature on the value of supervisory information production (Berger et al., 2000; Berger and Davies, 1998; DeYoung et al., 2001), as our findings suggest that market participants incorporate the likelihood of superior supervisory knowledge in their own assessment of public bank reports. More broadly, the paper adds to research on the institutional details of regulatory reporting (Dewing and Russell, 2012) and it's interplay with market monitoring in European countries.

While we provide the first systematic evaluation of the effect of a supervisory preference for confidential information on market monitoring, our study is subject to several important caveats. Most importantly, as our measure of private supervisory information is time-invariant and based on cross-country variation in supervisory reporting requirements, it might be correlated with other unobserved country-level factors that drive the strength of market reactions to public information. Together with a series of robustness checks, our results plausibly suggest that private supervisory knowledge shapes external monitoring incentives, but some endogeneity concerns remain.

Second, while variation in the implementation of the COREP requirements across countries allows for a relatively clean comparison of formal confidential reporting practices on essential risk information, we are unable to take into account additional private information exchange through, for instance, on-site examinations or non-COREP reporting provisions. As such, we do not measure additional firm-level differences in private supervisory knowledge. Likewise, our results reflect an average effect, but do not capture that the impact of private supervisory knowledge on the strength of market monitoring might be conditional on individual firm characteristics. Third, while a large literature supports the usage of stock market reactions as a measure of market monitoring, we do not examine other potential sources of market discipline, such as, most importantly, depositors and other debt holders. Our focus on equity investors also limits our analysis to publicly listed banks, which represent only a subset of the European banking system.

Overall, our study provides exploratory evidence motivated by, and consistent with, the idea that a supervisory preference for confidential information attenuates investors' incentives to monitor banks' public information. Whether this is a desirable feature of supervisory policy however remains an open question, and depends on the overall fragility of the banking system (Morrison and White, 2013). Our initial findings call for further research on the important issue of supervisory information sharing.

CRediT authorship contribution statement

Ferdinand Elfers: Conceptualization, Methodology, Validation, Writing – original draft, Writing – review & editing, Supervision. **Jeroen Koenraadt:** Methodology, Software, Validation, Formal analysis, Investigation, Writing – original draft.

Acknowledgments

We thank Jannis Bischof, Joachim Gassen, Martien Lubberink, Edith Leung, Jeroen Suijs, conference participants at the EAA Annual Conference 2018, and workshop participants at Erasmus University Rotterdam for their helpful comments. We thank Fanny Tallgren for research assistance.

Appendix

Table A.1
Variable definitions.

Variable	Description	Source
Dependent variables		
AVOL	Abnormal trading volume, calculated as the natural log of the ratio of the average trading volume divided by outstanding shares in the event window, and the average trading volume divided by outstanding shares in the estimation window. The event-window is $t = -1, 0, +1$ and the estimation window is $t - 30$ to $t - 10$ and $t + 10$ to $t + 30$, where $t = 0$ is the I/B/E/S earnings announcement date	Datastream
AVAR	Abnormal return variability, calculated as the natural log of the ratio of the average of the squared daily market model-adjusted returns in the event window and the variance of the daily market model-adjusted returns in the estimation window. The event-window is $t = -1, 0, +1$ and the estimation window is $t - 30$ to $t - 10$ and $t + 10$ to $t + 30$, where $t = 0$ is the I/B/E/S earnings announcement date	Datastream
CAR	Absolute cumulative abnormal return, calculated as the absolute of the sum of the difference between observed daily return and the expected daily return over the event window. The event-window is $t = -1, 0, +1$ and the estimation window is $t - 30$ to $t - 10$ and $t + 10$ to $t + 30$, where $t = 0$ is the I/B/E/S earnings announcement date	Datastream
Supervisory variables		
PRIV_INFO	Supervisory preference for private information, calculated as the sum of all fully- and partially required COREP tables required by the national banking supervisor (out of 18) from banks under supervision	European Banking Authority
DFREQ	COREP reporting frequency dummy, equal to '1' if reporting frequency is at least quarterly, and '0' if the reporting frequency is less than quarterly	European Banking Authority
OSPOWER	Legal power of the supervisor, calculated following Barth et al. (2004, 2013). The score is the sum of the answers to questions 5.5, 5.6, 5.7, 6.1, 10.4, 11.2, 11.3.1, 11.3.2, 11.3.3, 11.6, 11.7, 11.9.1 and 11.9.3 of the 'Bank Regulation and Supervision Survey' of the World Bank, where *Yes* = 1, *No* = 0. We use the average of the scores from 2007 and 2011	World Bank
NUMSUP	Resources power of the supervisor, calculated as the country's average number of staff employees with supervisory duties in the sample period, divided by the country's average total bank assets in the sample period. Data is taken from the 'Bank Regulation and Supervision Survey' of the World Bank. We take the average of the values from 2007 and 2011, or the last available datapoint when either is missing	World Bank
COLLECTIVISM	Individualism vs. collectivism dimension of the Hofstede (1984) cultural dimensions; expresses the inclination for a society in which individuals presume members belonging to their group to take care of each other	Carretta et al. (2015)
MASCULINITY	Masculinity vs. femininity dimension of the Hofstede (1984) cultural dimensions; expresses the social inclination for achievement, confidence and compensation for success	Carretta et al. (2015)
NORMATIVE	Long-term orientation vs. short-term orientation dimension of the Hofstede (1984) cultural dimensions; describes how people relate to social norms and traditions: people have a strong desire to explain as much as possible, they have a strong concern with establishing the absolute 'truth', they exhibit great respect for social conventions and traditions, and they focus on achieving quick results	Carretta et al. (2015)
POWER_DISTANCE	Power distance index dimension of the Hofstede (1984) cultural dimensions; expresses the preference for hierarchical order in which everyone has a specific role and this structure is commonly accepted	Carretta et al. (2015)
UNC_AVOIDANCE	Uncertainty avoidance dimension of the Hofstede (1984) cultural dimensions; outlines to what degree a society tries to avoid risk and uncertainty	Carretta et al. (2015)
INDULGENCE	Indulgence vs. restraint dimension of the Hofstede (1984) cultural dimensions; reflects a preference of a society which approves enjoyment and personal fulfillment	Carretta et al. (2015)
Bank control variables		
DMEDT1	Likelihood of supervisory intervention, is a dummy variable that is equal to '1' if a bank's T1-capital ratio is lower than the median value of all T1-capital ratio's in a particular year, and '0' otherwise	Datastream
SIZE	Size, calculated as the log of total assets	Datastream
LEV	Leverage, calculated as total debt divided by total assets	Datastream
ROA	Profitability, calculated as net income divided by total assets	Datastream
DLOSS	Loss dummy, equal to '1' if the reported EPS is negative, '0' if otherwise	Datastream
UE	Unexpected earnings, calculated as the absolute difference between the median forecasted EPS and reported EPS, scaled by the closing price of the previous fiscal year	I/B/E/S
REPLAG	Reporting lag, calculated as the number of trading days between the I/B/E/S earnings announcement date and the fiscal year-end	I/B/E/S, Datastream
DIV	Diversification, calculated as net interest income divided by earnings before interest and taxes	Datastream
RISK	Risk taking (ex-post), calculated as the non-performing loans divided by the total assets	Datastream
Country/Exchange variables		
DCROSS	Cross-listing dummy, equal to '1' if the stock is cross-listed on multiple exchanges, '0' otherwise	Datastream
DEXCH	Exchange dummy, equal to '1' if the stock is not listed on a major exchange in Europe, but on other smaller exchanges or OTC markets, and '0' otherwise	Datastream
GDP	GDP growth rate of the country	World Bank
STMKTCAP	Market capitalization, calculated as the country's average total stock market capitalization in the sample period, divided by the country's average total GDP in the sample period	World Bank
IPO	Number of IPO's, calculated as the natural log of the country's average number of IPO's per year in the sample period	Zephyr
NUMEST	Number of analyst estimates, calculated as the natural log of the country's average of the total number of EPS forecasts per year in the sample period divided by the country's average number of listed companies per year in the sample period	I/B/E/S, Datastream
LEGAL_ORIGIN	Legal origin of a country, either 'English', 'French', 'German', or 'Scandinavian'	La Porta et al. (1998)
INVESTOR_RIGHTS	Anti-director rights index; an aggregate measure of minority shareholder rights, which ranges from zero to five	Leuz et al. (2003)
COUNTRY_CULTURE	Cultural heritage of a country; either 'Catholic', 'Protestant', or 'Greek Orthodox'	World Religion Database

Table A.2
Weighted *PRIV_INFO*.
This table presents the results of our main tests using an alternative definition of *PRIV_INFO*, in which we weigh the number of *partially* required COREP tables by 0.5 (instead of 1). The table shows OLS regression coefficients and (in parentheses) standard errors for the regressions of the three market monitoring variables – abnormal trading volume (*AVOL*), abnormal return volatility (*AVAR*) and absolute cumulative abnormal return (*CAR*) – on *PRIV_INFO*, the supervisory preference for private information. *PRIV_INFO* is calculated as the weighted sum of all the fully and partially filled out COREP tables required by the national banking supervisor (out of 18). *DFREQ*, the COREP reporting frequency dummy, is equal to '1' if reporting frequency is at least quarterly, and '0' if the reporting frequency is less than quarterly. Model (2) controls for different variables that capture stock market sophistication. Total stock market capitalization (*STMKTCAP*) is calculated as the country's total stock market capitalization divided by the total GDP. Number of IPO's (*IPO*) is calculated as the natural log of the average number of IPOs per year in the country in the sample period. Number of analyst estimates (*NUMEST*) is calculated as the country's average of the total number of EPS forecasts per year in the sample period divided by the average number of listed companies in the sample period. See Table A.1 for a detailed description of the other variables. Standard errors are clustered on the bank level. ***, **, * denotes statistical significance at the 1%, 5%, 10% level respectively (two-tailed).

	(1)			(2)		
	AVOL	AVAR	CAR	AVOL	AVAR	CAR
PRIV_INFO	−0.021***	−0.039***	−0.001**	−0.024***	−0.051***	−0.001**
	(0.006)	(0.012)	(0.000)	(0.006)	(0.011)	(0.000)
DFREQ	0.026	0.010	0.011**	0.012	0.001	0.009*
	(0.055)	(0.138)	(0.005)	(0.065)	(0.148)	(0.005)
STMKTCAP				0.142**	0.290**	0.001
				(0.061)	(0.144)	(0.005)
IPO				−0.036	−0.067	0.002
				(0.024)	(0.051)	(0.002)
NUMEST				−0.058	−0.507***	−0.012**
				(0.049)	(0.124)	(0.005)
Adj. R^2	0.077	0.049	0.158	0.082	0.065	0.171
N	498	498	498	498	498	498
Banks	94	94	94	94	94	94
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

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