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Bank market power and supervisory enforcement actions

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ABSTRACT

This paper investigates the relationship between supervisory enforcement actions and bank market power. Employing a unique dataset on enforcement actions in Italy from 2006 to 2018, we first document that banks with higher market power are more likely to escape public scrutiny. Further, this effect is more substantial for local banks than commercial ones, coherent with the view that national supervisors are softer when dealing with local banks. Second, when uncovering the main characteristics of the banks with higher market power, we find that banks with higher market power do not outperform other banks in profitability but show a worse loan quality, suggesting that banks with higher market power have riskier loan portfolios than other banks and attract fewer enforcement actions. Our results are robust across several econometric techniques and alternative specifications by contributing to the long-lasting debate on the implications of the bank market power on financial stability, considering the role of enforcement actions.

1. Introduction

Banking supervision has the twofold aim of delving into banks' financial conditions and assessing their compliance with banking regulations, policy guidelines, and requirements. The needs for bank supervision obey to safeguard the required financial services to support economic activity (EBA, 2014, pp. 16), to grant the savers' interests, and impart confidence when multiple misconducts and failures occur in the banking sector (Delis, Staikouras, & Tsoumas, 2017; Lambert, 2019). In this context, besides on-site and off-site periodical examinations (Bank of Italy, 2012; Basel Committee on Banking Supervision, 2015), supervisory agencies ensure the principle of safe and sound management by imposing enforcement actions when banks misconduct. This represents another tool complementing capital adequacy requirements in counterpoising excess risk-taking behavior. Mainly, enforcement actions fulfill three functions: *i)* disciplinary effect (Berger, Davies, & Flannery, 2000; Bhattacharya, Plank, Strobl, & Zechner, 2002); *ii)* creating a culture of sound practices in banking (Basel Committee on Banking Supervision, 2015)); *iii)* acting as a warning to other non-sanctioned banks (Caiazza, Cotugno, Fiordelisi, & Stefanelli, 2018).

In general, enforcement actions generate monetary and social implications for targeted banks and the real economy. On the one hand, when banking authorities apply sanctions, banks must first repay their fines and then devote other financial resources to bring into line their behavior. Indeed, in the presence of bank misconduct, such regulatory bodies sanction the entire entity or specific board members for any deficiencies, even statutory auditors, by smoothing the rise of agency conflicts and ensuring the alignment between the shareholders' interests with those of officers in bank decision-making positions (Caiazza et al., 2018). On the other hand, sanctions create public embarrassment and discontent and prompt significant real effects flowing into contractions in consumer lending, impairing the extension of the credit supply toward households, corporates, and other agents in the commercial sector, which in turn could endanger further the shareholders' profits maximization (Danisewicz, McGowan, Onali, & Schaeck, 2018).

Nevertheless, regulatory authorities might be subject to agency problems concerning the regulated industry and pursue other benefits rather than the public interest (Laffont & Tirole, 1993; Zingales, 2013), as postulated by the regulatory capture view (Stigler, 1971). The same 2007–08 Financial Crisis showed weaknesses in the supervisory process (Kane, 2012), indicating that influential banks may avoid enforcement actions and benefit from preferential treatment, which might affect the financial stability (Kanas, Hassan Al-Tamimi, Albaity, & Mallek, 2019). Furthermore, the supervisory process might differ between commercial

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and local banks, where these latter banks benefit from softer public scrutiny (Agarwal, Lucca, Seru, & Trebbi, 2014).

In this respect, several papers have investigated the sources and the determinants of supervisory initiatives concerning the existence of excessive bank risk-taking (Duchin & Sosyura, 2014), liquidity and capital requirements violations (Delis & Staikouras, 2011, Barth, Caprio, & Levine, 2001), and a deterioration in the bank asset quality (Fernandez & Gonzalez, 2005). More recently, Lambert (2019) established a link between bank lobbying activities and the probability of enforcement actions. Conversely, our paper is one of the first studies investigating the determinants of enforcement actions by focusing on the role of bank market power, considering both commercial and local banks and their related incentives. This represents a timely issue for regulators because it might underline potential fallacies in the micro-prudential processes in European member states and highlight differences in supervision between commercial and local banks. In handling this investigation, we complement Lambert (2019). Yet, we focus on the concept of bank market power for three reasons. First, identifying lobbying activities in Europe is a difficult task because of the absence of a regulation that allows tracking bank lobbying activities as in the United States (for instance, *US Lobbying Disclosure Act, 1995*).[1] Second, the bank market power is one of the main factors affecting the structure of the banking industry and related stability (Berger & Hannan, 1998). It may also affect the relationship between supervised companies and supervisors.[2] Third, the concept of bank market power requires a more easy-accessible set of information for regulators related to the bank structure of the revenues and cost production (Kanas et al., 2019).

For this purpose, we hand-collect unique information on supervisory enforcement actions on 696 Italian banks from 2006 through 2018 to match this information with that one related to financial ratios from the Italian Banking Association (ABI) database. The choice of focusing on Italy is fourfold. First, information on enforcement actions is widely dispersed across several data sources that might require text search engine strategies to collect it. In conducting supervisory scrutiny, the Bank of Italy imposes sanctions on banks after performing off-site analysis and on-site inspections (often non-scheduled). Then, in case of bank misconduct, it publicly records and discloses all enforcement actions through monthly bulletins providing detailed case-by-case explanations for each ad-hoc measure on targeted banks. This source of information as well as being official, more reliable, and timelier than other sources in terms of informative coverage, allows us to hand-collect data not only on the possibility that some banks, because of their misconduct related to general organizational and disclosure failures, are targeted by supervisors but to account for the severity of the sanctions expressed in terms of the fine amount and relative scaling by the number of sanctioned people in the bank boardrooms. Then, we complement this information with that of the European Central Bank to ensure we cover all the potential sources of sanctions' imposition for Italian banks. Second, the Italian banking sector mainly comprises commercial and local banks. Thus, this setup is suitable for investigating potential inconsistencies in the regulation effectiveness in dealing with those banks in the spirit of Agarwal et al. (2014). Third, the Italian banking system has been at the center of debate for scandals related to misconduct episodes (i.e., Veneto Banca, Banca Popolare di Vicenza, Banca Popolare di Bari, Monte dei Paschi di Siena), attracting the attention of social media and public discontent among taxpayers because of national rescue programs (Cardillo, Onali, & Torluccio, 2021). Fourth, the Italian banking system, as well as being one of the most important in terms of bank activities in Europe (1.31 trillion euros, after France at 1.84 trillion and Germany at 2.65 trillion euros), is a bank-oriented system in channeling credit to the real economy, where local (or cooperative) banks play a vital role in the financial intermediation industry (for instance, in 2021, 248 Italian cooperative banks had 172 billion euros in deposits[3]).

We summarize our results as follows. First, using a probit regression analysis, we show that banks with higher market power have a lower probability of incurring enforcement actions from supervisory authorities. Furthermore, enforcement actions, as all other public authorities' interventions in the banking sector, contain a behavioral component since bank misconduct affects the sanctions from the supervisory agencies. For this purpose, we account for endogeneity using an Instrumental Variable Probit (hereafter, IV-Probit) and a Two-stage least square (2SLS) linear probability model. Furthermore, our results are consistent when we use several proxies for bank market power, run sample split analysis based on the bank specialization, and allow for the severity (the fine amount) of each sanction imposed by regulators. Second, we dig deeper into the characteristics of banks with a higher market power by considering two potential channels: bank performance and risk-taking. Our findings suggest that banks with higher market power are likely to have a higher fraction of non-performing loans in their balance sheets. When considering their performance, it is not statistically significant than other banks, suggesting that banks with higher market power do not outperform other banks but show a worse quality of their loan portfolios. Then, we finally find evidence that when regulators impose sanctions on banks, they smooth their market power, supporting the idea that supervision decreases bank market power.

Our evidence contributes to three strands of the literature. First, we contribute to the literature related to bank policy interventions. However, this literature is more concerned about the effects of enforcement actions. For instance, Delis and Staikouras (2011) show an inverted U-shaped relationship between on-site audits and bank risk, while Delis et al. (2017) find that enforcement action reduces the ratios of both risk-weighted assets and non-performing loans without observing any increase in the regulatory capital base of sanctioned banks. One exception is Lambert (2019). This latter study focuses on bank lobbying activities without considering the role of the bank's market power. In contrast, we shed some light on the implications of the bank market power on regulatory scrutiny.

Second, considering our focus on the bank market power, we contribute to the broader literature on banking competition. In this context, two views drive the debate: the competition-fragility view and the competition-stability view. The supporters of *competition-fragility* prescribe that a high level of competition reduces a bank's profitability and increases risk-taking. In turn, this also increases the overall risk of the banking system (Marcus, 1984; Keeley, 1990; Hellmann, Murdock, & Stiglitz, 2000; Hauswald & Marquez, 2006) and the instability of bank relationships with borrowers (Allen & Gale, 2004; Beck, De Jonghe, & Schepens, 2013; Berger, Klapper, & Turk-Ariss, 2009; Boot & Thakor, 1993; Danisman & Demirel, 2019; Jiménez, Lopez, & Saurina, 2013).[4] Conversely, the competition-stability view (i.e., Boyd & De Nicolò, 2005; Caminal & Matutes, 2002) postulates a negative relationship between competition and bank risk (Anginer, Demirguc-Kunt, & Min Zhu, 2014; Fiordelisi & Mare, 2014; Goetz, 2018; Leroy & Lucotte, 2017). In this context, our study not only underlines that banks with higher market power do not outperform others in profitability and have a higher fraction of non-performing loans than other banks, but they also escape from public scrutiny in the form of enforcement actions.

Third, we contribute to the empirical literature examining the

[1] We recognize that other institutional discrepancies might exist between the EU and the US banking sector, as suggested by Cardillo et al. (2021).

[2] Zingales (2017) shows that banks engaging in more lobbying activities have higher market power. This would entail that the bank's market power is also a proxy of the bank's political activism.

[3] Data from European Central Banking – Statistical Data Warehouse and European Association of Cooperative Banks.

[4] Despite the instability in the bank relationships, banks might benefit from better conditions in terms of credit pricing (Berger & Udell, 2006; Petersen & Rajan, 2002) and smaller information asymmetries (Rajan, 1992; Ramakrishnan & Thakor, 1984).

differences, in terms of the supervisory authority's behavior, between cooperative and commercial banks in the banking sector. This literature is more concerned with comparing these two types of banks' profitability and stability (Kuc & Teplý, 2023) without coping with their supervision. In this respect, we show that cooperative banks are less likely to be sanctioned by regulators than commercial banks, coherent with the view that supervisors are softer when dealing with local banks (Agarwal et al., 2014).

The structure of this paper is as follows. Section 2 develops the literature review and our hypothesis. Sections 3 and 4 present the data and variables used in our analysis and the empirical framework. Section 5 shows the main results, while Section 6 presents the robustness checks and extensions. Section 7 concludes.

2. Literature review and hypothesis development

This work refers to two strands of the financial economics literature. Our paper's first strand relates to studies on the effects of formal enforcement actions and bank activities (Delis et al., 2017). These studies posit that enforcement actions create behavioral changes in bank activities. On the one hand, Danisewicz et al. (2018) show that enforcement actions contract bank lending and liquidity creation activities, while Delis, Staikouras, and Tsoumas (2019) find that supervisory enforcement actions decrease the bank share of total deposits. On the other hand, Delis et al. (2017) postulate that sanctions might benefit the banking sector because they smooth the risk-taking incentives of sanctioned banks, measured as a decrease in the bank risk-weighted assets and non-performing loan ratios. This is also coherent with Delis and Staikouras (2011) and Berger, Cai, Roman, and Sedunov (2021). However, this latter study presents a different channel through which targeted banks reduce risk. The authors show that enforcement actions reduce the bank's use of the leverage and, in turn, the bank's contribution to the systemic risk. This effect is more pronounced in periods of financial crises rather than in normal times. However, the financial economics literature proves that enforcement actions affect non-sanctioned banks. One example is Caiazza et al. (2018). Their findings support the view that these policy actions produce competitive effects because non-sanctioned banks tend to behave similarly to sanctioned ones offloading non-performing loans and reducing their lending volumes.

If the enforcement actions create competitive effects, this paper is also related to that set of studies about the implications of bank competition on the overall financial stability (Albaity, Mallek, Hassan Al-Tamimi, & Noman, 2021). In this context, two theoretical explanations prevail: the *competition-fragility hypothesis* and the *competition-stability hypothesis*. On the one hand, the *competition-fragility hypothesis* theorizes that a more competitive banking sector erodes the bank market power and reduces bank margin ratios by leading to a higher bank risk appetite (Berger et al., 2009; Keeley, 1990; Marcus, 1984). On the other hand, the *competition-stability hypothesis* postulates that an increased bank market power in the loan market leads to an increase in the interest rates charged to bank borrowers. In this context, higher interest rates imply that the borrowers are less likely to default on their obligations by avoiding adverse selection and moral hazard problems. Several scholars have supported both perspectives by providing different explanations. For instance, using a cross-country analysis, Beck et al. (2013) document the prevalence of the risk-shifting hypothesis with a robust positive relationship between market power and stability. Berger et al. (2009) use a cross-country sample from 23 industrial countries from 1999 to 2005 and find that banks with higher Lerner index show lower *Z*-scores.

Danisman and Demirel (2019), using a large sample of 25 developed countries for the 2007–2015 period, find that higher market power in banking decreases risky behavior and that capital requirements are the most effective tool to reduce bank risk. Boyd and De Nicolò (2005) find that a less competitive banking sector determines an increase in interest rates applied to customers generating information asymmetries leading to financing riskier projects, while Anginer et al. (2014) show that the increased competition encourages banks to diversify their risks and reduce their contribution to the systemic risk. However, they also find that a stronger institutional environment may mitigate the adverse effects of a less competitive banking sector. Similarly, Goetz (2018) posits that a higher bank competition, intended as lower entry barriers in the banking sector, is beneficial because it stimulates efficiency and reduces bank failure probability. Similar results emerge from Leroy and Lucotte (2017) and Fiordelisi and Mare (2014). Recent studies also highlight that the relationship between bank competition and stability might not be linear (Jiménez et al., 2013; Martinez-Miera & Repullo, 2010). For instance, Jiménez et al. (2013) find a U-shaped relationship between bank competition and stability. Still, when considering an industrial organization approach based on the Lerner Index, they also find evidence of the competition-fragility hypothesis in the loan market.

Overall, it appears that the higher bank competition affects the stability of the system through two different channels: a reduction in profitability fosters greater risk-taking (Hellmann et al., 2000; Keeley, 1990; Marcus, 1984), and greater credit risk due to unstable relationships and lower investment in customer information (Allen & Gale, 2004; Boot & Thakor, 1993).

Although the financial economics literature primarily focuses on how enforcement actions affect bank behavior and risk-taking (Berger et al., 2021; Caiazza et al., 2018) because of organizational deficiencies or internal control failures, little is known about the determinants of enforcement actions, with a particular emphasis on the role of the bank market power affecting the bank probability to receive a sanction from supervisory agencies. This relationship might be unclear since the banking literature stipulates that bank risk depends on the trade-off between market power and charter value (Delis & Tsionas, 2009). This might also shape the link between supervised banks and their supervisors.

One consequence of using market power is that banks might raise the prices of financial products excessively over marginal costs, creating allocation problems in line with the streams of the literature referred to the *competition-stability view* (among others, Schaeck & Cihák, 2014). On the one hand, the higher market power can raise inefficiencies in bank management, resulting in higher intermediation costs, lower banking margins, and poorer asset quality (Demsetz, 1973; Martinez-Miera & Repullo, 2010). This corroborates previous findings of Delis and Staikouras (2011), according to which banks with higher market power might have incentives to lend to more poorly performing borrowers by increasing their risk-taking. On the other hand, regulators may suffer from an information problem since they may not know the real production function of the regulated banks (Peltzman, 1976). Furthermore, regulated firms with higher market power may take advantage of their supervisors because they are better informed about supply and demand market conditions. Hence, a higher bank market power may affect the supervisory treatment. This would result in a lesser likelihood of sanctioned banks with higher market power, even though they have a lower performance and asset quality.

An alternative argument supports this view. On the one hand, Zingales (2017) shows that banks engaging in more lobbying activities are more likely to have higher market power. On the other hand, Lambert (2019), using a sample of US commercial and saving banks during the period starting from 2007 to 2012, finds that banks engaging in more lobbying activities are less likely to receive a sanction even if they are not well-performing because they might interfere with the supervisory process and justify this evidence considering the regulatory capture theory (Stigler, 1971). Bridging both arguments, we may speculate that banks with higher market power are less likely to obtain an enforcement action.

Based on these two arguments, we postulate that banks with higher market power are less likely to receive enforcement actions from supervisory authorities, even if they are not well-performing.

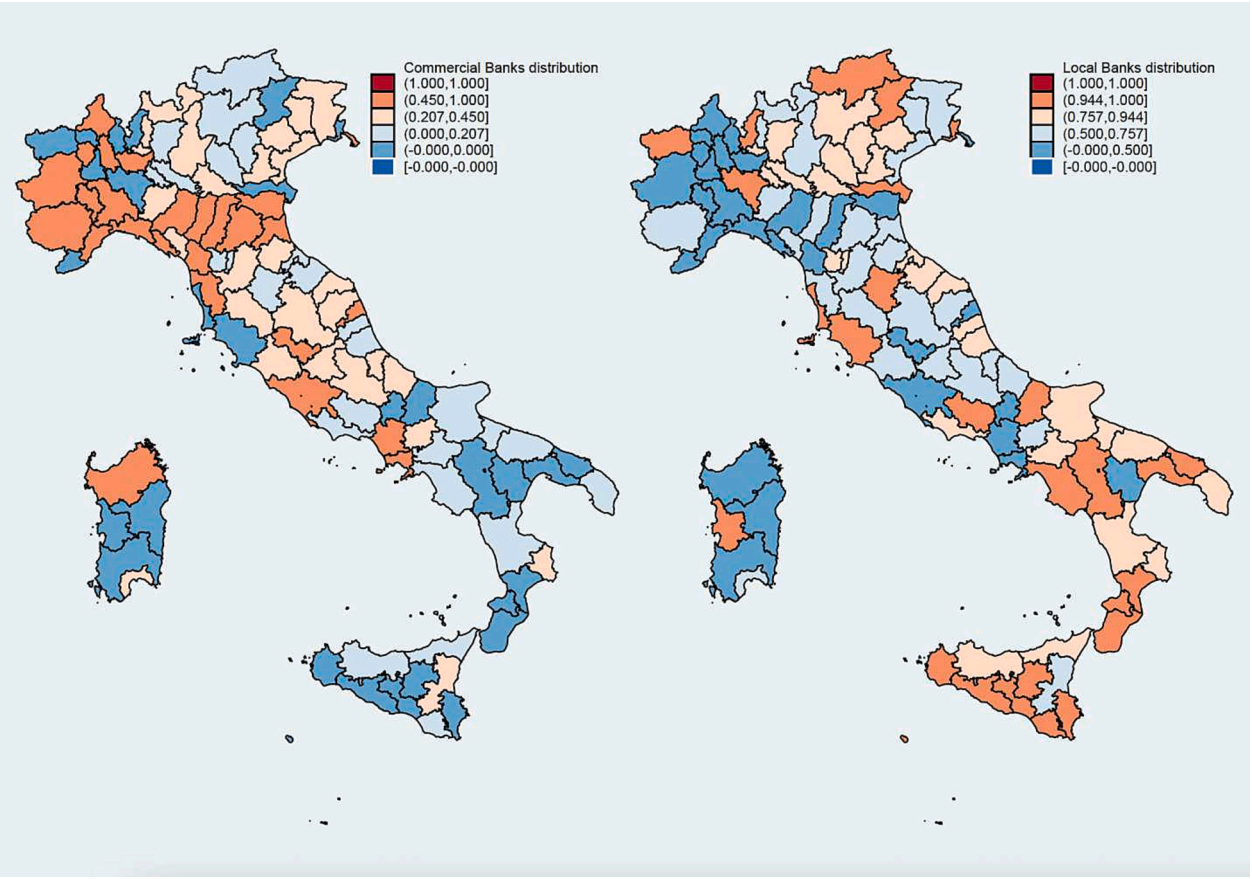

Fig. 1. This figure shows the presence of commercial and local banks in the national banking system.

H1A. Banks with higher market power are less likely to attract enforcement actions even though they are riskier than other banks.

Nevertheless, a counterargument might be driving the nexus between bank market power and the probability of sanctions from public authorities. For instance, according to the efficient-*structure hypothesis*, firms with highly skilled management and better production technology may benefit from economies of scale and lower costs (Berger, 1995) and gain higher market power. If banks with market power have a superior screening and monitoring ability, they spot less risky borrowers better than others, funding their projects and obtaining higher revenues. This may lead to higher profits, even if this might come at the cost of a higher market concentration (Demsetz, 1973; Peltzman, 1976). Concurrently, banks with a more efficient market screening may show lower levels of risk-taking. Indeed, Berger et al. (2009) and, more recently, Danisman and Demirel (2019) document that banks with higher market power, proxied by the Lerner index, are associated with lower *Z*-scores, suggesting that higher market power in banking decreases risky behavior, where capital requirements work effectively in reducing bank risk (Danisman & Demirel, 2019). These arguments suggest that banks with higher market power are less likely to engage in misconduct and sacrifice their revenue streams. This would lead to the fact that supervisors might be less likely to target these banks. There is also an alternative argument supporting the view. For instance, Keeley (1990) indicates that banks with higher market power will likely hold more capital buffers than others. Since more capitalized are less likely to take on more risks and misconduct, in the spirit of Calem & Rob (1999), this would lead to a lower probability for these banks to receive enforcement actions.

These two alternative views might suggest that the bank's market power does not necessarily leads to a higher chance for bank misconduct, but quite the contrary: banks with higher market power may benefit from cost advantages related to their productive efficiency, improved technology, and better asset quality. These arguments lead us to the following alternative hypothesis.

H1B. Banks with higher market power are less likely to attract enforcement actions because they outperform other banks.

3. Data and variables

To test our hypotheses, we collect data from several data sources. First, we mainly hand-collect information on supervisory enforcement actions for the population of Italian banks from monthly supervision bulletins from the Bank of Italy between 2006 and 2018 (Bank of Italy, 2006–2018). Second, we bridge this dataset with one of the European Central Bank to cover all the potential sources of sanctions imposition.[5,6] We collect annual information on bank-specific variables from the Italian Banking Association database (ABI Banking Data). Last, we retrieve regional macroeconomic conditions and information on suspicious transactions at the NUTS 2 level from Eurostat and Bank of Italy, respectively.

The final sample comprises a unique dataset of 696 Italian commercial and cooperative banks and 7375 bank-year entries (Figure 1)[7].

[5] For the observation period (2014–2018), there was a single sanction imposed on Banca Popolare di Vicenza.

[6] Since November 2014, the European Central Bank has had the role of supervision on significant institutions (in our dataset, 12 banking holding companies).

[7] Since we use the lagged variables of the controls and variables of interest, our firm-year observations drop to 6496.

3.1. Bank market power measure

Among several measures of bank market power, we use the Lerner index for two reasons. First, unlike Boone Index and H-statistic, it captures the bank pricing power and the extent to which a bank can increase the marginal price compared to the marginal cost, coherent with previous studies (Beck et al., 2013; Carbó, Humphrey, Maudos, & Molyneux, 2009; Clark, Mare, & Radić, 2018; Fiordelisi & Mare, 2014; Leroy & Lucotte, 2017). Second, the H-statistic, Boone Index, and Herfindahl Hirschman Index (HHI)[8] are more suitable for country- and region-level studies rather than bank-level ones, while the Lerner index itself fits better to a single-country setting (Carbó et al., 2009; Aghion, Bloom, Blundell, Griffith, & Howitt, 1996; Dell'Ariccia, 2001), such as the Italian banking sector.

For the estimation of the Lerner index, we follow Anginer et al. (2014) for our baseline regressions (*Lerner1*). Notably, we use a three-step approach, where we first estimate the log cost function according to the following formula[9]:

$$\begin{aligned}\text{Ln}\,(C_{it}) =& \alpha + \beta_1 \times ln(Q_{it}) + \beta_2 \times (ln(Q_{it}))^2 + \beta_3 \times ln(W_{1,it}) + \beta_4 \times ln(W_{2,it}) \\ &+ \beta_5 \times ln(W_{3,it}) + \beta_6 \times ln(Q_{it}) \times ln(W_{1,it}) + \beta_7 \times ln(Q_{it}) \times ln(W_{2,it}) \\ &+ \beta_8 \times ln(Q_{it}) \times ln(W_{3,it}) + \beta_9 \times (ln(W_{1,it}))^2 + \beta_{10} \times (ln(W_{2,it}))^2 \\ &+ \beta_{11} \times (ln(W_{3,it}))^2 + \beta_{12} \times ln(W_{1,it}) \times ln(W_{2,it}) + \beta_{13} \times ln(W_{1,it}) \\ &\times ln(W_{3,it}) + \beta_{14} \times ln(W_{2,it}) \times ln(W_{3,it}) + \gamma \times \text{Year Dummies} \\ &+ \delta \times \text{Bank Institutional Form} + \varepsilon_{it}\end{aligned} \tag{1}$$

where, W_1, W_2, and W_3 are three price inputs related to the bank funding costs (ratio between interest expenses and total assets), labor costs (ratio between personnel costs and total assets), and costs associated with the bank fixed assets (ratio between the depreciation of fixed assets and total assets), while Q_{it} represents the bank output, expressed in terms of the total bank assets (Anginer et al., 2014).

Then, we use the coefficients obtained from Eq. (1) to calculate the marginal cost function (MC_{it}) for each bank i in year t:

$$\begin{aligned}MC_{it} &= \partial C_{it}/\partial Q_{it} \\ &= C_{it}/Q_{it} \times [\beta_1 + 2 \times \beta_2 \times log(Q_{it}) + \beta_6 \times log(W_{1,it}) + \beta_7 \times log(W_{2,it}) \\ &\quad + \beta_8 \times log(W_{2,it})]\end{aligned} \tag{2}$$

Then, we may finally estimate our Lerner index (*Lerner1*) according to Eq. (3):

$$\text{Lerner1} = (P_{it} - MC_{it})/P_{it} \tag{3}$$

where P_{it} is the ratio of total revenues (interest, fees, trading income, and other operating income) to total assets. Further, we also employ alternative measures for the bank's market power in the robustness tests.[10]

3.2. Bank-specific and other macroeconomic variables

In our specifications, we control for bank-specific financial and management conditions and regional factors affecting bank activities and the probability of incurring sanctions. First, following Lambert (2019), we include factors referred to the bank capital adequacy, asset quality, management, earnings, liquidity, and bank sensitivity to the market risk. These factors can affect the probability that the bank might receive enforcement actions from supervisors. Banks with weak capital and liquidity conditions, worse asset quality, and poorly performing are more likely to be under public scrutiny and attract enforcement actions and public interventions (Wang, Meric, Liu, & Meric, 2009; Bayazitova & Shivdasani, 2012; Gropp, Hakenes, & Schnabel, 2011; Beltratti & Stulz, 2012). More specifically, as a proxy for bank capital adequacy, we consider *TIER1*, obtained as the ratio between Tier 1 capital and bank risk-weighted assets. Second, we account for the bank asset quality using the non-performing ratio (*NPL*), measured by the ratio of gross non-performing loans to total assets. We also include the before-tax net-income ratio (ROA) to allow for bank profitability, and then we consider the ratio of liquid assets to total assets (*LIQ*).

Finally, we include two bank-specific features related to the bank business model. We first account for the bank volume of financial intermediation (Dam & Koetter, 2012), obtained as the ratio between customer loans and total assets (TLTA). Duchin and Sosyura (2014) show that banks engaging in more lending activities are unlikely to shift assets toward riskier activities, such as investing in risky securities. Second, we also consider the ratio of customer deposits to total assets (*DEP*). The rationale behind such an inclusion is that banks with a higher reliance on deposits benefit from a more stable funding source and are less likely to be less risky (Cardillo et al., 2021).

To control for the macroeconomic conditions at the regional level, we include the province's gross domestic product growth (GDP), where the bank has its headquarters. We also consider a proxy for white collar crimes (STR), calculated as the ratio between suspicious transaction communications to the supervisory authority at the NUTS2 level and the population at the NUTS2 level where the bank has its headquarters. The idea is to account for regional crime factors that may lead our estimations and confound the effects of the enforcement actions on the outcome variable.

We winsorize all the accounting variables at the 1% and 99% levels while we report the analytical description of all the variables used in Table 1.

3.3. Descriptive statistics

Table 2 reports the number of sanctioned banks (Panel A and Panel B) in Italy and the descriptive statistics for the main variables used. Our sample includes 7374 bank-year observations – 4952 cooperative banks (70.34%) and 2088 commercial banks (29,66%) related to an overall sample of 696 Italian banks. We report the distribution of frequencies both for commercial and cooperative banks over the sample period. Our results suggest that 240 out of 696 banks incurred sanctions from public authorities during the period under investigation, entailing targeted firms' bearing around 34% of our sample, which is not negligible. Further, they indicate that cooperative banks are more likely to be sanctioned than commercial banks and posit that most sanctions occurred from 2010 to 2014, while there is a decreasing trend in the last years of our sample (2015–2018). For completeness, we also report the frequencies by type of sanction referred to board members (CEOs, board members, and board of statutory auditors) and the corresponding fine monetary amount (CEO M. €; BOARD M. € and SBOARD M. €).

Table 3 shows the mean, quartile values, median, standard deviation, and range for all variables used in our analyses.

[8] US-based studies use the HHI index at bank-level based on the branch data related to deposits and loans. However, this information is not publicly available for the Italian banking system (Cetorelli & Strahan, 2006).

[9] Following Anginer et al. (2014), the cost function contemplates three price inputs (W_1, the cost of funding defined as the ratio between interest expenses and total assets; W_2, the labor cost, defined as the ratio between personnel costs and total assets; and W_3, the cost of fixed assets, defined as the ratio between the depreciation of fixed assets and total assets), and a single output (Q_{it} as total assets). C_{it} is the total cost equal to the sum of interest expenses, commissions, trading costs, personnel costs, administrative costs, and other operating costs. In the estimation procedure, we also account for the institutional form and year fixed effects for the constrained regression. Then, we also stipulate the five usual restrictions according to the following mathematical notation. $\beta_3 + \beta_4 + \beta_5 = 1$; $\beta_6 + \beta_7 + \beta_8 = 0$; $\beta_9 + \beta_{12} + \beta_{13} = 0$; $\beta_{10} + \beta_{12} + \beta_{14} = 0$; $\beta_{11} + \beta_{13} + \beta_{14} = 0$.

[10] See the appendix for a more detailed description and dynamics of several measures of bank market power employed in this study.

Table 1
Variable descriptions.

Variables	Symbol	Description
Supervisory variables		
Sanction	S	A dummy variable that takes a value of 1 if a bank received an enforcement action with reference to deficiencies in the organization and internal controls; the credit risk process; impaired loans and loan loss provisions not reported to the supervisory authority; the violation of disclosure regulations to customers or a lack of reporting; and communication with the supervisory authority regarding something other than credit risk in the year, and zero otherwise
Severity	LnS	Ln (1 + Total supervisory sanction amount)
Severity per person	Ln2S	Ln (1+ Total supervisory sanction amount/Number of people sanctioned)
Bank competition variables		
Lerner 1	Lerner1	(P-MC)/P, where P is the price and MC is the marginal cost. We follow Anginer et al. (2014)'s construction methodology (single-output Lerner)
Lerner 2	Lerner2	(P-MC)/P, where P is the price and MC is the marginal cost (single-output Lerner – stochastic frontier analysis)
Lerner 3	Lerner3	(P-MC)/P, where P is the price and MC is the marginal cost (two-output Lerner - stochastic frontier analysis)
Adj. Lerner	Adj. Lerner	Adjusted Lerner (two-output Lerner - stochastic frontier analysis according to Koetter et al., 2012).
Bank-specific control variables		
Liquidity ratio	LIQ	Cash/Total assets
Non-performing loans ratio	NPL	Non-performing loans/Total assets
Tier 1 ratio	TIER1	Tier 1/Risk-weighted assets
Total loans ratio	TLTA	Customer loans/Total assets
Total deposit ratio	DEP	Customer deposits/Total assets
Return on assets	ROA	Before-tax profits/Total assets
Size	SIZE	Natural logarithm of total assets
Indicator if among largest 10% of banks	TOP	Indicator equal to 1 if the bank is among the 10% largest banks in terms of total assets each year and zero otherwise
Asset market share	MS	Share of each bank's total assets with reference to aggregate assets in the region in which the bank is headquartered (NUTS2) in each year
Security	SEC	Security/Total assets
Loan income share	INC	Interest and fee income on customer loans/Operating income
Commercial bank	CMB	A dummy variable taking a value of 1 if the bank is a commercial bank and zero otherwise
Cooperative bank	COB	A dummy variable taking a value of 1 if the bank is a cooperative bank and zero otherwise
Instrumental variable		
Overhead ratio	Overhead	Overheads (or general expenses)/ Intermediation margin
Disaster	Disaster	A dummy variable taking value of 1 if in the province (NUTS3) where the bank has the headquarter occur a natural disaster and zero otherwise
Female % of Supervisor's Examiners	FSE	A percentage of female examiners of ultimate supervisory unit responsible for supervisory inspection (Bank of Italy's branches, Bank of Italy – Rome Central Unit; Frankfurt SSM).
Macro variables		
GDP	GDP	GDP growth in the province (NUTS3) where the bank is headquartered
Suspicious transactions	STR	Suspicious transaction communications at the NUTS2 level/Population NUTS level in the same region (NUTS2) where the bank is headquartered
Household income	HI	Variation in household income in the province (NUTS3) where the bank is headquartered
Unemployment rate	UR	Total unemployed, as a percentage of civil labor force in the province (NUTS 3) where the bank is headquartered
High school degree	HSD	Ratio of the proportion of high school graduates to the population in the region (NUTS 2) where the bank is headquartered

This table reports the variables' description.

4. Empirical strategy

We adopt an econometric approach in line with the previous work of Lambert (2019), where the dependent variable is a dummy that takes of one if the bank *i* received at least an enforcement action concerning organizational (deficiencies in the organization and internal controls; the credit risk and other operational processes) and disclosure failures (impaired loans and loan loss provisions not reported to the supervisory authority, the violation of disclosure regulations to customers or a lack of reporting, and communication with the supervisory authority regarding something other than credit risk) in the year *t*, and zero otherwise.

The variable of our interest is the Lerner index, as a proxy for the bank market power. We also include a set of bank-specific and macroeconomic control variables described in Section 3.2. Thus, we employ the following IV-Probit specification (4):

$$\text{Prob}\ (Y_{it} \mid \mathbf{X}_{it}) = F\ (\alpha + \beta\ \mathbf{X}_{it}) \tag{4}$$

where Y is the dependent variable, X_{it} is a vector of variables, including our interest (Lerner index) and macroeconomic and bank-specific factors. Furthermore, we lag vector X_i by one year to smooth simultaneity concerns. We also include year and institutional fixed effects to account for the type of business model and year trends. Finally, we cluster standard error at the bank level to account for serial correlation within each bank.

The rationale for using an IV probit estimation is related to the fact that sanctions have a behavioral component: a decrease in safety and an increase in unsound management may lead to more bank failures and competition among surviving banks may decrease as banks adjust their behavior (Goetz, 2018; Koetter, Kolari, & Spierdijk, 2012). Past studies use a measure of bank efficiency as an instrumental variable (Beck et al., 2013; Leroy & Lucotte, 2017). In line with previous studies, in our empirical framework, we rely on the overhead ratio (for simplicity, *Overhead*). The rationale for this instrument is that the being overhead ratio a measure of business expenses not directly related to production, they are highly and positively correlated with the marginal costs (*relevance condition*) but uncorrelated with the potential bank misconduct (*exclusion restriction*) (Berger & DeYoung, 1997; DeYoung, 1998). When supervisory authorities impose sanctions on banks, the main explanation concerns organizational and internal control failures. Our view also finds robust empirical support. First, through the correlation matrix analysis, we observe the level of correlation between the Lerner index and the overhead ratio is relatively high. In contrast, the correlation between variable *S* and the Overhead is very low ($\rho = 0.03$, $p < 5\%$), as reported in Table 4.[11]

[11] Being *S* a binary variable, we also calculated point-biserial correlation between *S* and our IV. The coefficient is equal to −0.0033, confirming a low and non-statistically significant correlation between the IV and the dependent variable.

Table 2
Descriptive statistics.

Panel A – Enforcement actions, commercial banks (2006–2018)							
Year	Number of sanctions per year	No. CEO	No. BOARD	No. SBOARD	CEO (M. Euros)	BOARD (M. €)	SBOARD (M €)
2006	1	1	6	3	0.01	0.05	0.02
2007	9	14	117	23	0.71	4.23	0.81
2008	7	10	90	19	0.45	2.36	0.48
2009	8	7	62	24	0.12	0.97	0.35
2010	11	13	95	23	0.27	1.36	0.25
2011	14	16	144	39	0.25	1.75	0.46
2012	6	5	46	14	0.12	0.72	0.20
2013	8	8	81	23	0.81	5.47	1.36
2014	15	11	97	43	0.77	6.34	1.54
2015	1	1	0	0	0.01	0.00	0.00
2016	2	2	28	6	0.12	1.48	0.32
2017	2	0	19	3	0.00	0.63	0.07
2018	2	0	0	0	0.45	0.00	0.00
Total	86	88	785	220	4.09	25.35	5.86

Panel B – Enforcement action Cooperative Banks (2006–2018)							
Year	Number of sanctions per year	No. CEO	No. BOARD	No. SBOARD	CEO (M. €)	BOARD (M. €)	SBOARD (M €)
2006	18	19	167	51	0.37	1.95	0.44
2007	34	36	302	77	0.28	2.30	0.42
2008	18	19	178	53	0.13	1.35	0.34
2009	19	17	202	54	0.24	2.55	0.58
2010	30	32	248	70	0.43	2.27	0.59
2011	47	50	456	120	0.69	4.44	1.09
2012	21	22	202	50	0.28	1.63	0.38
2013	23	23	235	63	0.39	2.68	0.80
2014	16	18	151	45	0.36	2.20	0.65
2015	8	9	69	20	0.18	1.23	0.36
2016	5	3	49	15	0.10	0.92	0.27
2017	4	1	7	3	0.14	0.08	0.03
2018	6	2	11	3	0.78	0.24	0.07
Total	249	251	2277	624	4.37	23.86	6.02

Panel C – Sanctioned Banks vs. Non-sanctioned Banks		
Sanctioned Banks	240	34%
Non-sanctioned Banks	456	66%
Total Banks	696	100%

Panel A and Panel B presents the frequencies for supervisory enforcement actions. Panel C provides the descriptive statistics. We winsorized variables at 1% and 99%.

Second, we run a *t*-test showing no significant difference in the overhead ratios between sanctioned and non-sanctioned banks.[12] Third, we run a simple regression setup, including the overhead ratio among the regressors for the bank's probability of receiving a sanction. We do not find a statistical significance for our first instrumental variable, which leads us to believe that it is exogenous to the sanctions imposed by the supervisory authority. We report these findings in the Appendix (B-C).

The second instrument we employ is a dummy variable equal to one if we are in the presence of natural disasters in the province (NUTS 3), where the bank has its headquarters and zero otherwise. The underlying idea is that they are exogenous to the bank behavior, and their occurrence affects bank lending activities randomly. Furthermore, it is unlikely that the bank's probability of being sanctioned by supervisory authorities is strictly related to the occurrence of a natural disaster. To explain the rationale of such an instrument, we rely on the previous work of Duqi, McGowan, Onali, and Torluccio (2021), according to which natural disasters may hinder or increase the bank's market power. On the one hand, natural disasters deteriorating the collateral market value (Gan, 2007) may help banks increase their market power by potentially increasing their power in price setting on their borrowers (i.e., banks may cash out higher interest rates on their borrowers). This might affect the quality and pricing of financial services and credit rationing phenomena (Carbó et al., 2009). This view predicts a positive relationship between the bank market power and natural disasters. On the other hand, natural disasters may turn upside down the structure and dynamics of the banking sector, leading to higher credit availability, where banks charge lower interest rates on their borrowers – both corporates and households – increasing the market competition and reducing the bank market power (Cetorelli & Strahan, 2006; Syverson, 2019) consequently.

Thus, we hand-collect information on natural disasters at the NUTS3 level from the Civil Protection Department, the National Institute of Statistics, and different ad-hoc legislative measures. To check the validity of our reasoning, we also run a *t*-test analysis to check the existence of correlations between the dependent variable and our proposed instrument. The results reported in Table 5 show no statistically significant difference in the number of disasters between sanctioned and non-sanctioned banks. Furthermore, we check the validity of our second instrument through a simple probit regression model, as reported in Columns 2 and 3 of the table presented in Appendix B.

[12] For clarity, we also report the *t*-tests for all the variables used in our main analysis.

Table 3
Descriptive statistics.

Variable	N	Mean	SD	P25	Median	P75	Min	Max
S	7375	0.045	0.208	0.000	0.000	0.000	0.000	1.000
lnS	7375	0.405	1.890	0.000	0.000	0.000	0.000	12.660
ln2S	7373	0.528	2.424	0.000	0.000	0.000	0.000	15.493
Lerner1	7355	0.152	0.149	0.100	0.172	0.236	−0.607	0.422
Lerner2	7374	0.124	0.265	0.044	0.172	0.274	−1.078	0.608
Lerner3	7373	0.219	0.255	0.151	0.262	0.345	−0.969	0.712
Adj. Lerner	7373	0.159	0.544	0.109	0.305	0.455	−2.242	0.831
TIER1	7041	0.183	0.135	0.117	0.151	0.203	0.045	1.159
ROA	7375	−0.001	0.003	−0.002	−0.001	0.000	−0.010	0.014
NPL	7375	0.077	0.058	0.036	0.065	0.106	0.000	0.297
LIQ	7357	0.014	0.015	0.008	0.011	0.016	0.000	0.131
TLTA	7375	0.626	0.174	0.533	0.648	0.751	0.050	0.942
DEP	7375	0.523	0.163	0.434	0.520	0.631	0.001	0.856
SIZE	7375	13.325	1.693	12.127	13.095	14.236	9.215	20.086
INC	7373	0.434	0.238	0.286	0.349	0.461	0.107	0.991
SEC	7374	0.263	0.216	0.125	0.220	0.334	0.000	0.971
TOP	7375	0.101	0.301	0.000	0.000	0.000	0.000	1.000
MS	7375	0.034	0.108	0.001	0.004	0.014	0.000	1.000
Overhead	7374	0.693	0.663	0.265	0.577	0.752	0.194	2.642
Disaster	7375	0.026	0.160	0.000	0.000	0.000	0.000	1.000
FSE	6323	0.293	0.172	0.148	0.250	0.417	0.000	1.000
STR	7374	0.082	0.055	0.033	0.077	0.121	0.000	0.254
GDP	7374	0.015	0.031	−0.004	0.017	0.034	−0.205	0.242
UR	7332	8.375	5.180	4.470	6.946	10.421	1.873	31.456
HI	6762	0.002	0.026	−0.016	0.006	0.020	−0.076	0.062
HSD	7374	22.601	5.144	19.300	22.300	25.900	12.600	36.300

The table provides the descriptive statistics. We winsorized variables at 1% and 99%.

Table 4
Correlation matrix.

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	S	1.00												
2	Lerner1	**−0.04**	1.00											
3	Lerner2	**−0.06**	**0.38**	1.00										
4	Lerner3	**−0.06**	**0.40**	**0.95**	1.00									
5	Adj.Lerner	**−0.06**	**0.23**	**0.69**	**0.76**	1.00								
6	TIER1	**−0.05**	**−0.24**	**−0.09**	**−0.06**	0.02	1.00							
7	ROA	**0.06**	**−0.44**	**−0.57**	**−0.57**	**−0.43**	**0.05**	1.00						
8	NPL1	**0.11**	**0.04**	**−0.45**	**−0.45**	**−0.42**	**−0.20**	**0.39**	1.00					
9	LIQ	−0.00	**−0.09**	0.01	**−0.03**	**−0.08**	**0.03**	−0.01	0.01	1.00				
10	TLTA	0.01	**0.18**	**0.04**	**0.09**	**0.17**	**−0.41**	−0.02	**0.25**	−0.02	1.00			
11	DEP	**−0.02**	**−0.09**	**0.14**	**0.15**	−0.01	0.00	−0.02	−0.02	**−0.05**	**−0.14**	1.00		
12	SIZE	0.00	**0.27**	**0.23**	**0.07**	**−0.06**	**−0.27**	**−0.04**	**0.07**	−0.01	**0.11**	**−0.26**	1.00	
13	Overhead	**0.03**	**−0.86**	**−0.35**	**−0.36**	**−0.22**	**0.25**	**0.44**	−0.02	**0.06**	**−0.14**	**0.14**	**−0.25**	1.00

This table presents the correlation matrix for the main variables used in our tests. We report statistically significant coefficients (at the 5% or better) in bold font.

5. Results

5.1. Preliminary inspection of the bank market power

In this section, we explore univariately the banks' characteristics considering their bank market power. Table 6 presents the findings of the t-test analysis based on the assumption of unequal variances[13] between banks with higher and lower market power.

Unsurprisingly, larger banks (*SIZE*) have higher market power than other banks. This result also corroborates the too-big-to-fail argumentation (Dam & Koetter, 2012), according to which larger banks benefitting from significant market power than other banks might benefit from preferential treatment from authorities. Second, our findings highlight that banks with a higher market power show a larger volume of lending activities (*TLTA*), suggesting that these banks have a larger market share in the loan market than other banks. However, they are less likely to rely on deposits (*DEP*) for funding. This latter result aligns with the view that these financial institutions bank on a less stable funding source to finance their lending (Cardillo et al., 2021).Third, although both types of banks (with higher/lower market power) show a negative performance trend during our sample periods, the means show

Table 5
Difference in means for the instrument variables.

	Overhead	Disaster
Mean of non-sanctioned banks	0.7992	0.0266
Mean of sanctioned banks	0.7092	0.0209
SD of non-sanctioned banks	5.8917	0.1608
SD of sanctioned banks	0.4656	0.1432
Diff in mean	0.0900	0.0057
T	1.2054	0.7033

This table presents *t*-tests for the instrumental variables used in our IV regression setup. ***, **, and * indicates the statistical significance at 1%, 5%, and 10%.

[13] We also check for this assumption, by analysing the differences in standard deviation between both groups. Our results, reported in the Appendix D, suggest this is the case. Both groups of banks have their own centroids and distributions. This test is also useful to validate the inclusion of control variables since it helps to explain the extant heterogeneity between banks with a higher market power and lower one.

Table 6
Preliminary inspections of the bank market power.

	SIZE	TLTA	DEP	TIER1	ROA	NPL	LIQ
No. of banks' obs. With Low *Lerner1*	3677	3677	3677	3493	3677	3677	3672
No. of banks' obs. With High *Lerner1*	3678	3678	3678	3539	3678	3678	3665
Mean of Low Lerner1	12.9293	0.6231	0.5447	0.1851	−0.0004	0.0771	0.0143
Mean of High Lerner1	13.7179	0.6300	0.5026	0.1813	−0.0019	0.0776	0.0137
Difference in mean	−0.7887	−0.0068	0.0421	0.0038	0.0015	−0.0005	0.0006
p-value	0.0000	0.0910	0.0000	0.2409	0.0000	0.7141	0.0797

The table reports the t-tests for the difference in means related to the bank-specific characteristics. We define the two groups based on the median of the bank Lerner index sample distribution (*Low/High Lerner 1*). Size is the log total bank assets. *TLTA* is the ratio between total loans and total assets. *DEP* is total deposits to total assets. *TIER1* is the bank Tier 1 capital to total assets. *ROA* stands for bank return on assets. NPL is the ratio between bank non-performing loans to total assets. *LIQ* is the ratio of liquid assets to total assets. We report the number of banks, means of both groups, difference in means, and the related *p*-values.

Table 7
Main results: Bank market power and supervisory enforcement actions.

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	S	S	S	lnS	ln2S
L.Lerner1	−0.0741***	−0.0823**	−0.0957***	−0.6633**	−0.9036**
	(0.0240)	(0.0345)	(0.0262)	(0.3326)	(0.4266)
L.TIER1	−0.1649***	−0.0942***	−0.1673***	−0.8645***	−1.1003***
	(0.0414)	(0.0170)	(0.0392)	(0.1527)	(0.1967)
L.ROA	1.5004	2.2734	1.3772	27.8843*	33.0389
	(1.0751)	(1.6523)	(1.0969)	(15.7330)	(20.5674)
L.NPL	0.5519***	0.5703***	0.5593***	4.9649***	6.7426***
	(0.0615)	(0.0715)	(0.0586)	(0.6551)	(0.8519)
L.LIQ	−0.0959	−0.1341	−0.0974	−0.888	−1.5145
	(0.2231)	(0.1498)	(0.2165)	(1.4913)	(1.7154)
L.TLTA	−0.1076***	−0.0982***	−0.1102***	−0.8866***	−1.1459***
	(0.0202)	(0.0194)	(0.0193)	(0.1814)	(0.2285)
L.DEP	−0.0063	−0.0073	−0.0106	−0.0002	−0.0369
	(0.0180)	(0.0173)	(0.0179)	(0.1595)	(0.2035)
L.SIZE	0.0069***	0.0054**	0.0070***	0.0621**	0.0688**
	(0.0024)	(0.0026)	(0.0023)	(0.0254)	(0.0314)
L.STR	0.0209	−0.0034	0.0217	0.0274	−0.1152
	(0.0974)	(0.0825)	(0.0970)	(0.7463)	(0.9791)
L.GDP	−0.1354	−0.105	−0.1413	−0.7987	−1.1039
	(0.1012)	(0.1127)	(0.1048)	(1.0483)	(1.3199)
			First Stage IV		
Overhead		−0.4217***	−0.4217***	−0.4217***	−0.4217***
		(0.0144)	(0.0144)	(0.0144)	(0.0144)
Disaster		0.0134*	0.0134*	0.0134*	0.0134*
		(0.0081)	(0.0081)	(0.0081)	(0.0081)
Intercept	YES	YES	YES	YES	YES
N. Obs	6496	6496	6496	6496	6494
Year FE	YES	YES	YES	YES	YES
Institutional Form FE	YES	YES	YES	YES	YES
Estimation Method	Probit	2SLS	IV-Probit	2SLS	2SLS
Under-identification		0.0000		0.0000	0.0000
Weak identification		523.3263		523.3263	523.0903
Hansen J-statistic (p-value)		0.8493		0.8314	0.7907
Wald test of $\rho = 0$ (p-value)			0.2456		

The table reports the results on the relationship between bank market power and supervisory enforcement actions (2006–2018). We employ Probit (Column 1), 2SLS (Columns 2, 4, and 5), and IV probit regressions (Column 3). In Columns 1 and 3 we report the average marginal effects for the sake of the magnitude interpretation of our coefficients. The first stage includes all explanatory variables in the second stage. Robust standard errors are clustered at bank-level and are reported in parentheses. ***, **, * indicate statistical significance at 1%, 5%, and 10% respectively.

that banks with higher market power have worse profitability than banks with lower market power. Finally, our evidence advocates that banks with a higher market power tend to be less liquid, as suggested by the mean value of *LIQ* (0.014 vs. 0.013). When considering liquidity, although the t-test is statistically significant, both groups show similar liquidity from an economic point of view.

Our preliminary evidence suggests that banks with a higher market power tend to be less profitable and less reliant on customer deposits than other banks, even if they have larger lending volumes.

5.2. Main results: Bank market power and supervisory enforcement actions

We show our main results in Table 7 and report the average marginal effect of probit and IV-Probit regressions.

Lerner1 enters the regression with a statistically significant and negative coefficient ($\beta = -0.0741$, $p < 1\%$), suggesting that banks with higher market power are less likely to receive an enforcement action from regulators. Regarding the economic magnitude, as market power increases by one unit, the probability of obtaining a sanction decreases by 7.41%. In Column (2), although our dependent variable is dichotomous, we also report estimations from two-stage least squares (2SLS) to allow for endogeneity concerns and verify the consistency of our

Table 8
Alternative Lerner measures.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	S	S	S	S	S	S
L.Lerner2	−0.2032***	−0.1775**				
	(0.0720)	(0.0844)				
L.Lerner3			−0.1817***	−0.1576**		
			(0.0548)	(0.0724)		
L.Adj. Lerner					−0.2018**	−0.1767*
					(0.0972)	(0.0997)
L.TIER1	−0.1738***	−0.1040***	−0.1617***	−0.0831***	−0.1566***	−0.051
	(0.0400)	(0.0181)	(0.0381)	(0.0183)	(0.0396)	(0.0360)
L.ROA	0.0463	−2.6694	0.1797	−1.9033	0.3767	−5.9467
	(1.1642)	(3.7183)	(1.2073)	(3.3027)	(1.1731)	(6.3617)
L.NPL1	0.5005***	0.3177**	0.5069***	0.3431***	0.5073***	−0.0506
	(0.0658)	(0.1244)	(0.0620)	(0.1139)	(0.0650)	(0.3446)
L.LIQ	−0.0569	−0.0023	−0.0844	−0.107	−0.1511	−0.6209*
	(0.2039)	(0.1576)	(0.1984)	(0.1480)	(0.2139)	(0.3443)
L.TLTA	−0.1151***	−0.0956***	−0.1100***	−0.0834***	−0.1051***	−0.0076
	(0.0197)	(0.0196)	(0.0189)	(0.0211)	(0.0199)	(0.0594)
L.DEP	0.0015	0.0546	−0.0034	0.0322	−0.0195	−0.0274
	(0.0194)	(0.0348)	(0.0186)	(0.0256)	(0.0179)	(0.0264)
L.SIZE	0.0084***	0.0136**	0.0068***	0.0070**	0.0060***	0.0022
	(0.0025)	(0.0059)	(0.0023)	(0.0032)	(0.0023)	(0.0038)
L.STR	0.004	−0.078	0.0047	−0.0784	0.0012	−0.2928
	(0.0975)	(0.1004)	(0.0980)	(0.0994)	(0.0980)	(0.2050)
L.GDP	−0.1302	−0.0533	−0.1296	−0.0504	−0.1261	0.0727
	(0.0992)	(0.1168)	(0.1041)	(0.1168)	(0.0995)	(0.1572)
			First Stage IV			
Overhead	−0.1938***	−0.1937***	−0.2182***	−0.2182***	−0.1930**	−0.1910**
	(0.0316)	(0.0317)	(0.0251)	(0.0297)	(0.0805)	(0.0808)
Disaster	0.0378***	0.0383***	0.0423***	0.0423***	0.0458*	0.0504*
	(0.0115)	(0.0113)	(0.0103)	(0.0100)	(0.0283)	(0.0290)
Intercept	YES	YES	YES	YES	YES	YES
N. Obs	6496	6496	6495	6495	6495	6495
Year FE	YES	YES	YES	YES	YES	YES
Bank specialization FE	YES	YES	YES	YES	YES	YES
Estimation Method	IV-Probit	2SLS	IV-Probit	2SLS	IV-Probit	2SLS
Under-identification		0.0000		0.0000		0.0000
Weak identification		23.5425		35.1676		6.0152
Hansen J-statistic (p-value)		0.8701		0.8744		0.7784
Wald test of ρ = 0 (p-value)	0.0189		0.0109		0.0199	

The table reports the results for alternative measures of bank market power (2006–2018). In Columns 1, 3 and 5 we report the average marginal effects for the sake of the magnitude interpretation of our coefficients.Robust standard errors are clustered at bank-level and are reported in parentheses. ***, **, * indicate statistical significance at 1%, 5%, and 10% respectively.

instrumental variables. The results remain unaltered, while the high significance of the under-identification test and the Kleibergen-Paap Wald F-statistic value provide some evidence of the instrument's validity. Furthermore, the Hansen test is not statistically significant and excludes over-identification problems.

In Column 3, we report the IV-probit estimates.[14] Again, our findings re-iterate those reported in Columns 1 and 2, according to which as a bank's market power increases, the probability of receiving a sanction from the supervisory authority decreases. In Column (4), we account for the severity of the enforcement action, measured as the fine amount imposed by the authorities. This is also coherent with Cotugno, D'Amato, Gallo, and Stefanelli (2021). For this purpose, we first rely on a log transformation of the sanction amount and then run a 2SLS estimation. Our results suggest that the sanction severity decreases when the bank's market power increases. Finally, the results hold when we replace the regional and continuous factors with the regional fixed effects. These findings are in Appendix E.

We may conclude that banks with higher market power are less likely to attract enforcement actions. This result is robust when controlling for enforcement actions' behavioral component (endogeneity) and severity (the fine amount imposed by the authorities).

6. Robustness checks and extensions

6.1. Robustness checks: other measures of bank market power

One may argue that our results are sensitive to the chosen measure of bank market power. For this reason, we first calculate the Lerner index following the intermediation approach based on the stochastic frontier analysis to estimate the single-output cost function (Beck et al., 2013; Berger et al., 2009; Coccorese, 2014). Specifically, we use three inputs: the price of deposits, the price of fixed assets, and the price of labor.[15] In Table 8, Columns 1 and 2, we report the results for this alternative measure of the Lerner index (*Lerner2*). The outcomes show that the *Lerner2* coefficient is negative and statistically significant, re-iterating our previous result according to which, as market power increases, is associated with a lower bank probability of incurring a sanction ($\beta = -0.2032$ p < 1%). The validity of our instrument remains unaltered.[16]

Second, disparities in bank specialization and business models might

[14] Although we account for the endogeneity, the Wald test value shows a *p*-value higher than the critical value ($p = 0.24$), highlighting IV-probit regressions would not be required.

[15] To see our estimation procedure for this method to calculate the Lerner Index, see the supplementary appendix.

[16] However, the ρ Wald test's high significance in regression (2) highlights the need to adopt an IV regression since *Lerner2* should be considered endogenous to the model.

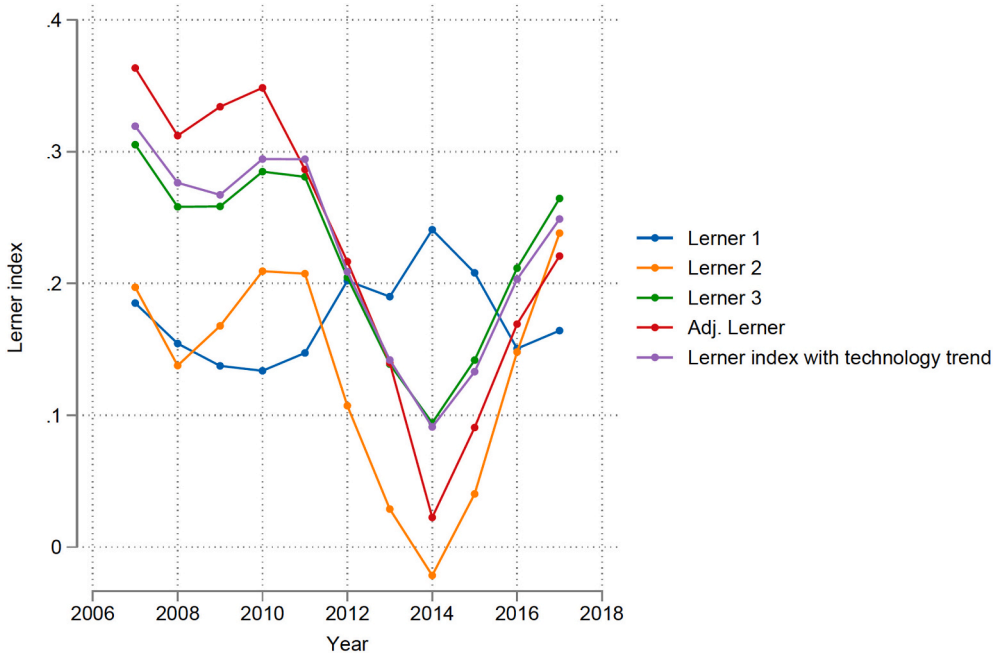

Fig. 4. This figure shows the trend of the different Lerner Index employed in the analysis for the period 2006-2018, also including the Lerner accounting for technological advances proposed by Hunter and Timme (1986) and Coccorese and Pellecchia (2010).

drive our findings. To allow for this issue, we calculate the third version of the Lerner index (*Lerner3*) based on a two-output cost function model for loans and securities and the stochastic frontier with three input models, consistent with Fiordelisi and Mare (2014) and Clark et al. (2018).[17] Table 8, Columns 3 and 4, reports the results confirming a negative and statistically significant relationship between market power and enforcement action.

Third, Koetter et al. (2012) propose an alternative measure for the Lerner index (adjusted Lerner, *Adj. Lerner*), based on the *quiet life hypothesis*, according to which firms with high market power can give up part of their producer surplus due to inefficiencies (Hicks, 1935). Although Hicks refers to generic firms, Rhoades and Rutz (1982) suggest that the banking sector is suitable for testing this hypothesis because banks avoid exhibiting significant abnormal returns due to supervised firms' status and the fiduciary role in the economy. Columns 5 and 6 report the results based on this alternative measure of bank market power. As before, the *Adj. Lerner* is statistically significant ($\beta = -0.2018$ in the IV-Probit model) with a coefficient in line with previous estimates (*Lerner1*, *Lerner2*, and *Lerner3*). In unreported results,[18] we also use an alternative Lerner index, coherent with Coccorese & Pellecchia (2010) and Hunter and Timme (1986), to account for changes in the cost function over the years due to technological advances.[19] The results remain virtually stable.

6.2. Robustness checks: sample splits

We further explore the impact of the bank business model and adopt a sample split analysis based on the bank specialization. We divide the sample into commercial banks (CMB) and cooperative banks (COB).[20] Table 9 reports the results.

Our evidence corroborates our prior findings in five out of six specifications for both commercial and cooperative banks. Furthermore, the coefficient for local banks is more inflated than for commercial banks. This evidence is coherent with two arguments, which are not mutually exclusive. On the one hand, local banks are more likely to escape supervisory scrutiny. On the other hand, and coherent with Agarwal et al. (2014), public agencies are softer in exerting their supervisory activities when dealing with this kind of bank.

6.3. The mechanism: bank market power, performance, and risk

Thus far, we have documented that banks with higher market power are less likely to receive enforcement actions from supervisory authorities. Here, we aim to gain more evidence on the relationship between market power and bank performance. We investigate why this might be the case and why these banks attract fewer enforcement actions. In this respect, there are two competing arguments. On the one hand, these banks might attract fewer enforcement actions because they are well-performing firms and violate fewer rules (**H1B**). On the other hand, exercising their higher market power, they are less likely to receive a sanction, supporting the regulatory capture view (Peltzman, 1976; Stigler, 1971) (H1A). This test is crucial to understanding if our results are proclive to H1A rather than H1B or vice-versa.

To test which hypothesis prevails, we first consider a measure of bank profitability, namely *ROA*, and second, we consider a measure of bank asset quality and risk, namely the non-performing loans ratio.

In this respect, each Column of Table 10 shows the findings of fixed-effects regressions of bank profitability and risk, where the dependent variables include *ROA* and *NPL*. We also consider control variables in

[17] For the calculation of *Lerner3*, please refer to the Supplementary Appendix.
[18] We also thank an anonymous referee for this valuable suggestion. For the sake of brevity, these findings are available upon request.
[19] In the Appendix A, after the explanation of different Lerner index measures, we also include a Figure 4 about the time dynamics of all several Lerner indexes used in all our analysis during the whole sample period.

[20] Savings banks represent a small portion of the sample (on average 30 banks per year). Thus, we include these credit institutions in the cooperative banks' groups. This is also coherent with the decision-making process of saving banks based on the "one member, one vote" voting principle.

Table 9
Sample splits: bank market power and supervisory enforcement actions.

	(1)	(2)	(3)	(4)	(5)	(6)
	Commercial Banks			Cooperative Banks		
L.Lerner3	−0.0686***	−0.0895	−0.1191**	−0.0786***	−0.4710*	−0.5383**
	(0.0245)	(0.075)	(0.0565)	(0.0251)	(0.2749)	(0.2402
L.TIER1	−0.1625**	−0.0908***	−0.1657***	−0.1607***	−0.0437	−0.1566***
	(0.0643	(0.0304)	(0.0632)	(0.0533)	(0.0362)	(0.0492
L.ROA	2.8425**	3.0861	2.6161*	−2.942	−22.7715	−4.5534*
	(1.4043)	(2.806)	(1.4517)	(2.4213)	(17.5809)	(2.4013
L.NPL1	0.0069	0.0245	0.0444	0.7401***	0.2512	0.7842***
	(0.0971)	(0.1483)	(0.1019)	(0.083)	(0.3561)	(0.0865
L.LIQ	−0.3895	−0.2497*	−0.3837	0.177	0.1809	0.1233
	(0.2369)	(0.1309)	(0.2394)	(0.3303)	(0.392	(0.3607
L.TLTA	−0.0509*	−0.0449	−0.0517*	−0.1276***	−0.0346	−0.1223***
	(0.0273)	(0.0276)	(0.0267)	(0.037)	(0.0546	(0.0373
L.DEP	−0.0006	0.0047	−0.0056	0.0027	0.1083**	−0.0101
	(0.0243)	(0.0295)	(0.0233)	(0.0322)	(0.0516	(0.0333
L.SIZE	0.0064*	0.0076	0.0068**	0.0095***	0.0059	0.0113***
	(0.0034)	(0.0051)	(0.0033)	(0.0025)	(0.0036	(0.0025
L.STR	−0.4566*	−0.3839*	−0.4856**	0.156	−0.2528	0.1355
	(0.2429)	(0.2146)	(0.238)	(0.1083)	(0.2248	(0.1087
L.GDP	0.2413	0.2953	0.2377	−0.2624**	−0.0907	−0.2568**
	(0.1924)	(0.2228)	(0.1893)	(0.1223)	(0.159	(0.1218
			First Stage IV			
Overhead		−0.2530***	-0.2530***		−0.1248***	−0.1248***
		(0.0373	−0.0373		−0.0463	−0.0463
Disaster		0.0473	0.0473		0.0247***	0.0247***
		(0.0408	−0.0408		−0.0084	−0.0084
Intercept	YES	YES	YES	YES	YES	YES
N. Obs	1714	1714	1714	4649	4649	4649
Year FE	YES	YES	YES	YES	YES	YES
Institutional Form FE	YES	YES	YES	YES	YES	YES
Estimation Method	Probit	2SLS	IV-Probit	Probit	2SLS	IV-Probit
Under-identification		0.0003			0.0017	
Weak identification		22.8947			7.5693	
Hansen J-statistic (p-value)		0.3682			0.7775	
Wald test of $\rho = 0$ (p-value)			0.2515			0.0294

The table reports the results for commercial banks (Columns 1–3) and local (or cooperative) banks (Columns 4–6) referred to the period 2006–2018. As before, *S* is the dependent variable for all estimation reported. In Columns 1,3,4, and 6 we report the average marginal effects for the sake of the magnitude interpretation of our coefficients. The panel probit regression model is reported in Column (3). The IV-Probit regression model is reported in columns (3) and (6). The 2SLS model is reported in columns (2) and (5). The first stage includes all explanatory variables in the second stage. Robust standard errors clustered at bank-level are reported in parentheses. ***, **, * indicate statistical significance at 1%, 5%, and 10% respectively.

line with previous tests, namely, tier 1 ratio (*TIER1*), liquidity (*LIQ*), lending volume (*TLTA*), total bank deposits to total bank assets (*DEP*), bank size (*SIZE*), GDP growth in the province in which the bank has its headquarters (*GDP*), and the regional number of suspicious transaction communications (*STR*), where the bank has its headquarters. We also include bank- and year-fixed effects and cluster standard errors at the bank level.

Table 10 reports the findings on the nexus between bank market power and performance.

First, our results indicate a statistically significant decrease in bank performance at those banks with higher market power at the 1% level (Colum 1). This result holds when we unpack our sample into commercial and local banks. However, in terms of magnitude, the coefficient on the Lerner index enters the regression economically negligible and economically insignificant, suggesting that banks with higher market performance do not outperform others in terms of profitability. This situation is also reflected in Fig. 2.

Second, we move into the bank-risk taking. Banks with higher market power have a higher fraction of non-performing loans in their balance sheets. This result is in line with the *competition-fragility view*, which highlights a higher market power lowers the overall competition and negatively influences the bank's organizational processes and the quality of internal controls, thereby negatively influencing safety and sound management practices. Our evidence corroborates this view by adding that this phenomenon is more likely to occur when considering local rather than commercial banks. Then, we also present Fig. 3, documenting the relative change in the estimates of NPL in the function of several thresholds of the bank market power, suggesting that for a higher level of market power, the worse quality of loan portfolios is more severe.

Thus far, our results show that banks with higher market power are less likely to obtain enforcement actions. However, their higher market power is not associated with economically significant bank profitability. This evidence suggests that our results do not support a cost-efficiency hypothesis of a higher bank market power. Indeed, banks with higher market power do not outperform other banks in the financial sector. Far from over, our findings go in the opposite direction, documenting that these banks show a higher fraction of non-performing loans, coherent with a competition-fragility view, according to which banks with a higher market power might be associated with higher risk-taking.

6.4. *Extensions: what if supervisory agencies intervene on banks? Do they reduce their market power?*

Thus far, we have documented that banks with a higher bank market power are less likely to incur enforcement actions from supervisors. Yet, our results exclude that banks with a higher market power outperform other banks in profitability, so they attract fewer enforcement actions. Conversely, we find some evidence that banks with higher market power show a higher fraction of non-performing loans, suggesting a risk-taking channel of the bank market power.

From a different premise, in this section, we seek to answer the reverse question: if supervisory agencies intervene on banks, do they affect their market power? This aspect is thought-provoking for two

Table 10
Market power, bank performance, and risk.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	ROA	ROA	ROA	NPL	NPL	NPL
L.Lerner1	−0.0029***	−0.0023***	−0.0034***	0.0488***	0.0691***	0.0264
	(−5.3332)	(−4.4494)	(−3.4516)	(4.8821)	(6.9968)	(1.5895)
L.NPL	0.0137***	0.0105***	0.0161***			
	(8.6829)	(7.2250)	(4.7230)			
L.ROA				5.4320***	7.0742***	4.0626***
				(11.4807)	(11.3324)	(6.9816)
L.TIER1	0.0020***	0.0009***	0.0042***	−0.0245***	−0.0183***	−0.0460***
	(3.8403)	(2.9902)	(2.9316)	(−3.4319)	(−2.6212)	(−2.9253)
L.LIQ	−0.0010	0.0081	−0.0055	0.1094**	0.0357	0.0879*
	(−0.1788)	(1.1630)	(−0.7816)	(2.3279)	(0.5409)	(1.7539)
L.TLTA	0.0006	0.0005	0.0005	0.0389***	0.0225*	0.0362*
	(0.8666)	(0.9643)	(0.3906)	(3.4674)	(1.7109)	(1.7976)
L.DEP	−0.0006	−0.0015***	0.0002	−0.0096	−0.0243	0.0083
	(−1.0238)	(−3.2586)	(0.1778)	(−0.7770)	(−1.5644)	(0.4529)
L.SIZE	−0.0000	−0.0001	0.0003	−0.0111***	−0.0011	−0.0180***
	(−0.1408)	(−0.8157)	(0.9682)	(−3.0317)	(−0.3134)	(−3.2647)
L.STR	−0.0001	0.0000	−0.0028	0.1124***	0.1467***	−0.1039
	(−0.0610)	(0.0206)	(−0.5385)	(2.7694)	(3.4450)	(−1.1971)
L.GDP	0.0007	0.0007	−0.0008	−0.0096	−0.0258	0.0485
	(0.6094)	(0.6988)	(−0.2747)	(−0.6403)	(−1.5258)	(1.5241)
Constant	−0.0036	−0.0012	−0.0105*	0.1797***	0.0674	0.2767***
	(−1.1783)	(−0.5092)	(−1.9288)	(3.6266)	(1.4294)	(3.2959)
Observations	6496	4648	1848	6496	4648	1848
R-squared	0.259	0.305	0.257	0.462	0.460	0.498
Number of banks	688	462	262	688	462	262
Full Sample	Full	Local	Commercial	Full	Local	Commercial
Year FE	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES

The table reports the results related to the nexus between market power, bank performance, and risk (2006–2018), intended as bank profitability and risk. We also run sample splits analysis for commercial and local (or cooperative) banks. Robust standard errors clustered at the bank-level are reported in parentheses. ***, **, * indicate statistical significance at 1%, 5%, and 10% respectively.

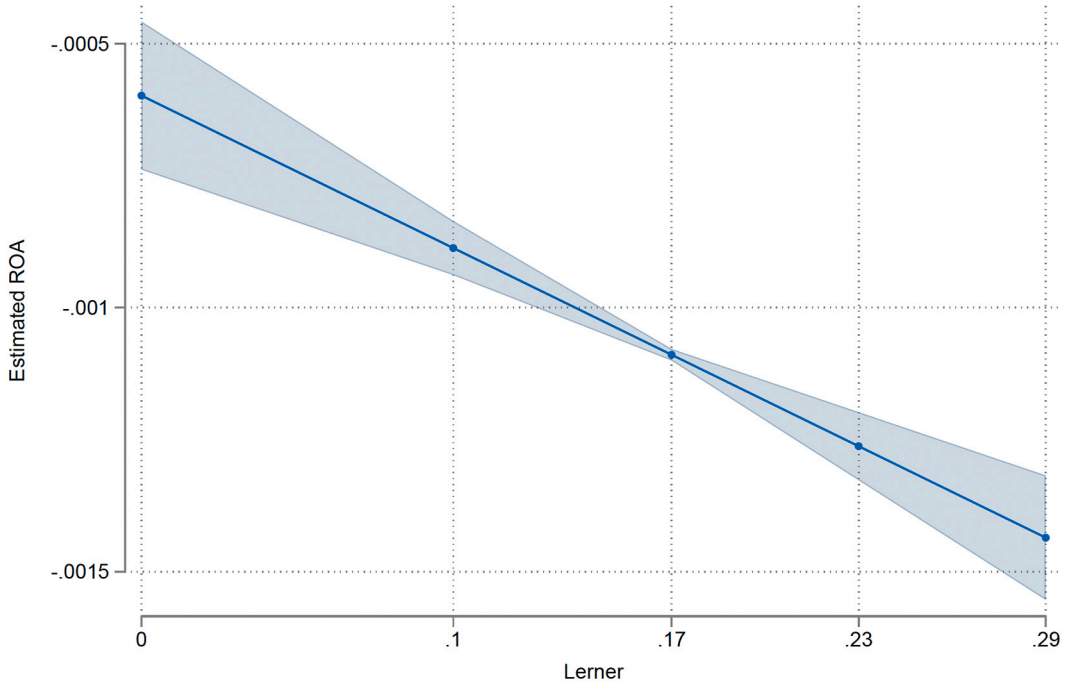

Fig. 2. This figure shows the relationship between bank market power and profitability.

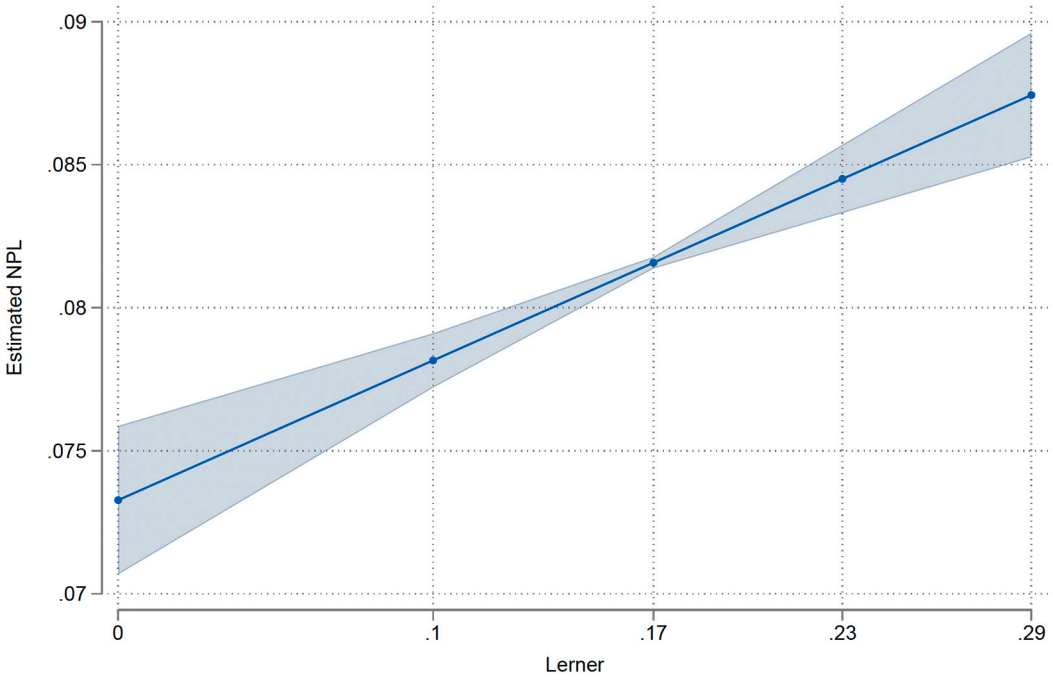

Fig. 3. This figure shows the relationship between market power and bank fraction of non-performing loans.

Table 11
Extensions: enforcement actions and ex-post bank market power (Part I).

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	F1.Lerner1	F2.Lerner1	F3.Lerner1	F1.Lerner2	F2.Lerner2	F3.Lerner2
S	−0.0157**	−0.0300***	−0.0226**	−0.0953**	−0.1284***	−0.0669
	(0.0077)	(0.0101)	(0.0104)	(0.0419)	(0.0458)	(0.0472)
L.NPL	−0.0745	−0.2107***	−0.1983***	−3.4270***	−3.2068***	−2.9152***
	(0.0616)	(0.0689)	(0.0705)	(0.2131)	(0.2469)	(0.2835)
L.ROA	−18.4552***	−15.9112***	−13.9008***	−21.0861***	−17.6695***	−9.7383*
	(1.2904)	(1.3657)	(1.3981)	(4.7032)	(5.4296)	(5.7407)
L.TIER1	−0.0701***	−0.0406**	−0.0065	0.1943***	0.2246***	0.1646**
	(0.0222)	(0.0196)	(0.0195)	(0.0696)	(0.0699)	(0.0839)
L.INCL	−0.0537***	−0.0426***	−0.0326***	−0.0808**	−0.0979**	−0.1097**
	(0.0096)	(0.0098)	(0.0103)	(0.0403)	(0.0470)	(0.0504)
L.SEC	0.1218***	0.0778***	0.0852***	−0.2601***	−0.0728	0.1137
	(0.0193)	(0.0211)	(0.0227)	(0.0776)	(0.0828)	(0.0940)
L.TOP	0.0703***	0.0682***	0.0668***	0.0847***	0.0790**	0.0401
	(0.0076)	(0.0085)	(0.0095)	(0.0294)	(0.0335)	(0.0391)
L.MS	0.0229	−0.0019	−0.0213	−0.3412***	−0.3921***	−0.4197***
	(0.0182)	(0.0213)	(0.0231)	(0.1063)	(0.1180)	(0.1299)
L.GDP	−0.0454	0.0391	−0.0876	0.3182	0.7341**	0.6521*
	(0.0795)	(0.0767)	(0.0824)	(0.2645)	(0.3000)	(0.3641)
L.UR	−0.0024***	−0.0024***	−0.0025***	−0.0104***	−0.0130***	−0.0147***
	(0.0005)	(0.0006)	(0.0006)	(0.0021)	(0.0023)	(0.0025)
L.HI	0.1218	−0.1773	−0.2011	1.7310**	2.5897***	4.4013***
	(0.1843)	(0.1985)	(0.2053)	(0.8195)	(0.9018)	(0.9143)
L.HSD	0.0000	0.0002	−0.0001	−0.0057***	−0.0078***	−0.0122***
	(0.0006)	(0.0006)	(0.0007)	(0.0022)	(0.0024)	(0.0028)
			First Stage IV			
Female % of Supervisor's Examiners (FSE)	0.0271*	0.0370*	0.0493**	0.0271*	0.0370*	0.0493**
	(0.0160)	(0.0190)	(0.0210)	(0.0160)	(0.0190)	(0.0210)
Intercept	YES	YES	YES	YES	YES	YES
N. Obs	5152	4494	3859	5167	4510	3875
Year FE	YES	YES	YES	YES	YES	YES
Bank specialization FE	YES	YES	YES	YES	YES	YES
Under-identification	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Weak identification	41.2866	36.4516	37.3649	41.7384	36.5917	37.1188
Adj. R2	0.237	0.204	0.178	0.272	0.251	0.227

The table reports the results for IV-regression on the effects of enforcement actions on bank market power. The sample period is 2006–2018. The first stage includes all explanatory variables in the second stage. The dependent variables in each regression are noted in the first line of the table below. The dependent variables are lagged one period. Robust standard errors clustered at bank-level are reported in parentheses. ***, **, * indicate statistical significance at 1%, 5%, and 10% respectively.

Table 12
Extensions: enforcement actions and ex post competition (Part II).

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	F1.Lerner3	F2.Lerner3	F3.Lerner3	F1.Adj.Lerner	F2.Adj.Lerner	F3.Adj.Lerner
S	−0.0440**	−0.0505**	−0.0095	−0.0510***	−0.0521***	−0.0202
	(0.0180)	(0.0198)	(0.0205)	(0.0172)	(0.0190)	(0.0199)
L.NPL	−1.5969***	−1.5752***	−1.4339***	−1.5350***	−1.4865***	−1.3449***
	(0.1075)	(0.1223)	(0.1356)	(0.0973)	(0.1101)	(0.1249)
L.ROA	−18.6647***	−16.3170***	−13.0273***	−18.7342***	−16.5621***	−12.4809***
	(2.2842)	(2.5942)	(2.7916)	(2.0143)	(2.3056)	(2.4144)
L.TIER1	−0.1466***	−0.0793**	−0.0399	0.0202	0.0725**	0.0928***
	(0.0355)	(0.0337)	(0.0386)	(0.0306)	(0.0287)	(0.0319)
L.INCL	0.0543***	0.0190	0.0030	0.0278*	0.0058	0.0013
	(0.0175)	(0.0207)	(0.0231)	(0.0162)	(0.0197)	(0.0214)
L.SEC	0.0778**	0.1406***	0.2184***	0.0331	0.0904***	0.1630***
	(0.0329)	(0.0363)	(0.0421)	(0.0302)	(0.0335)	(0.0379)
L.TOP	0.1720***	0.1673***	0.1539***	0.0829***	0.0816***	0.0675***
	(0.0129)	(0.0150)	(0.0177)	(0.0124)	(0.0144)	(0.0172)
L.MS	0.1556***	0.1353***	0.1168**	0.0769**	0.0560	0.0360
	(0.0342)	(0.0393)	(0.0454)	(0.0328)	(0.0376)	(0.0437)
L.GDP	0.1900	0.2355*	0.2549	0.1693	0.2664**	0.2853*
	(0.1268)	(0.1380)	(0.1707)	(0.1138)	(0.1286)	(0.1599)
L.UR	−0.0012	−0.0032***	−0.0049***	−0.0012	−0.0025***	−0.0035***
	(0.0009)	(0.0010)	(0.0012)	(0.0008)	(0.0009)	(0.0010)
L.HI	0.6613*	1.2697***	1.9341***	0.6034*	1.3194***	2.0813***
	(0.3482)	(0.3707)	(0.3901)	(0.3339)	(0.3445)	(0.3703)
L.HSD	−0.0020**	−0.0043***	−0.0073***	−0.0025***	−0.0041***	−0.0067***
	(0.0010)	(0.0011)	(0.0013)	(0.0009)	(0.0011)	(0.0012)
			First Stage IV			
Female % of Supervisor's Examiners (FSE)	0.0271*	0.0370*	0.0493**	0.0271*	0.0370*	0.0493**
	(0.0160)	(0.0190)	(0.0210)	(0.0160)	(0.0190)	(0.0210)
Intercept	YES	YES	YES	YES	YES	YES
N. Obs	5167	4510	3875	5167	4510	3875
Year FE	YES	YES	YES	YES	YES	YES
Bank specialization FE	YES	YES	YES	YES	YES	YES
Under-identification	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Weak identification	41.7384	36.5917	37.1188	41.7384	36.5917	37.1188
Adj. R2	0.354	0.328	0.297	0.417	0.404	0.385

The table reports the results for IV-regression on the effects of enforcement actions on bank market power. The sample period is 2006–2018. The first stage includes all explanatory variables in the second stage. The dependent variables in each regression are noted in the first line of the table below. The dependent variables are lagged one period. Robust standard errors clustered at bank-level are reported in parentheses. ***, **, * indicate statistical significance at 1%, 5%, and 10% respectively.

reasons. First, suppose the enforcement actions reduce the bank's market power. In that case, based on previous results, policy actions from supervisory authorities are desirable for the banking sector because of the correlation between bank market power and bank non-performing loans. Thus, enforcement actions affecting bank governance (Cotugno et al., 2021) should alleviate bank risk-taking, capital concerns, and the rise of non-performing loans (Delis et al., 2017). Second, if sanctions reduce the bank market power, this might be evidence that regulators imposing them ensure the stability in the banking sector by promoting level-playing-field.[21] In this respect, the European Systemic Risk Board acknowledges the lack of competition among the causes of misconduct risk (ESRB, 2015, p. 9).

For this purpose, we rely on an IV regression analysis (Angrist, 2001; Caiazza et al., 2018), where the first stage is as follows:

$$S_{it} = \alpha_0 + \beta_0 Z_{it} + \delta_0 X_{it} + \mu_{it} \quad (5)$$

where S is a dummy variable that takes the value of one if a supervisory authority targets a bank and zero otherwise; Z_{it} is the instrumental variable, and X_{it-1} is the set of control variables. Then, we estimate the second stage as follows:

$$Y_{it+j} = \alpha_1 + \beta_0 \hat{S}_{it} + \delta_1 X_{it} + \varepsilon_{it+1} \quad (6)$$

where Y_{it+j} is the forward of our market power measure (Lerner Index_{it+1}) related to the i-th bank at time t + 1, t + 2, and t + 3, while X_{it} is a vector of control variables.[22] The idea is to understand how long the effect of the enforcement action last on the bank's market power. As before, we also include year and bank specialization fixed effects.

In this exercise, we rely on Delis et al. (2017) and Delis et al. (2019) to identify a valid instrument. The authors use the Gender of Supervisor's Bank Examiners as an instrumental variable, obtained as the number of women to the total number of bank examiners for each authority (FDIC and OCC) and each US State. We extend this instrument to the Italian case. We conjecture that it satisfies both relevance and exclusion conditions. First, it is plausibly exogenous because female examiners are more likely to exert more monitoring efforts in the screening diligence and impose an enforcement action on the targeted bank (*relevance*

[21] However, we recognize that the higher competition might generate risk-increasing incentives for banks and influence organizational and internal control processes.

[22] We also include a vector of control variables in line with Koetter et al. (2012). We first include controls in line with the previous analysis: TIER1, ROA, the NPL ratio, share of interest and commissions derived from credit activity to the bank total operating income (INC), and the scaled amount of security by bank total assets (SEC). Then, we also add two other bank-specific controls, namely the asset market share (MS) - estimated as the ratio between the total assets of the bank in a defined region (NUTS2) in a given year and the aggregate value of the total assets of the banks that have their headquarters in the region in a given year - and the top largest bank dummy (TOP) taking the value of one if the bank falls within the 10% of the largest banks in the country in any given year and zero otherwise. Finally, we allow for macroeconomic conditions (Koetter et al., 2012). We include the GDP (GDP), the unemployment rate (UR), the variation in household disposable income (HI) at NUTS3 level, and the education level of the population at the NUTS2 level (HSD). This latter variable is only available at NUTS2 level.

Table 13
Extensions: Enforcement actions and ex-post bank activities.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	F1.TLTA	F2.TLTA	F3.TLTA	F1.DEP	F2.DEP	F3.DEP
S	−0.0203***	−0.0195**	−0.0098	0.0021	−0.0042	−0.0077
	(0.0065)	(0.0078)	(0.0079)	(0.0090)	(0.0092)	(0.0094)
L.NPL	0.3370***	0.3148***	0.3700***	−0.2974***	−0.2847***	−0.2516***
	(0.0454)	(0.0533)	(0.0573)	(0.0620)	(0.0679)	(0.0750)
L.ROA	0.0755	0.1317	−0.8822	−1.1649	−2.9021**	−2.6846**
	(0.8863)	(0.9886)	(1.2055)	(1.1354)	(1.2110)	(1.3539)
L.TIER1	−0.1243***	−0.1079***	−0.1002***	0.0252	0.0624***	0.0570***
	(0.0180)	(0.0170)	(0.0184)	(0.0210)	(0.0191)	(0.0216)
L.INCL	−0.1354***	−0.1184***	−0.1109***	0.0423***	0.0381***	0.0403***
	(0.0099)	(0.0102)	(0.0111)	(0.0109)	(0.0111)	(0.0118)
L.SEC	−0.6292***	−0.5944***	−0.5457***	−0.1132***	−0.1247***	−0.1156***
	(0.0183)	(0.0201)	(0.0221)	(0.0252)	(0.0266)	(0.0298)
L.TOP	0.0099	0.0202**	0.0315***	−0.0930***	−0.1016***	−0.1043***
	(0.0086)	(0.0095)	(0.0106)	(0.0124)	(0.0134)	(0.0147)
L.MS	−0.0293*	−0.0201	−0.0174	0.1021***	0.1101***	0.1083***
	(0.0170)	(0.0180)	(0.0196)	(0.0242)	(0.0256)	(0.0283)
L.GDP	−0.2328***	−0.0781	−0.1254	0.1576*	0.0381	0.2543***
	(0.0640)	(0.0706)	(0.0778)	(0.0846)	(0.0887)	(0.0941)
L.UR	−0.0055***	−0.0053***	−0.0054***	0.0040***	0.0027***	0.0018***
	(0.0004)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0006)
L.HI	0.2529	0.1245	0.1154	0.5924***	0.8964***	0.9283***
	(0.1690)	(0.1817)	(0.1946)	(0.2267)	(0.2422)	(0.2600)
H.LSD	0.0002	0.0003	0.0006	−0.0030***	−0.0037***	−0.0044***
	(0.0005)	(0.0005)	(0.0006)	(0.0007)	(0.0007)	(0.0008)
Intercept	YES	YES	YES	YES	YES	YES
Observations	5167	4510	3875	5167	4510	3875
R-squared	0.605	0.572	0.523	0.170	0.187	0.196
Year FE	YES	YES	YES	YES	YES	YES
Bank Specialization FE	YES	YES	YES	YES	YES	YES

The table reports coefficient estimates, and robust standard errors clustered by banks in parentheses for the 2SLS model in Eqs. (6) and (7). The sample period is 2006–2018. The first stage includes all explanatory variables in the second stage. The dependent variables in each regression are listed in the first line of the table below. The dependent variables are lagged one period. Robust standard errors clustered at bank-level are reported in parentheses. ***, **, * indicate statistical significance at 1%, 5%, and 10%, respectively.

condition). Second, the gender of the supervisory examiners is unrelated to the bank's decisions, activities, and market power (*exclusion condition*). Notably, we compute the percentage of female supervisor's examiners (FSE) as a ratio between the number of female supervisor examiners on the total supervisor's examiners referred to the supervisory organizational unit responsible for the supervisory activity, such as the branch of the Bank of Italy responsible for the geographical area, the central administration of the Bank of Italy in Rome, the ECB administration in Frankfurt.

Table 11 and Table 12 report the results.

The coefficient on FSE enters the regression with the predicted sign, which is positive and statistically significant. Further, the Kleibergen-Paap test confirms the instrument's validity. Concerning the relationship of our interest, the coefficient on *S* in Column (1) suggests that the enforcement actions reduce the bank's market power, and the relationship is statistically significant at 5%. Moving to the results in Columns 2 and 3, we highlight that the enforcement actions' effect on bank market power persists for three years. We also run the same exercise with all the other measures of bank market power (*Lerner2*, *Lerner 3*, and *Adj. Lerner*). Our results corroborate previous findings, and they still hold when we allow for the sanction severity (*lnS* and *ln2S*).[23]

Finally, we also investigate whether the reduction in the bank market power is due to a reduction in the bank lending activities or in the deposits. Thus, we estimate a model in line with Eq. (6), where we replace our measures of bank market power with the *Loan-asset ratio* (*TLTA* and *Deposit Ratio* (*DEP*), measured as the ratio of bank total deposits to total assets. Table 13 reports the results.

Our results document that the reduction in the bank market power due to the sanction is driven by an economically significant reduction in bank lending activities rather than a reduction in bank deposits. This argument is coherent with our result in the previous section since a higher market power is associated with a higher fraction of non-performing loans as shown in the previous section. Thus, when authorities intervene on banks, they constrain their lending volume.

7. Conclusions

This study examines the interlinkages between the bank market power and regulatory enforcement actions. Using a unique sample of 696 Italian commercial and cooperative banks, we find that banks with higher market power are less likely to incur enforcement actions. This effect is more pronounced for cooperative banks. This latter evidence is coherent with Agarwal et al. (2014), according to which national supervisors are often softer when dealing with local and cooperative banks than other banks. These findings are robust when we rely on several estimation techniques, allow for potential endogeneity, and use alternative configurations of the bank market power.

Second, we also uncover whether the lower probability of sanction associated with higher market power is driven by either cost-efficiency or risk-taking explanations. This check is crucial because it investigates the channel through which the bank's market power affects the regulatory process. Our findings show that their higher market power is not associated with economically significant bank profitability. Thus, we can exclude that banks with higher market power are more efficient, well-performing, and outperform other banks. Conversely, such banks show a higher fraction of non-performing loans. In this respect, we corroborate the competition-fragility view, in which higher market power can raise inefficiencies in bank management, resulting in higher intermediation costs, lower banking margins, and poorer quality activities. This evidence suggests that these banks are riskier than others and,

[23] We do not report the results for the severity of the sanction for brevity. The results are available upon request.

at the same time, less likely to attract enforcement actions.

Nevertheless, when we investigate the effects of enforcement actions on targeted banks, our results show that such interventions reduce bank market power, and the effect lasts two years and translates into a reduction of bank lending volume rather than bank deposits. This is also coherent with our evidence that higher market power can adversely affect the bank loan quality, measured by the higher fraction of non-performing loans.

Hence, our contribution to the extant literature is threefold. First, we contribute to the literature on the implications of the bank market power in the banking sector. Second, our paper speaks to the literature on the effects of regulatory supervision on bank market power. Third, we contribute to the empirical literature examining the differences between cooperative and commercial banks in the banking sector and how the supervisory treatment may differ. In this respect, we show that cooperative banks are less likely to be penalized by regulators, coherent with the view that supervisors might be softer when dealing with local banks (Agarwal et al., 2014).

Our study is not free from limitations, even if they might represent the logical premise from new research avenues. First, we focused on how technological developments affect bank cost function and the related bank probability of receiving an enforcement action, with no emphasis on supervisory technology (SupTech), which could improve the effectiveness and efficiency of enforcement activities. Second, and more related to regulatory oversight, our sample covers the entire population of listed and unlisted banks. However, a closer look at listed banks could ensure the evaluation of the effects of enforcement actions on the bank's contribution to systemic risk and, more broadly, overall financial stability. This would be interesting especially because it might complement those studies about the effects of macroprudential regulation. Finally, in our paper, we were concerned about the implications of the enforcement actions on bank boards without considering the implications on other bank stakeholders, such as employees and customers, where these latters are the main actors composing demand for financial services, given that enforcement actions create public embarrassment and discontent (Danisewicz et al., 2018). Thus, understanding the implications of enforcement actions on these stakeholders would be a way to measure the social costs of sanctions.

Overall, our findings have important policy implications. First, our results highlight that cooperative banks with higher market power are less likely to be targeted by supervisory agencies. Thus, regulators might re-think the discipline of cooperative (local and mutual) banks imposing tighter public scrutiny on such banks (Agarwal et al., 2014), in line with the regulation of commercial banks to avoid potential misconduct. When authorities intervene on them, sanctions effectively impact the bank market power by curbing excessive risk-taking (Delis et al., 2019) and decreasing excessive bank lending volumes. Second, our evidence also supports those national government efforts in EU-member states (i.e., Italy) to ensure regulatory harmonization between these two types of financial institutions, avoiding regulatory arbitrages. However, we recognize that we may not discriminate the transmission channels of the effect of bank market power on safety and sound management. On the one hand, a higher bank market power affects organizational and credit processes. On the other hand, internal controls are ineffective in dealing with competitive pressures. An adequate risk culture might mitigate such a problem, even if empirical evidence on the relationship between risk culture and bank stability has not yet been addressed (Bianchi, Carretta, Farina, & Fiordelisi, 2021).

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Data availability

The authors do not have permission to share data.

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Appendix A. The Lerner index in the robustness checks

In the par. 6, we proposed three different measures of the Lerner index to conduct the robustness tests. This section describes in detail how the proposed indices were estimated.

A.1. Lerner 2

Lerner2 was calculated according to Beck et al. (2013) and Coccorese (2014). For bank *i* at time *t*, the translog cost function was calculated using the total cost (TC_{it}), one output Q_{it} (Total assets) and three input prices (w_{hit}), where w_{1it} is the price of funding, computed as the ratio between interest expenses on customer deposits; w_{2it} is the labor cost, computed as the ratio of labor cost to the number of employees; w_{3it} is the fixed capital cost, estimated as the ratio of administrative costs to the depreciation of fixed assets. We also use banks' equity (E_{it}) considering that capital can be used as a funding source and time trend (T), considering technological change.

Imposing the usual condition of the translog cost function (linear homogeneity in input prices and the symmetry condition), we divide the total costs and price of all inputs by one factor price (in our case, W_{3it}, or fixed capital). Consequently, the translog cost function is as follows:

$$\begin{aligned} ln(TC_{it}/w_{3it}) =& \beta_0 + \beta_1 lnQ_{it} + \sum_{h=1}^{2} \beta_h ln\left(\frac{w_{hit}}{w_{3it}}\right) + 0.5\beta_{QQ}(lnQ_{it})^2 + 0.5\sum_{h=1}^{2}\sum_{k=1}^{2} \beta_{hk} ln\left(\frac{w_{hit}}{w_{3it}}\right) ln\left(\frac{w_{hit}}{w_{3it}}\right) + \sum_{h=1}^{2} \beta_{Qh} lnQ_{it} ln\left(\frac{w_{hit}}{w_{3it}}\right) + \beta_E lnE_{it} + 0.5\beta_{EQ}(lnE_{it})^2 \\ &+ \sum_{h=1}^{2} \beta_{Eh} lnE_{it} ln\left(\frac{w_{hit}}{w_{3it}}\right) + \beta_{EQ} lnE_{it} lnQ_{it} + \beta_T T + 0.5\beta_{TT} T^2 + \sum_{h=1}^{2} \beta_{Th} T ln\left(\frac{w_{hit}}{w_{3it}}\right) + \beta_{TQ} T\, lnQ_{it} + \upsilon_{it+}\nu_{it} \end{aligned} \tag{8}$$

We estimated (8) using the SFA approach with standard assumptions in the banking literature (Koetter et al., 2012; Kumbhakar & Lovell, 2000).

Marginal costs were calculated using Eq. (9) by considering the derivative relating to the single output (Q_{it}), which yields

$$MC_{it} = \frac{TC_{it}}{Q_{it}}\left[\beta_Q + \beta_1 \ln Q_{it} + 0.5\beta_{QQ}(\ln Q_{it}) + \sum_{h=1}^{2} \beta_{Qh} \ln Q_{it} \ln\left(\frac{w_{hit}}{w_{3it}}\right) + \beta_{EQ} \ln E_{it} + \beta_{TQ} T\right] \tag{9}$$

We then calculated *Lerner2* using the usual formula proposed in (4).

A.2. Lerner3

Lerner3 was estimated following Koetter et al. (2012), Fiordelisi and Mare (2014), and Clark et al. (2018). For bank i at time t, the translog cost function was calculated using the total cost (TC_{it}), two outputs (loans y_1 and securities y_2) and three input prices computed as for *Lerner2* (the cost of funding, the labor cost, and the fixed asset price). Consequently, the translog cost function is follows:

$$\ln(TC_{it}/w_{3it}); \ln(TP_{it}/w_{3it}) = = \alpha + \sum_{h=1}^{2}\beta_h \ln\left(\frac{w_{hit}}{w_{3it}}\right) + \sum_{k=1}^{2}\gamma_k \ln y_{kit} + 0.5\sum_{h=1}^{2}\delta_h \ln\left(\frac{w_{hit}}{w_{3it}}\right)^2 + \sum_{h=1}^{2}\sum_{k=1}^{2}\zeta_{hk}\ln\left(\frac{w_{hit}}{w_{3it}}\right)\ln\left(\frac{w_{kit}}{w_{3it}}\right) + 0.5 \times \sum_{k=1}^{2}\eta_k \ln(y_{kit})^2 + 0.5\kappa_{12}\ln y_{1it}\ln y_{2it} + \sum_{h=1}^{2}\sum_{k=1}^{2}\zeta_{hk}\ln\left(\frac{w_{hit}}{w_{3it}}\right)\ln(y_{kit}) + \phi lnE_{it} + \sum_{h=1}^{2}\lambda_h T^h + \sum_{k=1}^{2}\xi_k \ln\left(\frac{w_{kit}}{w_{3it}}\right)T + \sum_{k=1}^{2}\omega_k \ln y_{kit}T + \varepsilon_{it} \tag{10}$$

Marginal cost was calculated using Eq. (11) by considering the sum of derivatives relating to total securities (y_{1it}) and loans (y_{2it}), which yields

$$MC_{it} = \frac{TC_{it}}{y_{1it}}\left[\beta_1 + \eta_1 \ln y_{1it} + 0.5\kappa_{12}y_{2it} + \sum_{h=1}^{2}\zeta_{1h}\ln\left(\frac{w_{hit}}{w_{3it}}\right) + \omega_1 T\right] + \frac{TC_{it}}{y_{2it}}\left[\beta_2 + \eta_2 \ln y_{2it} + 0.5\kappa_{12}y_{1it} + \sum_{h=1}^{2}\zeta_{2h}\ln\left(\frac{w_{hit}}{w_{3it}}\right) + \omega_2 T\right] \tag{11}$$

We then calculated *Lerner3* using the usual formula proposed in (4).

A.3. Adjusted Lerner

The adjusted Lerner index was estimated following Koetter et al. (2012). We estimated the marginal cost using (10) and (11), and we used the profit before taxes (TP) as the dependent variable in the production function (11). Both variables were estimated using stochastic frontier analysis. For banks with negative TP, we used the methodology proposed by Bos and Koetter (2009). Consequently, we estimated the efficiency-adjusted Lerner index with the following formula proposed by Koetter et al. (2012):

$$\text{Adj.Lerner} = \frac{\text{TP} + \text{TOC} - \text{MC} \times \text{TO}}{\text{TP} + \text{TOC}} \tag{12}$$

where *TC* is the predicted total operating cost, *MC* is the corresponding marginal cost, *TP* is the predicted profit before taxes and *TO* is the total output (Loans + Securities).

A.4. Technological advances in the bank cost function

We also employ a measure of Lerner Index accounting for technological advances in the bank cost function. This procedure follows Coccorese & Pellecchia (2010). In particular, considering a translog function with three inputs and one output (Lerner 1 and Lerner 2), we adjust the cost function by including a technology index, TREND, as in Hunter and Timme (1986, p. 154) and Coccorese & Pellecchia (2010), able to capture time trend in the technical changes.

In the next figure (Fig. 4), we document the trends in the bank market power across the whole sample period considered in this study. Several measures are not stable during our sample period. In particular, the bank market power is higher after the 2007–08 financial crisis. Then, it shrinks with the increased regulatory scrutiny from the national central bank after the financial crisis and sovereign debt crisis.

Appendix B. Exclusion restriction test

This table reports probit regressions where we relate our instruments with the bank probability to receive an enforcement actions. Robust standard errors are clustered at bank-level and are reported in parentheses. ***, **, * indicate statistical significance at 1%, 5%, and 10% respectively.

	(1)	(2)	(3)
	S	S	S
Overhead	0.0011		0.0011
	(0.0008)		(0.0008)
Disaster		−0.0004	−0.0005
		(0.0175)	(0.0175)
L.TIER1	−0.1633***	−0.1628***	−0.1633***
	(0.0426)	(0.0428)	(0.0427)
L.ROA	3.2008***	3.2487***	3.2009***
	(10.1210)	(10.1250)	(10.1190)
L.NPL	0.5373***	0.5362***	0.5372***
	(0.0615)	(0.0615)	(0.0616)
L.LIQ	−0.0662	−0.0607	−0.0662
	(0.2175)	(0.2171)	(0.2174)
L.TLTA	−0.1131***	−0.1128***	−0.1130***
	(0.0202)	(0.0202)	(0.0202)
L.DEP	−0.0045	−0.0043	−0.0045
	(0.0181)	(0.0181)	(0.0181)

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	(1)	(2)	(3)
	S	S	S
L.SIZE	0.0045**	0.0044**	0.0045**
	(0.0023)	(0.0023)	(0.0023)
L.STR	0.0445	0.0469	0.0445
	(0.0966)	(0.0964)	(0.0967)
L.GDP	−0.1342	−0.1340	−0.1341
	(0.1011)	(0.1012)	(0.1012)
N.Obs	6500	6500	6500

Appendix C. Bi-serial correlations

The following table reports bi-serial correlations between the instrumental variables – overhead ratios and disasters – and the bank probability of receiving an enforcement actions.

	S	CTI	Disaster
S	1		
Overhead	−0.0033	1	
	(0.7798)		
Disaster	−0.0074	−0.0016	1
	(0.5267)	(0.8930)	

Appendix D. Differences in variances

The table reports tests for the difference in variances between bank with higher and lower market power. We define the two groups based on the median of the bank Lerner index sample distribution (*Low/High Lerner 1*). Size is the log total bank assets. *TLTA* is the ratio between total loans and total assets. *DEP* is total deposits to total assets. *TIER1* is the bank Tier 1 capital to total assets. *ROA* stands for bank return on assets. NPL is the ratio between bank non-performing loans to total assets. *LIQ* is the ratio of liquid assets to total assets. We report the number of banks, means of both groups, difference in means, and the related *p*-values. The number of observations is equal to that one of Table 6.

	SIZE	TLTA	DEP	TIER1	ROA	NPL	LIQ
SD with Low Lerner1	1.618	0.176	0.162	0.148	0.003	0.061	0.015
SD with High Lerner1	1.672	0.171	0.159	0.120	0.002	0.054	0.016
Differences in SD	−0.054	0.005	0.003	0.029	0.001	0.008	0.000
p-value	0.044	0.077	0.323	0.000	0.000	0.000	0.565

Appendix E. Allowing for regional fixed effects

The table reports the results on the relationship between bank market power and supervisory enforcement actions (2006–2018). We employ Probit (Column 1), 2SLS (Columns 2, 4, and 5), and IV probit regressions (Column 3). In Columns 1 and 3 we report the average marginal effects for the sake of the magnitude interpretation of our coefficients. The first stage includes all explanatory variables in the second stage. Robust standard errors are clustered at bank-level and are reported in parentheses. ***, **, * indicate statistical significance at 1%, 5%, and 10% respectively.

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	S	S	S	lnS	ln2S
L.Lerner1	−0.8657***	−0.0685*	−1.1117***	−0.5669	−0.7548*
	(0.2883)	(0.0362)	(0.3284)	(0.3503)	(0.4486)
L.TIER1	−1.6532***	−0.0795***	−1.6671***	−0.7513***	−0.9421***
	(0.4709)	(0.0163)	(0.4470)	(0.1461)	(0.1900)
L.ROA	28.5442**	3.3450**	2.2722	36.3210**	45.2090**
	(13.2109)	(1.6888)	(1.4640)	(16.0461)	(21.1020)
L.NPL	6.1535***	0.4883***	6.2183***	4.2501***	5.8171***
	(0.7820)	(0.0748)	(0.7334)	(0.6829)	(0.8948)
L.LIQ	−0.6452	−0.1191	−0.7629	−0.8328	−14,847
	(2.8735)	(0.1514)	(2.8415)	(1.5419)	(17.3100)
L.TLTA	−1.0233***	−0.0705***	−1.0124***	−0.6688***	−0.8318***
	(0.2709)	(0.0217)	(0.2630)	(0.2051)	(0.2552)

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(*continued*)

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	S	S	S	lnS	ln2S
L.DEP	−0.3726	−0.0363**	−0.4108*	−0.2618	−0.3717*
	(0.2362)	(0.0177)	(0.2325)	(0.1646)	(0.2092)
L.SIZE	0.1034***	0.0059**	0.1131***	0.0661**	0.0722**
	(0.0322)	(0.0029)	(0.0316)	(0.0279)	(0.0347)
			First Stage IV		
Overhead		−0.4110***	−0.4110***	−0.4110***	−0.4110***
		(0.0145)	(0.0145)	(0.0145)	(0.0145)
Disaster		0.0224***	0.0224***	0.0224***	0.0224***
		(0.0086)	(0.0086)	(0.0086)	(0.0086)
Intercept	YES	YES	YES	YES	YES
N. Obs	6115	6496	6115	6496	6494
Year FE	YES	YES	YES	YES	YES
Institutional Form FE	YES	YES	YES	YES	YES
Estimation Method	Probit	2SLS	IV-Probit	2SLS	2SLS
Under-identification		0.0000		0.0000	0.0000
Weak identification		475.1853		475.1853	474.984
Hansen J-statistic (p-value)		0.9493		0.9314	0.9707
Wald test of $\rho = 0$ (p-value)			0.3000		

References

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

Aghion, P., Bloom, N., Blundell, R., Griffith, R., & Howitt, P. (1996). Competition and innovation: An inverted-U relationship. *The Quarterly Journal of Economics, 120*(2), 701–728.

Albaity, M., Mallek, R. S., Hassan Al-Tamimi, H. A., & Noman, A. H. M. (2021). Does competition lead to financial stability or financial fragility for Islamic and conventional banks? Evidence from the GCC countries. *International Journal of Finance and Economics, 26*(3), 4706–4722.

Allen, F., & Gale, D. (2004). Competition and financial stability. *Journal of Money, Credit and Banking, 36*(3), 453–480.

Anginer, D., Demirguc-Kunt, A., & Min Zhu, M. (2014). How does competition affect bank systemic risk? *Journal of Financial Intermediation, 23*, 1–26.

Angrist, J. D. (2001). Estimation of limited dependent variable models with dummy endogenous regressors. *Journal of Business & Economic Statistics, 19*, 2–28.

Bank of Italy. (2012). Disposizioni di vigilanza in materia di sanzioni e procedura sanzionatoria amministrativa, 18. *December, 2012*.

Barth, J. R., Caprio, G., Jr., & Levine, R. (2001). Banking Systems around the Globe: Do Regulation and Ownership Affect Performance and Stability? In F. S. Mishkin (Ed.), *Prudential Supervision: What Works and What Doesn't*. University of Chicago Press.

Basel Committee on Banking Supervision. (2015). Guidelines for identifying and dealing with weak banks. Retrieved from https://www.bis.org/bcbs/publ/d330.pdf.

Bayazitova, D., & Shivdasani, A. (2012). Assessing TARP. *The Review of Financial Studies, 25*(2), 377–407.

Beck, T., De Jonghe, O., & Schepens, G. (2013). Bank competition and stability: Cross-country heterogeneity. *Journal of Financial Intermediation, 22*, 218–244.

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

Berger, A., Davies, S., & Flannery, M. (2000). Comparing market and supervisory assessments of bank performance: Who knows what when? *Journal of Money, Credit and Banking, 32*, 641–667.

Berger, A., Klapper, L., & Turk-Ariss, R. (2009). Bank competition and financial stability. *Journal of Financial Services Research, 35*(2), 99–118.

Berger, A. N. (1995). The relationship between capital and earnings in banking. *Journal of Money, Credit and Banking, 27*(2), 432–456.

Berger, A. N., Cai, J., Roman, R. A., & Sedunov, J. (2021). Supervisory enforcement actions against banks and systemic risk. *Journal of Banking and Finance, 106222*.

Berger, A. N., & DeYoung, R. (1997). Problem loans and cost efficiency in commercial banks. *Journal of Banking and Finance, 21*, 849–870.

Berger, A. N., & Hannan, T. H. (1998). The efficiency cost of market power in the banking industry: A test of the 'quiet life' and related hypotheses. *Review of Economics and Statistics, 80*, 454–465.

Berger, A. N., & Udell, G. F. (2006). A more complete conceptual framework for SME finance. *Journal of Banking and Finance, 30*(11), 2945–2966.

Bhattacharya, S., Plank, M., Strobl, G., & Zechner, J. (2002). Bank regulation with random audits. *Journal of Economic Dynamics and Control, 26*, 1301–1321.

Bianchi, N., Carretta, A., Farina, V., & Fiordelisi, F. (2021). Does espoused risk culture pay? Evidence from European banks. *Journal of Banking and Finance, 122*, Article 105767.

Boot, A. W. A., & Thakor, A. V. (1993). Security design. *The Journal of Finance, 48*, 1349–1378.

Bos, J. W. B., & Koetter, M. (2009). Handling losses in translog profit models. *Applied Economics, 41*(146), 1466–1483.

Boyd, J., & De Nicolò, G. (2005). The theory of bank risk taking and competition revisited. *The Journal of Finance, 60*(3), 1329–1343.

Caiazza, S., Cotugno, M., Fiordelisi, F., & Stefanelli, V. (2018). The spillover effect of enforcement actions on bank risk-taking. *Journal of Banking and Finance, 91*, 146–159.

Calem, P, & Rob, R (1999). The Impact of Capital-Based Regulation on Bank Risk-Taking. *Journal of Financial Intermediation, 8*(4), 317–352.

Caminal, R., & Matutes, C. (2002). Market power and banking failures. *International Journal of Industrial Organization, 20*(9), 1341–1361.

Carbó, S., Humphrey, D., Maudos, J., & Molyneux, P. (2009). Cross-country comparison of competition and pricing power in European banking. *Journal of International Money and Finance, 28*, 115–134.

Cardillo, G., Onali, E., & Torluccio, G. (2021). Does gender diversity on banks' boards matter? Evidence from public bailouts. *Journal of Corporate Finance, 71*, Article 101560.

Cetorelli, N., & Strahan, P. E. (2006). Finance as a barrier to entry: Bank competition and industry structure in local US markets. *The Journal of Finance, 61*(1), 437–461.

Clark, E., Mare, D. S., & Radić, N. (2018). Cooperative banks: What do we know about competition and risk preferences? *Journal of International Financial Markets Institutions and Money, 52*, 90–101.

Coccorese, P. (2014). Estimating the Lerner index for the banking industry: A stochastic frontier approach. *Applied Financial Economics, 24*, 73–88.

Coccorese, P., & Pellecchia, A. (2010). Testing the 'Quiet Life' Hypothesis in the Italian Banking Industry. *Economic Notes, 39*(3), 173–202.

Cotugno, M., D'Amato, A., Gallo, A., & Stefanelli, V. (2021). Do supervisory enforcement actions affect board composition? *Corporate Governance, 29*, 22–44.

Dam, L., & Koetter, M. (2012). Bank bailouts and moral hazard: Evidence from Germany. *The Review of Financial Studies, 25*(8), 2343–2380.

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

Danisman, G. O., & Demirel, P. (2019). Bank risk-taking in developed countries: The influence of market power and bank regulations. *Journal of International Financial Markets Institutions and Money, 59I*, 202–217.

Delis, M. D., & Staikouras, P. K. (2011). Supervisory effectiveness and Bank risk. *Review of Finance, 15*(3), 511–543.

Delis, M. D., Staikouras, P. K., & Tsoumas, C. (2017). Formal enforcement actions and bank behaviour. *Management Science, 63*(4), 959–987.

Delis, M. D., Staikouras, P. K., & Tsoumas, C. (2019). Supervisory enforcement actions and bank deposits. *Journal of Banking and Finance, 106*, 110–123.

Delis, M. D., & Tsionas, E. G. (2009). The joint estimation of bank-level market power and efficiency. *Journal of Banking & Finance, 33*(10), 1842–1850.

Dell'Ariccia, G. (2001). Asymmetric information and the structure of the banking industry. *European Economic Review, 45*, 1957–1980.

Demsetz, H. (1973). Industry structure, market rivalry, and public policy. *The Journal of Law and Economics, 16*(1), 1–9.

DeYoung, R. (1998). Management quality and X-inefficiency in National Banks. *Journal of Financial Services Research, 13*, 5–22.

Duchin, R., & Sosyura, D. (2014). Safer ratios, riskier portfolios: Banks' response to government aid. *Journal of Financial Economics, 113*(1), 1–28.

Duqi, A., McGowan, D., Onali, E., & Torluccio, G. (2021). Natural disasters and economic growth: The role of banking market structure. *Journal of Corporate Finance, 71*, Article 102101.

European Banking Authority (EBA). (2014). *Guidelines on common procedures and methodologies for the supervisory review and evaluation process (SREP)* (No. EBA/GL/2014/13).

European Systemic Risk Board (ESRB). (2015). *Report on misconduct risk in the banking sector*. Frankfurt am Main: European Systemic Risk Board.
Fernandez, A., & Gonzalez, F. (2005). How accounting and auditing systems can counteract riskshifting of safety nets in banking? Some international evidence. *Journal of Financial Stability, 1*, 466–500.
Fiordelisi, F., & Mare, D. S. (2014). Competition and financial stability in European cooperative banks. *Journal of International Money and Finance, 45*(C), 1–16.
Gan, J. (2007). Collateral, debt capacity, and corporate investment: Evidence from a natural experiment. *Journal of Financial Economics, 85*(3), 709–734.
Goetz, M. R. (2018). Competition and bank stability. *Journal of Financial Intermediation, 35*, 57–69.
Gropp, R., Hakenes, H., & Schnabel, I. (2011). Competition, risk-shifting, and public bail-out policies. *The Review of Financial Studies, 24*(6), 2084–2120.
Hauswald, R., & Marquez, R. (2006). Competition and strategic information Acquisition in Credit Markets. *The Review of Financial Studies, 19*(3), 967–1000.
Hellmann, T. F., Murdock, K. C., & Stiglitz, J. E. (2000). Liberalization, moral hazard in banking and prudential regulation: Are capital requirements enough? *The American Economic Review, 90*(1), 147–165.
Hicks, J. (1935). Annual survey of economic theory: The theory of monopoly. *Econometrica, 3*, 1–20.
Hunter, W. C., & Timme, S. G. (1986). Technical change, organizational form, and the structure of bank production. *Journal of Money, Credit and Banking, 18*(2), 152–166.
Jiménez, G., Lopez, J. A., & Saurina, J. (2013). How does competition affect bank risk-taking? *Journal of Financial Stability, 9*(2), 185–195.
Kanas, A., Hassan Al-Tamimi, H. A., Albaity, M., & Mallek, R. S. (2019). Bank competition, stability, and intervention quality. *International Journal of Finance and Economics, 24*(1), 568–587.
Kane, E. J. (2012). Ethical failures in regulating and supervising the pursuit of safety net subsidies. In *Research handbook on international financial regulation*. Edward Elgar Publishing.
Keeley, M. C. (1990). Deposit insurance, risk, and market power in banking. *American Economic Review, 80*(5), 1183–1200.
Koetter, M., Kolari, J. W., & Spierdijk, L. (2012). Enjoying the quiet life under deregulation? Evidence from adjusted Lerner indices for U.S. banks. *The Review of Economics and Statistics, 94*(2), 462–480.
Kuc, M., & Teplý, P. (2023). Are European commercial banks more profitable than cooperative banks? Evidence from a low interest rate environment. *International Journal of Finance and Economics, 28*(4), 4385–4400.
Kumbhakar, S. C., & Lovell, C. A. K. (2000). *Stochastic frontier analysis*. Cambridge: Cambridge University Press.
Laffont, J. J., & Tirole, J. (1993). *A theory of incentives in procurement and regulation*. MIT press.
Lambert, T. (2019). Lobbying on regulatory enforcement actions: Evidence from US commercial and savings banks. *Management Science, 67*(6), 2545–2572.
Leroy, A., & Lucotte, Y. (2017). Is there a competition-stability trade-off in European banking? *Journal of International Financial Markets, Institutions & Money, 46*, 199–215.
Marcus, A. J. (1984). Deregulation and bank financial policy. *Journal of Banking and Finance, 8*, 557–565.
Martinez-Miera, D., & Repullo, R. (2010). Does competition reduce the risk of Bank failure? *The Review of Financial Studies, 23*(10), 3638–3664.
Peltzman, S. (1976). Toward a more general theory of regulation. *The Journal of Law and Economics, 19*(2), 211–240.
Petersen, M. A., & Rajan, R. G. (2002). Does distance still matter? The information revolution in small business lending. *Journal of Finance, 57*(6), 2533–2570.
Rajan, R. G. (1992). Insiders and outsiders: The choice between informed and arm's length debt. *Journal of Finance, 47*(4), 1367–1400.
Ramakrishnan, R. T., & Thakor, A. V. (1984). Information reliability and a theory of financial intermediation. *Review of Economic Studies, 51*(3), 415–432.
Rhoades, S. A., & Rutz, R. D. (1982). Market power and firm risk: A test of the `quiet life' hypothesis. *Journal of Monetary Economics, 9*(1), 73–85.
Schaeck, K., & Cihák, M. (2014). Competition, efficiency, and stability in banking. *Financial Management, 43*(1), 215–241.
Stigler, G. J. (1971). The theory of economic regulation. *The Bell Journal of Economics and Management Science*, 3–21.
Syverson, C. (2019). Macroeconomics and market power: Context, implications, and open questions. *Journal of Economic Perspectives, 33*(3), 23–43.
Wang, J., Meric, G., Liu, Z., & Meric, I. (2009). Stock market crashes, firm characteristics, and stock returns. *Journal of Banking & Finance, 33*(9), 1563–1574.
Zingales, L. (2013). Preventing economists' capture. In D. Carpenter, & D. Moss (Eds.), *Preventing regulatory capture*. Cambridge: Cambridge University Press.
Zingales, L. (2017). Towards a political theory of the firm. *Journal of Economic Perspectives, 31*(3), 113–130.