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Corporate Crime in European Emerging Markets

Ichiro Iwasaki^{a, b} and Evžen Kočenda^{c, d, e}

Abstract: We examine the corporate criminal records of 18,187 firms operating in 17 European emerging markets and empirically analyze the effects of board composition and national institutions on crime deterrence. Our analysis reveals that 872 firms (about 5% of the sample) committed 1,734 crimes over 2020-2023. We show that firms with larger boards and greater board independence are associated with higher incidences of corporate crime, suggesting that larger or nominally independent boards may not function effectively in emerging market contexts. In contrast, female leadership and board gender diversity do not exhibit significant deterrent effects, implying that gender inclusion alone may not suffice in these environments. In banks with an outside board chairman, the occurrence of corporate crime increases substantially. Importantly, stronger national institutions consistently correlate with lower crime rates, a pattern observed universally across European emerging markets, and boards in countries with stronger institutions appear more effective in deterring crime.

JEL classification numbers: D22, G34, K14, L22, M21

Keywords: corporate crime; board composition; board diversity; corporate governance; national institutions; banks; European emerging markets

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1 Introduction

Corporate crime poses a serious challenge to modern business environments, with broad implications for investors, employees, consumers, and society at large (Clinard and Yeager, 2017; de Batz and Kočenda, 2024). Misconduct at the corporate level not only erodes public trust and shareholder value but also leads to substantial financial and reputational damage for firms and economies (Jackson et al., 2014). These consequences are particularly acute in the banking sector, where institutions manage vast sums of money that do not belong to them (Kočenda and Iwasaki, 2022). While prior research on corporate crime has predominantly focused on developed economies—especially the United States—the dynamics in European emerging markets remain insufficiently explored. These markets are distinguished by transitional regulatory frameworks, evolving governance systems, and distinct institutional environments (Bauer et al., 2007; Bulmer and Lequesne, 2020), all of which may affect the incidence and nature of corporate misconduct. The need to understand and mitigate corporate crime is especially pressing in these markets, where institutional frameworks are still evolving and often face challenges related to enforcement and transparency (Claessens and Yurtoglu, 2013; Baumöhl et al., 2019; Duri, 2021). Hence, the primary research question guiding our analysis is: How do board composition and national institutional quality influence the incidence of corporate crime among firms operating in European emerging markets?

In this respect, we aim to address a critical gap in the literature by examining how firm-level governance structures and national institutional quality interact to influence the likelihood of corporate crime. Although previous research has documented associations between board characteristics and firm outcomes (Jensen and Meckling, 1976; Lipton and Lorsch, 1992; Dalton et al., 1999; Uzun et al., 2004; Ebaid, 2023), and highlighted the role of institutional quality in shaping corporate behavior (La Porta et al., 1998; Baumöhl et al., 2019; Keresztúri et al., 2023), much of this work has either focused on developed countries or treated governance and institutional factors in isolation. In order to keep the introductory section reasonably short, we further expand our motivation and address the key contributions and gaps in the related literature in Section 2, where we also develop our testable hypotheses.

The novelty of our analysis lies in its integration of these two strands of literature within the underexplored context of European emerging markets. Specifically, we contribute new empirical insights by leveraging a large-scale firm-level dataset that captures actual criminal activity by companies, an aspect rarely observed in quantitative corporate governance research. We also assess how the governance and institutional

features interact to either mitigate or exacerbate corporate wrongdoing.

We address our primary research question by analyzing data from 18,187 firms across 17 European emerging economies over the period from January 2020 to September 2023. We use firm-level criminal records linked to board characteristics (e.g., board size, independence, gender diversity) and matched with country-level indicators of institutional quality (e.g., rule of law, press freedom, control of corruption). We employ the Poisson maximum likelihood estimator to estimate regression models to evaluate the effects of governance and institutional variables on crime incidence. We also conduct extensive robustness checks, including estimations of logistic and log-log hurdle regression models.

Our findings show that firms with larger boards and greater board independence are associated with higher incidences of corporate crime, suggesting that larger or nominally independent boards may not function effectively in emerging market contexts. This is important for banks, where the occurrence of corporate crime increases substantially if a board chairman position is held by an outside representative.¹ In contrast, female leadership and board gender diversity do not exhibit significant deterrent effects, implying that gender inclusion alone may not suffice in these environments. Importantly, stronger national institutions, especially press freedom and the rule of law, consistently correlate with lower crime rates, underscoring their role as critical external constraints. We also find significant interaction effects, linking the efficacy of board structures to the quality of national institutions. Specifically, we show that boards in countries with stronger institutions appear more efficient in deterring crime.

The rest of the paper is structured as follows. Section 2 reviews relevant literature and develops testable hypotheses. Section 3 presents our data sources and empirical strategy. Section 4 provides a descriptive overview of corporate crime in the region. Section 5 reports the main empirical results and robustness checks, while Section 6 concludes with policy implications and directions for future research.

2 Literature Review and Hypothesis Development

In accordance with Auditing Standard No. 5, Paragraph 25, under Section 404 of the Sarbanes–Oxley Act (SOX, 2002), management is responsible for (i) setting an appropriate tone at the top of the management hierarchy; (ii) establishing and maintaining a culture of integrity and high ethical values; and (iii) implementing appropriate internal

¹ Board oversight plays an even more pivotal role in banks, as misconduct can lead to capital flight, liquidity crises, or erosion of depositor confidence (Nguyen et al., 2015).

controls to prevent, deter, and detect misconduct. However, this standard also highlights the potential limitations of internal controls, noting that “internal control can be circumvented by collusion or management override” (SOX, 2002).² This warning underscores that the effectiveness of internal controls as a defense against corporate crime heavily relies on the integrity and commitment of management. It also suggests that internal controls may not effectively prevent misconduct committed by managers themselves. Therefore, the board of directors, which exercises oversight and control over top management, must play a crucial role in ensuring management’s commitment to establishing and maintaining truly effective internal controls and preventing management from engaging in wrongful acts. In addition, a set of relevant national institutions serves as a working framework and imposes limits on corporate crime. While the Sarbanes–Oxley Act is not legally binding to companies outside the U.S., it has substantially affected similar regulations enacted by other countries, chiefly in Europe. The most recent items in the European regulatory framework aimed at improving internal controls, audit, and public oversight, including cooperation among EU authorities, include Directive 2014/56/EU and Regulation (EU) No 537/2014. These rules are directly relevant to EU companies, but non-EU countries acknowledge their relevance for their own firms as well.³

Over the past several decades, researchers in corporate finance and business administration have repeatedly demonstrated that the effectiveness of management oversight by any board of directors heavily depends on the board’s composition (Barnhart and Rosenstein, 1998; Bhagat and Black, 2002; Kyere and Ausloos, 2021). In our analysis, we specifically focus on board size (number of directors) and the independence of board directors from top management—variables that have long been central to research in the field. These governance elements are of particular importance in the banking sector, where the complexity of operations and regulatory scrutiny demand a careful balance between board size, expertise, and independence to ensure both comprehensive oversight and effective decision-making (Baral and Patnaik, 2021). In addition, we also consider

² These limitations are particularly critical in the banking sector, where institutions handle public deposits and operate within complex financial systems. Failures in internal controls or oversight in banks can lead to systemic risks affecting the broader economy, which is why banking regulators impose more stringent governance and control requirements compared to other industries (Mourlon-Druol, 2015; Fidrmuc and Lind, 2018).

³After adopting the Sarbanes–Oxley Act of 2002, the Public Company Accounting Oversight Board (PCAOB) was created as a nonprofit corporation to oversee the audits of US-listed public companies. In Europe, auditing oversight is administered by relevant bodies in individual countries. The Committee of European Auditing Oversight Bodies was established in 2016 to further improve oversight of audits across the EU.

gender diversity, a relatively new aspect that is gaining attention among researchers (Gaio et al., 2024). While developed markets are relatively well covered, research targeting emerging markets is far from sufficient. Hence, we concentrate on emerging European markets, where the three elements described above are also crucial when evaluating the functions of boards in emerging market firms (Iwasaki et al., 2024a, b). The three elements of corporate governance also form the basis of the development of our hypotheses.

Regarding board size, Jensen and Meckling (1976) suggested that an excessively large board may fail to effectively fulfill its oversight functions. The literature remains divided on the optimal size of boards, with perspectives varying based on the intended functions of the board. Some researchers, emphasizing the board's role as a "knowledge tank," favor larger boards (Dalton et al., 1999; Coles et al., 2008). Others argue that larger boards are essential for effectively managing the increasing scale and complexity of firm operations (Lehn et al., 2008).

Conversely, proponents of the board's management oversight function echo Jensen and Meckling's perspective, advocating for smaller, more compact boards. In fact, O'Reilly et al. (1989) argued that larger boards often face challenges related to communication and coordination. Furthermore, Lipton and Lorsch (1992) suggested that larger boards create more opportunities for board members to engage in free riding, which can undermine the board's oversight effectiveness. Jensen (1993) later argued that smaller board sizes enhance coordination and communication, thereby facilitating more efficient decision-making (Jensen, 1993). It is widely recognized that being part of a large organization can diminish the presence of each member, thereby weakening his or her sense of responsibility and loyalty toward the organization (MacDermid et al., 2001). As Boone et al. (2007) pointed out, board size involves a trade-off between the costs and benefits of monitoring.⁴ However, from the perspective of corporate crime deterrence, it is crucial to consider the potential negative correlation between board size and the effectiveness of management oversight mechanisms. This trade-off is especially relevant for banks, where boards must be large enough to encompass the necessary skills to oversee complex financial risks but small enough to maintain coordination and accountability, ensuring effective deterrence of misconduct (Faisal and Challen, 2021). Therefore, we test the following hypothesis:

Hypothesis H1: *Firms with larger board sizes are likely to have a higher incidence of*

⁴The existence of this trade-off relationship is precisely why empirical evaluations in previous studies have been divided over the impact of board size on firm performance (Guest, 2009).

crime.

There is no denying that board independence from top management is a crucial firm-level factor determining the effectiveness of the board's oversight function and preventing corporate misconduct and crime. Board independence is frequently highlighted in corporate crime research as a significant factor influencing the incidence of misconduct; it is typically assessed by considering the route of the board chairman's appointment and the proportion of outside/independent directors on the board. For instance, Uzun et al. (2004) demonstrated the effectiveness of board independence in reducing corporate misconduct by identifying a negative correlation between the incidence of corporate misconduct in the U.S. from the 1970s to the 2000s and the number of independent directors serving on boards and their audit and remuneration committees. Ebaid (2023), analyzing listed firms in Saudi Arabia, also reported that greater board independence correlates with a lower likelihood of financial statement manipulation. Similarly, numerous studies in China have shown that the presence of outside/independent directors on boards has a deterrent effect on corporate fraud (Kong et al., 2019; Chen et al., 2022; Xiang and Zhu, 2023). Conversely, several studies have indicated that firms in which the same individual holds both the positions of CEO and chairman of the board tend to exhibit a high incidence of noncompliance (Zhou et al., 2018; Zhao et al., 2021; Wang et al., 2022). Finally, based on a meta-analytic review, Neville et al. (2018) demonstrated that a generally negative relationship between board independence and corporate misconduct varies based on the implementation form that independence takes on (i.e., independence of the whole board or between the roles of CEO and board chair) and is more strongly negative in countries with less corruption. We ask whether previous studies' findings might also broadly apply to emerging markets. Thus, we propose to test the following hypothesis regarding the effectiveness of board independence in reducing corporate crime:

Hypothesis H2: *Board independence in emerging market firms inhibits the incidence of corporate crime.*

The last corporate governance element on our list is gender diversity, which has attracted significant attention from researchers in recent years due to the advantages it offers to corporate management. Indeed, numerous studies have closely examined the association between board gender diversity and various corporate activities, including financial performance, and have generally reported a positive relationship between female participation and financial performance under different aspects (e.g., return, risk,

cost of capital, fraud, etc.); for a meta-analytic assessment, see Gaio et al. (2024). According to Iwasaki et al. (2024b), Central and Eastern European countries are on par with advanced nations in terms of the prevalence of firms recruiting female board members and the proportion of female directors, with the presence of women on boards garnering considerable attention in these emerging markets.

Board gender diversity is also a focal point in several studies on corporate misconduct. For instance, Arnaboldi et al. (2021) investigated the frequency of fines received by European banks from US regulators over a 10-year period from 2008 to 2018 and found that greater female representation on boards leads to a proportional reduction in the frequency of fines, equivalent to savings of \$7.48 million per year. The authors argued that the preventive effect of board gender diversity on misconduct stems from the relatively higher ethical standards and stronger risk aversion among female directors rather than merely their contribution to diversity. Furthermore, Cumming et al. (2015b) identified a negative correlation between securities fraud committed in China from 2001 to 2010 and board gender diversity, supporting the hypothesis that female presence effectively reduces both the frequency and severity of misconduct in the male-dominated securities industry. Luo et al. (2020) used data from Chinese listed firms, chiefly in the manufacturing sector, to support their hypothesis that firms with female chief financial officers (CFOs) are less likely to engage in risky and unethical behavior as compared to their counterparts with male CFOs. This finding builds on psychological and sociological research indicating that women tend to be more risk-averse and ethical than men. Despite the links between gender diversity and corporate crime being documented in China, the relationship between board composition and corporate crime in general is less researched, in particular in European emerging markets. Based on these findings, we test the following hypothesis regarding board gender diversity in emerging market firms:

Hypothesis H3: *Board gender diversity in emerging market firms reduces the incidence of corporate crime.*

The final strand of the literature related to our analysis is linked to the quality of national institutions. In our analysis, we accentuate this approach since links between national institutions and corporate crime are entirely underexplored in the context of European emerging markets. Many studies have evaluated the impact of state-level institutional quality on corporate behavior and performance, but have neglected corporate crime, with the majority identifying a positive link between these factors. Examples include Baumöhl et al. (2019), who found a positive relationship between institutional

quality and firm survival in European emerging markets, but did not explore a link with respect to corporate crime. Further, Matemilola et al. (2019) demonstrated a positive impact of institutional quality on the capital structure of firms in developing countries, and Agostino et al. (2020) observed positive effects of institutional quality on total factor productivity among small and medium-sized manufacturing firms in Europe. In addition, Iwasaki et al. (2022) reported that institutional quality and the maturity of financial institutions significantly influence the survival of small and medium-sized enterprises in European emerging economies. Finally, Kočenda and Iwasaki (2020) showed that institutional quality in terms of the development of the banking sector is a vital factor positively affecting bank survival in Central and Eastern Europe.⁵

However, the evidence is less clear in terms of corporate crime. Further, and regrettably, almost all available studies on corporate crime focus solely on crimes committed in a specific country or compare situations across a limited number of countries. As such, they often overlook the national institutions expected to significantly influence the incidence of corporate crime. An exception is Keresztúri et al. (2023), who cover 79 countries between 2011–2019 and regress the total number of corporate misconduct events by country onto the World Press Freedom Index, compiled and released by the NGO Reporters Without Borders. As a result, they conclude that press freedom effectively discourages corporate crime.

Historically, national institutions have played a pivotal role in maintaining social order and deterring crime and misconduct. Judicial and police systems are indeed the primary tools of the state mechanism serving this purpose. Additionally, various government regulations, legal protections for freedom of the press and speech, accountability mechanisms, and the monitoring capabilities of civil society also play crucial roles in this context. In summary, the quality of these national institutions is expected to significantly influence the incidence of corporate crime. Therefore, we propose to test the following hypothesis:

⁵ The impact of national institutions with respect to banks can be further emphasized because the commercial banks require reliable contract enforcement and property-rights protection. During the economic transformation, foreign strategic investors have bought controlling stakes in many CEE banks, bringing with them their compliance practices and demanding clearer property-rights protection and creditor-friendly courts (Bonin et al. 2015). Large private-sector banks that emerged during the CEE transition therefore lobbied for judicial reforms, creditor-rights legislation, and better information infrastructure in the 1990s and early 2000s (Bonin et al., 2015). These reforms, in turn, correlate with lower corporate crime incidence in our sample countries. Evidence from CEE shows that bank-friendly institutional upgrades were critical for bank survival during post-crisis restructuring, underscoring the feedback loop between finance and institutional quality (Kočenda and Iwasaki, 2020). Survival outcomes became more complicated during the dual crises of the COVID-19 pandemic and the Russo-Ukrainian war, but the CEE banking sector played a role in influencing firm resilience through credit provision and financial support mechanisms (Kočenda and Iwasaki, 2025).

Hypothesis H4: *The quality of national institutions influences the incidence of corporate crime in emerging markets.*

While sharing the same research interest as Keresztúri et al. (2023), we will examine Hypothesis H4 by employing a broader perspective of national institutions and utilizing a large-scale firm-level dataset.

3 Data and Empirical Methodology

This section describes the data and empirical methodology used to test the four hypotheses presented in the previous section.

3.1 Data

The dataset employed for the empirical analysis in this paper is assembled from three different sources. The first source is Orbis, a comprehensive company database compiled by Bureau van Dijk, a Moody's Analytics company. As of 2025, Orbis is the largest commercial database, covering more than 400 million firms and organizations across various industries worldwide. It provides extensive information on both listed and unlisted firms in European emerging markets. These markets include 11 EU member countries in Central and Eastern Europe (Bulgaria, Croatia, the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovakia, Slovenia, Romania) and 6 non-EU member countries in Eastern Europe (Albania, Bosnia and Herzegovina, Moldova, Montenegro, North Macedonia, Serbia).⁶

Orbis offers detailed business descriptions and financial statements for each registered firm, alongside data on ownership and board structures. This makes it an ideal source for the research purposes addressed in this paper. The board structure data provided by Orbis includes job titles and genders of individual board members. This information allows for detailed analysis of the total number of board members per firm, their appointment processes (internal vs. external), and their gender. Utilizing this feature of the Orbis database, we searched for (i) listed and unlisted firms in 17 European emerging markets that (ii) were confirmed to have had certain business activities from

⁶ The set of 17 European emerging markets was chosen based on the critical common feature these countries share – all of them belonged to the so-called “command economies” with a command economic system having been installed after World War Two. Since the 1990s, these countries embarked on an uneasy road to privatizing state-owned companies that had to undergo critical restructuring along the way. They have also striven to adopt necessary institutions, improve the legal environment, and establish a workable international trade and cooperation framework to facilitate their transition toward a market economic system (Kočenda, 2001).

2017 to 2018 and (iii) demonstrated ongoing activities in 2019, ensuring that (iv) information on the job titles and genders of all board members was available.

Based on the available records, we proceeded with data cleaning and sample creation in the following way. First, we excluded firms for both listed and unlisted companies if any control variables were identified as clear outliers or exhibited unrealistic values. Second, since we aim to assess board impact, in the case of unlisted firms, we removed firms where the board of directors' variable (particularly board size) was found to be an outlier or showed unrealistic values. On the other hand, for listed firms, we took a more cautious approach to maintain a sufficient number of observations. We cross-checked the figures with the firm's securities reports to see if the board of directors' variable appeared close to an outlier. Then, we retained only those firms for which the ORBIS data were confirmed to be accurate. Following the above steps, the final sample comprised 18,187 firms, of which 1,206 were listed (6.63 %) and 16,981 were not listed (93.37 %).⁷

In **Appendix Table A.1**, we display a breakdown of the 18,187 sample firms organized into two country groups with respect to their EU membership. We further present detailed information on the country-level composition of sample firms in 17 European emerging markets by listing status (listed vs. unlisted), number of employees, and industry sector in **Appendix Table A.2**. As we show, our sample covers firms of various sizes and spans across a wide range of industry sectors. The highest proportion (40%) represents manufacturing firms, while the representation of banks and financial institutions (2%) and energy suppliers (2%) is considerably lower. However, these proportions correspond to the numbers of specific firms in the economies under research. According to the official statistics available, our sample sufficiently represents the firms in Central and Eastern European (CEE) countries. In addition to information on each sample firm's board structure, we also collected data from Orbis on the industrial sector, firm size, firm age, and financial performance. In this respect, we employ some long-term firm performance variables so that we are able to control for steady financial and operational performance in firms surviving in their business, even when committing crime. This approach is in line with the idea that firm survival is shaped by long-term performance rather than short-term output.⁸

⁷ We acknowledge that some variables presented in Table 1 might seem to have extreme values. For example, the board size variable records a maximum of 146. Still, it is an accurate number. Our dataset contains a large energy corporation with 146 directors listed in its financial report. Due to this case, we double-checked our data to ensure their accuracy. We thank the reviewer for drawing our attention to this issue.

⁸ For example, in a highly impactful analysis, Decker et al. (2016) show that firm survival and growth are not driven by isolated annual outcomes but rather by the persistent ability to generate high growth over multiple years, which is a key to survival. Similarly, Cefis and Marsili (2019)

The second data source is the Global Risk Information Database (GRID), also provided by Moody's Analytics. GRID is a unique source compiling a comprehensive range of risk-relevant information from around the globe. It includes media reports, official gazettes, and other publications by international organizations and national government agencies, as well as additional data on sanctions and penalties applied to corporations and businesspeople. From this source, we were able to identify relevant crime events. Despite its wide reach, the GRID database often does not allow its users to specify the exact date of crime occurrence, but provides the timing when they were disclosed. On the other hand, the risk data are linked to company-related and ownership-related data maintained in Orbis, effectively reducing false positives that may arise while screening companies and individuals. We screened a total of 18,187 firms in the sample for criminal information using their names and locations in the GRID and extracted criminal data that also matched the corporate identity numbers in Orbis.⁹ The GRID registers 57 crime categories, and we have divided them into three types to serve our analysis: economic crimes, political and social crimes, and international crimes. In **Appendix Table A.3**, we present all relevant details and show that one or more firms in our sample committed crimes belonging to 36 crime categories (out of 57) between January 2020 and September 2023.¹⁰

The third data source constitutes a set of national-level institutional indices compiled and released by the World Bank, the Varieties of Democracy Project, and the NGO Reporters Without Borders. These indicators provide comparable data on the quality of institutions across more than 200 countries and territories, including all 17 European emerging markets analyzed in this paper. From the databases of these organizations, we extracted data on five institutional dimensions over a three-year period from 2017 to 2019. These dimensions cover (a) Rule of Law, (b) Voice and Accountability, (c) Control of Corruption, (d) Access to Justice, and (e) Press Freedom. In addition, to assess the overall impact of national institutions, we followed the approach of Baumöhl et al. (2019) and generated a first principal component score from these five institutional variables, creating a comprehensive index of national institutions.

demonstrate that long-term innovation capability and performance buffer firms against market exits, particularly during downturns. The logic readily extends to financial or operational performance as well.

⁹Although criminal information extracted from the GRID may include some records of crimes committed by individual managers or employees, the majority concerns organized crime and misconduct committed by firms.

¹⁰Further details on Orbis and the GRID can be found on the Moody's Analytics website (<https://www.moody.com/web/en/us/capabilities/company-reference-data/orbis.html>; <https://www.moody.com/web/en/us/kyc/products/grid.html>).

3.2 Empirical methodology

Hypotheses H₁ to H₃, regarding the effect of board composition on corporate crime, are to be tested by regressing the number of crimes (*crime*) committed by the *i*-th firm against five board composition variables (*board_composition*), while controlling for a series of firm attributes (*control*) that potentially influence the incidence of crime; we also include the fixed effects of the industry and state to which the *i*-th firm belongs. Board composition variables include: (1) board size (total number of directors) of the firm; (2) outside board chairmanship, which assigns a value of 1 to firms that elect the chairman of the board from among outside directors; (3) board independence proxied by the ratio of outside/independent directors to all directors; (4) female CEO, bearing a value of 1 in firms where a CEO is female;¹¹ and (5) board female representation (the proportion of female directors on the board). We use the Poisson maximum likelihood estimator to estimate the following equation:

$$crime_{i,t} = \mu + \beta \cdot board_composition_{i,t-1} + \sum_{n=1}^8 \gamma_n \cdot control_{n,i,t-1} + \theta_j + \varphi_k + \varepsilon_i, \quad (1)$$

where μ is a constant term, β and γ are the parameters to be estimated, θ represents the fixed effects for the *j*-th industry to which the *i*-th firm belongs, φ represents the fixed effects of the *k*-th country in which the *i*-th firm is located, and ε is a disturbance term.

Hypothesis H₄, which describes the impact of the quality of national institutions on the incidence of corporate crime, will be tested by estimating the effects of six national institution variables: (1) Rule of Law, (2) Voice and Accountability, (3) Control of Corruption, (4) Access to Justice, (5) Press Freedom, and (6) Comprehensive NI index. These variables are introduced in place of country-level fixed effects while controlling for all firm attributes, including board composition, as outlined in the following equation:

$$crime_{i,t} = \mu + \alpha \cdot national_institution_{k,t-1} + \sum_{m=1}^5 \beta_m \cdot board_composition_{m,i,t-1} + \sum_{n=1}^8 \gamma_n \cdot control_{n,i,t-1} + \theta_j + \varepsilon_i, \quad (2)$$

where α represents the parameter associated with each national institution variable.

Drawing on survey articles by Cumming et al. (2015a) and Cole et al. (2021), along with empirical results from previous studies cited in Section 2, we employ eight control

¹¹ We use only the “female CEO” variable because, in more than 90% of sampled firms with a female CEO, the CEO also holds the position of chairing the board of directors.

variables. These variables capture (a) listing status, (b) ownership concentration, (c) state ownership, (d) foreign ownership, (e) firm size, (f) firm age, (g) profitability, and (h) solvency, and they are estimated simultaneously with board composition and national institution variables. According to the literature, listed firms under government and market surveillance are less likely to commit corporate crimes as compared to their unlisted counterparts, *ceteris paribus*. Similarly, firms controlled by large shareholders, the state, or foreign investors, where managers are subject to strict oversight, also show a lower propensity for misconduct. Conversely, large corporations and firms that have been operational for an extended period tend to have a higher likelihood of misconduct and crime, due to the complex relationships within their internal organization and with stakeholders. Furthermore, researchers have argued and demonstrated that highly profitable firms are more prone to crime due to lax managerial discipline, whereas firms with high solvency often avoid criminal risks due to their ample cash reserves. Therefore, five variables are expected to act in ways that reduce corporate crime (listing status, ownership concentration, state ownership, foreign ownership, and solvency), while three variables are expected to act in ways that encourage it (firm size, firm age, and profitability).

The names, definitions, and descriptive statistics of the aforementioned variables are detailed in **Table 1**. As indicated by regression equations (1) and (2), a total of 19 independent variables, ranging from board size to solvency, are predetermined relative to the dependent variables. Specifically, the variable of corporate crime refers to events occurring from January 2020 to September 2023, while 11 variables, including the 5 board composition variables and 6 control variables from listing status to firm age, pertain to events from 2019. The remaining 8 variables, consisting of 6 national institution variables along with profitability and solvency, are calculated as averages for the period from 2017 to 2019. In this way, we can avoid endogeneity arising from simultaneous causality between dependent and independent variables.¹² Industry-level fixed effects, θ , are controlled by incorporating a total of 13 industry dummy variables, with the manufacturing industry serving as the reference category.¹³ The statistical significance of regression coefficients is computed using heteroscedasticity-consistent robust standard errors. Finally, we avoid potential endogeneity concerns by adopting an estimation

¹²The correlation coefficients for all combinations of variables estimated simultaneously remain well below the threshold of 0.70, a level that could indicate potential multicollinearity; a matrix is not presented to conserve space. Additionally, our preliminary estimation procedure confirmed that the variance inflation factors (VIFs) for the independent variables were all less than 5.0.

¹³The industrial sector categories correspond to those listed in **Appendix Table A.1**.

strategy that regresses the number of corporate crime records (from January 2020 to September 2023, as reported in the GRID database) on a set of national- and firm-level preconditions observed in 2019 or during the period 2017–2019 (averages). This implies that our dataset is cross-sectional rather than panel in nature, and therefore it is not suitable for controlling for firm-level fixed effects econometrically. In this respect, we follow an empirical approach that has been commonly employed in the relevant literature analyzing corporate misconduct (e.g., Cao et al., 2023; Lu et al., 2023; Zhao et al., 2024).

4 Corporate Crime in Emerging Markets: A Quantitative Statistical Overview

Before reporting the empirical results, in this section, we provide a quantitative statistical overview of corporate crime in the 17 European emerging markets using the dataset described in the previous section.

We found that among 18,187 firms across the 17 European emerging markets, a total of 872 firms (4.8% of the total) have committed offenses according to corporate crime records extracted from the GRID. Of these 872 crime-committing firms, 537 (61.6%) committed a single offense, 296 (33.9%) had between two and five criminal records, and 39 (4.5%) were involved in six or more offenses (**Appendix Figure A.1**). Furthermore, these firms committed a total of 1,734 offenses during the observation period, with 1,049 (60.5%) classified as economic crimes, 652 (37.6%) as political and social crimes, and the remaining 33 (1.9%) as international crimes (**Appendix Figure A.2**).

Interestingly, the frequency and patterns of corporate crime vary remarkably across the two different country groups. As shown in **Appendix Table A.5**, the proportion of sample firms engaged in misconduct in Eastern European non-EU countries (4.9%) is comparable to that in Central and Eastern European EU member countries (4.8%). Nevertheless, the breakdown of crime-committing firms by the number of offenses shows that the proportion of crime-committing firms with two or more offenses is significantly higher in Eastern European non-EU countries as compared to their counterparts. This relatively strong tendency toward habitual offenses in Eastern European non-EU countries may stem from the vulnerability of state governance there, in contrast to the more robust systems in Central and Eastern European EU members. Corporate recidivism of firms in Eastern European non-EU countries can be associated with path-dependent causes, such as weak state governance or ineffective self-monitoring (Zheng and Chun, 2017).

More importantly, political and social crimes occur with surprising frequency in

Eastern European non-EU countries. According to **Appendix Table A.5**, an astonishing 64.3% of corporate crimes in these countries fall into the category of political and social offenses, as compared to 35.0% in Central and Eastern European EU members. In the latter, unlawful corporate acts are predominantly economic in nature, primarily involving economic malpractice or tax evasion. In contrast, firms in Eastern European non-EU countries are frequently implicated in bribery, perjury, and other activities that contribute to political and social instability. This suggests that the state security systems in these economies are significantly weaker than those in their EU counterparts.

Appendix Table A.6 examines whether the incidence of these corporate crimes in European emerging markets correlates with board composition and state-level institutional quality. This table compares differences between crime-committing and law-abiding firms, as well as among three groups of crime-committing firms categorized by the number of offenses, using variables related to board composition and national institutions. According to the table, the mean values of board composition variables are typically higher for crime-committing firms than for noncriminal ones, except for board female representation. The differences between crime-committing and noncriminal firms are statistically significant according to the *t*-test and the test for differences in proportions in terms of board size, outside board chairmanship, and board independence. Furthermore, among the three groups of crime-committing firms, those with a higher number of offenses tend to have larger boards and greater board independence, as evidenced by the mean values of these variables. Multiple group comparisons using analysis of variance (ANOVA) corroborate this trend regarding board size and outside board chairmanship. These results affirm Hypotheses H₁ and H₃ but contradict the expectation outlined in Hypothesis H₂. Conversely, the relationship between the incidence rates of corporate crimes and the quality of national institutions aligns strongly with Hypothesis H₄. Notably, the mean values for all five national institution variables are statistically significantly higher for law-abiding firms as compared to crime-committing firms. The number of offenses committed by crime-committing firms, however, shows a weak inverse correlation with national institution variables.

Appendix Table A.7 presents the correlation coefficients between the number of offenses committed by firms and variables related to board composition and national institutions. These coefficients are calculated for all 17 emerging markets, as well as for specific country groups and types of crime. Across the 17 emerging markets, the correlation coefficients between the number of offenses and variables such as board size, outside board chairmanship, and board independence are significantly positive. In

contrast, the coefficients for female CEOs and female board representation are insignificant. By and large, these patterns persist consistently across data segmented by country group and crime type. Conversely, the correlation coefficients between the number of offenses and national institution variables are significantly negative in all but two cases, underscoring the deterrent effect of state-level institutions on corporate crime across various country groups and crime types.

The findings presented in Appendix **Tables A.6** and **A.7** generally support Hypotheses H₁ and H₄ but do not provide evidence for Hypotheses H₂ and H₃. However, these univariate analyses do not control for other factors that may influence the incidence of corporate crime. Therefore, the final assessment of the hypotheses will be deferred to the regression analysis in the following section.

5 Empirical Results

This section reports the results of the hypothesis tests conducted using the data and methods described in Section 3. Subsections 5.1 and 5.2 present findings on the effects of board composition and national institutions on corporate crime, respectively. Subsection 5.3 examines the synergistic effects between board composition and national institutions. Finally, Subsection 5.4 evaluates the statistical robustness of the estimation results from multiple perspectives.

5.1 The effect of board composition on corporate crime

The estimation results for Eq. (1) are summarized in **Table 2**. Recalling that the independent variable is the number of crime records registered in the GRID database, a statistically significant coefficient would indicate an increase in the number (or fraction) of crime incidents linked to an explanatory variable. Hence, coefficients around 0.1 and above would carry economic significance. Models [1] through [5] indicate that board size, outside board chairmanship, and board independence exhibit significantly positive coefficients that associate the effects with increased corporate crime. Then, specifically, according to the estimates in Models [1] to [3], an additional board member is associated with a statistically significant increase of 0.03 in corporate crime incidents, on average, which is not really an economically meaningful impact. On the other hand, firms chaired by an external board member exhibit, on average, 0.49 more criminal incidents than those led by an internal chairman; this outcome is highly economically significant. Furthermore, a 10-percentage-point increase in board independence is linked with a 0.06 increase in

the number of crimes committed by the firm; such an impact is only marginally economically relevant. The above evidence contradicts that found in other emerging markets (Ebaid, 2023; Xiang and Zhu, 2023). One reason could be that outside directors might lack the necessary information or involvement to effectively monitor the company's activities, potentially leading to oversight failures. Further, the lack of a necessary culture of integrity (SOX, 2002) might be behind the findings since fostering an integral culture within the firm, for which management is responsible, has been argued to reduce corporate misconduct (Vu et al., 2025).¹⁴

In contrast, the coefficients for female CEOs and female board representation are negative but not statistically significant. Byron and Post (2016) found in their meta-analysis that female representation is associated with a reduction in corporate fraud, but our statistically insignificant results hint that the gender diversity of directors might not be at a sufficient level in emerging CEE markets to influence the effectiveness of board oversight. The finding also indirectly resonates with the evidence of Atalay et al. (2025) that gender-board diversity enhances sustainable (ESG) practices in emerging markets, which are unlikely to be associated with corporate misconduct, but gender diversity requires a critical mass beyond a single female director. Within the banking sector, earlier evidence suggests that greater gender board diversity may improve risk oversight and ethical decision-making, which are crucial for preventing misconduct. Still, as in other sectors, a critical mass of female representation appears necessary to realize these benefits fully (Adams and Funk, 2012).

The above results support Hypothesis H₁ but do not provide evidence for Hypotheses H₂ and H₃ regarding the impact of board composition on corporate crime. However, when all board composition variables are estimated simultaneously in Model [6], the statistical significance of the outside board chairmanship variable decreases below the 10% threshold. This suggests that the empirical evidence for the effect of board chairmanship is weak in a statistical sense.¹⁵

While **Table 2** assumes a monotonic or linear effect of board composition, several prior studies on optimal board structure have convincingly indicated the possibility of

¹⁴ In banks, establishing a culture of integrity is especially critical given their fiduciary responsibility to depositors and the systemic risks posed by financial misconduct. Management commitment to ethical standards, supported by effective board oversight, is essential to prevent fraud and maintain public trust in the banking system (Hurley et al., 2014).

¹⁵ For banks, the leadership roles on boards, including the chairmanship, are often subject to regulatory standards emphasizing independence and expertise. Although our findings suggest weak statistical evidence for the chairmanship's effect in the broader sample, it remains possible that in banking firms, strong and independent board leadership plays a more pronounced role in curbing corporate misconduct (Dong et al., 2017).

nonlinearity. For example, Raheja (2005), Adams and Ferreira (2007), or Ning et al. (2010) argued that board size, independence, and gender diversity may exert curvilinear effects on top management decision-making and organizational behavior. Accordingly, the possibility of nonlinear effects of board composition on corporate crime in emerging market firms cannot be overlooked. We explored this issue further and re-estimated Eq. (1) by incorporating squared terms for three board composition variables: board size, board independence, and female board representation.

According to **Table 3**, the squared terms for board size and board independence are statistically significant and negative, indicating nonlinear effects for these two variables. The non-linear relationship between corporate board characteristics and crime incidence can be theoretically explained through competing governance mechanisms. In the case of board size, increasing the number of directors initially improves oversight by broadening expertise and reducing individual biases, thus enhancing the board's ability to detect and prevent managerial misconduct (Lipton and Lorsch, 1992; Jensen, 1993). However, beyond a certain threshold, larger boards face coordination inefficiencies, diluted accountability, and collective action problems, which undermine monitoring effectiveness and may facilitate corporate wrongdoing (Yermack, 1996; Raheja, 2005; Coles et al., 2008). Similarly, board independence exhibits diminishing returns. While a higher proportion of independent directors enhances objectivity and reduces managerial entrenchment (Fama and Jensen, 1983), excessive independence can impair access to firm-specific information and reduce directors' embeddedness in internal processes, thereby weakening their ability to detect subtle or complex forms of misconduct (Adams and Ferreira, 2007; Duchin et al. 2010). These theoretical perspectives support a non-linear, typically inverted *U*-shaped, association between both board size and independence and the likelihood of corporate crime. Our estimation results are in line with the above theoretical reasoning and indicate that, although greater board size and independence are positively correlated with the incidence of corporate crimes, their marginal impact diminishes as their values increase. However, the small regression coefficients suggest that the effect diminishes slowly, and its economic impact is rather small.¹⁶ In contrast, the squared term for female board representation is not significant. Based on these findings, we conclude that there are no analytical concerns in estimating only the linear terms of the board composition variables in subsequent regression analyses.

¹⁶The nonlinear effect of board size indirectly correlates with the evidence that an initially positive impact of board size reaches a threshold, but an excessive number of board directors indicates an increase in the probability of failure among firms in CEE countries (Baumöhl et al., 2020).

5.2 The effect of national institutions on corporate crime

The estimation results for Eq. (2) are presented in **Table 4**. All six models produce negative estimates for national institution variables, with statistical significance at the 5% level or lower. Negative coefficient estimates indicate that better national institutions are linked with a lower incidence of corporate crime. In addition, the estimated coefficients for these institutional variables are quite significant in economic terms, given the scale and definition of each institutional measure. For instance, a one-unit increase in the World Bank's Rule of Law indicator corresponds to a decrease of 0.46 in the average number of corporate crimes at the country level. This economically meaningful outcome indicates that the quality of national institutions is closely linked to the frequency of corporate crime in European emerging markets. Furthermore, the magnitude of the coefficients clearly demonstrates the strong deterrent effect of national institutional quality on corporate crime, providing solid support for Hypothesis H₄.

Further, the institutions exhibit a critical impact in terms of press openness. Notably, the *t*-value for Press Freedom is -6.29, the highest among the six institutional variables, followed by the Comprehensive NI index (-3.66) and Rule of Law (-3.22).¹⁷ These results suggest that press surveillance is crucial in curbing corporate crime, comparable to the social control exerted by legal frameworks in Central and Eastern Europe. This finding aligns with those of Keresztúri et al. (2023), who highlight the role of the press in exposing corporate crime. The above results are further important with respect to banks, as in Central and Eastern Europe (CEE), private banks emerged as part of the economic transformation during the 1990s (Bonin et al., 2015), and banking sectors lacked a solid footing as compared to the old EU members (Brůha and Kočenda, 2018). In this respect, the importance of a free and investigative press is especially critical in the banking sector, where complex financial transactions and asymmetric information can mask misconduct. Press freedom acts as an external check that complements formal regulatory oversight, increasing transparency and helping to uncover fraudulent activities that might otherwise go undetected in banks (Nguyen, 2021). Further, the importance of national institutions in preventing corporate crime indirectly correlates with evidence that not only corporate governance but also banking reforms that cultivate institutions relevant to a sound banking sector were instrumental in bank survival in CEE countries (Kočenda and

¹⁷The *t*-values are calculated based on the coefficients and standard errors reported in **Table 9**. For example, the *t*-value for Press Freedom is computed as the coefficient (-0.06748) divided by the standard error (0.0107) = -6.29. In a similar way, we obtain the *t*-values for the Comprehensive NI index (-0.9285/0.0254 = -3.66) and Rule of Law (-0.4568/0.142 = -3.22).

Iwasaki, 2020).¹⁸

5.3 Synergistic effects between board composition and national institutions

The estimation results in **Tables 2** and **4** align with Hypotheses H₁ and H₄, confirming the impacts of board size and national institutions on corporate crime. However, they provide no support for Hypotheses H₂ and H₃, regarding the roles of outside/independent directors and female board representation. This raises a critical question: Are national institutional quality and board composition mutually independent in their influence? More specifically, does a board's ability to prevent corporate crime differ between firms in countries with robust institutional frameworks and those in countries with weaker institutions, where boards may need to curb managerial and employee misconduct independently, without substantial administrative or judicial support?¹⁹

In the next step, we investigate potential synergistic effects between board composition and national institutions. For that, we incorporated relevant interaction terms into and modified the specification (2) into the following form:

$$\begin{aligned} crime_{i,t} = & \mu + \alpha \cdot national_institution_{k,t-1} + \sum_{m=1}^5 \beta_m \cdot \\ & board_composition_{m,i,t-1} + \sum_{p=1}^5 \beta_p (national_institution_{k,t-1} \cdot \\ & board_composition_{p,i,t-1}) + \sum_{n=1}^8 \gamma_n \cdot control_{n,i,t-1} + \theta_j + \varepsilon_i. \end{aligned} \quad (3)$$

In specification (3), all variables are defined in the same way as in specifications (1) and (2).

The results of the synergistic effects between board composition and national institutions are presented in **Table 5**. Models [2] and [3] in the table show that, when outside board chairmanship and board independence are used as board composition variables, their interaction with the Comprehensive NI index yields significantly negative estimates. The synergistic impact of the outside chairmanship (-0.14) is economically

¹⁸ The vulnerabilities of banking sectors in emerging European markets during this transitional phase were exacerbated by weak institutional frameworks, including underdeveloped legal enforcement and regulatory bodies. These institutional shortcomings increased the risk of corporate crime within banks and highlighted the urgent need for comprehensive reforms to establish robust governance and supervisory practices tailored to the banking industry (Mekki, 2019; Bermpei ta al., 2018).

¹⁹ This question is especially pertinent for banks, where regulatory oversight is intense but varies substantially across emerging European markets. In jurisdictions with strong institutions, banking boards often benefit from complementary external supervision, reducing their sole burden in misconduct prevention. Conversely, in countries with weaker institutional environments, banks rely more heavily on internal governance mechanisms, making board independence and effectiveness critical to safeguarding against corporate crime (Haan and Vlahu, 2015).

significant. The absolute values of the regression coefficients for the interaction terms are approximately one-third those of the coefficients for the board composition variables alone, suggesting important implications. Notably, the Comprehensive NI index ranges from -4.587 in Belarus to 4.725 in Estonia, spanning 9.312 points. This suggests that in countries with high institutional quality, such as the Czech Republic, Estonia, Lithuania, and Slovakia, the negative synergistic effect between national institutions and board independence not only offsets the positive impact of board independence but may also lead to an overall reduction in corporate crime. We conjecture that in banks and finance firms in countries with better institutions, the synergy between effective institutional frameworks and independent boards likely enhances compliance culture and reduces opportunities for misconduct. This environment fosters a dual-layered defense where regulatory bodies and board governance work together to deter corporate crime more effectively than either could achieve alone (Push and Mihus, 2024). Such a positive effect of institutional quality is in line with previous research linking the impact of institutions on survival ability among production firms (Baumöhl et al., 2019) and banks (Kočenda and Iwasaki, 2020) in Central and Eastern Europe.

Conversely, the interaction terms in the remaining three models are either positive or statistically insignificant. Out of these, the interaction between board size and the comprehensive NI index is statistically significant and positive (0.006), which indicates that stronger institutions seem to exacerbate the crime risk of larger boards. Seemingly counterintuitive results can still be meaningful. Large boards may inhibit effective oversight, leading to increased misconduct (Jensen, 1993) while stronger institutions can create both more risks (via regulatory detection) and more incentives for firms to conceal or avoid detection (La Porta et al., 2000). The combination can lead firms with large boards to either conceal more effectively or be more confident, thus amplifying misconduct risk in robust institutional environments. However, the above synergistic impact is surely not economically significant. Still, the results imply that synergistic effects between corporate boards and national institutions may be particularly relevant to the status and authority of outside/independent board chairs and directors. In this regard, Hypothesis H₂ may not apply uniformly across all European emerging markets but could pertain to selected countries where national institutions have reached a certain development threshold. For example, for banks operating in countries with less developed institutions, the lack of strong external enforcement elevates the importance of empowered independent directors and board chairs. Their capacity to act decisively in governance matters becomes crucial in compensating for institutional weaknesses,

highlighting the heterogeneous nature of board effectiveness across different institutional environments (Krause et al., 2019).

5.4 Robustness checks and additional results

We assessed the robustness of the baseline estimates reported in **Tables 2** and **4** by examining the nonlinearity of board composition in **Table 3** and exploring the synergistic effects between national institutional variables and board composition variables in **Table 5**. Now, we proceed to further evaluate the statistical robustness of the hypothesis-testing results from additional perspectives.

As a first step, we estimated Eq. (1) and Eq. (2) by country group. The results, presented in **Table 6**, reveal that the effects of board composition on the number of offenses committed by firms differ across the two country groups. Specifically, Models [1] and [2] in the table show that larger board sizes are associated with increased corporate crime in both Central and Eastern European EU members and Eastern European non-EU countries, which supports Hypothesis H₁; the economic significance of the impact is only marginal, though. However, the impact of board independence varies between the two groups, showing opposite and economically weak effects, albeit the evidence for Eastern European non-EU countries is quite weak. Additionally, in non-EU countries, the presence of a female CEO is more likely to reduce corporate crime (Models [2] and [4]), which is consistent with Hypothesis H₃.²⁰ These differences suggest that the country's context plays a significant role in shaping the relationship between board composition and corporate crime. As a result, caution is needed when interpreting the hypothesis test baseline results presented earlier in **Tables 2 - 4**. By contrast, the relevant values of coefficients associated with the Comprehensive NI index (Table 6; Models [3] and [4]) show both statistically and economically significant negative effects. This finding highlights the universal deterrent effect of national institutions on corporate crime, which is in line with Hypothesis H₄. The results derived from Models [1] to [4] are broadly consistent with those of Models [5] and [6], which introduce a series of interaction terms between board composition variables and a dummy variable for Eastern European non-EU countries on the right-hand side of the regression equation that is estimated using the

²⁰ Female leadership has been associated with stronger risk management and ethical decision-making, especially in the banking sector, which may explain a more pronounced deterrent effect in non-EU markets where governance structures are still evolving (Dong et al., 2017). At the same time, we need to mention that East European firms with female COEs are mostly small businesses and thus tend to be far from big corporate scandals. A large and significant coefficient on female CEOs in non-EU countries seems to be the result of such a phenomenon.

full sample.²¹

The second robustness test focuses on estimation by crime type, with the results summarized in **Table 7**. Once again, the Comprehensive NI index shows significantly negative coefficients across all three models, highlighting its economically strong deterrent effect, particularly with respect to international crime. In contrast, the frequent absence of statistical significance of coefficients associated with board composition variables precludes an overall assessment of the deterrent effect, with the exception of board size.²² Still, due to its size, the coefficient of the female CEO stands out. However, the estimate in Model [3] suggests that the economically significant deterrent effect of a female CEO is limited to international crime. These findings indicate that the impact of board composition on corporate crime is shaped not only by the country context but also by the type of crime.

The third robustness test involves estimations conducted under various sample and estimation constraints. This test examines several factors, including the industrial sector, firm size, firm age, and the committing of multiple offenses. The estimations were performed by dividing the sample firms into two groups: mining and manufacturing, finance and insurance, versus non-mining and non-manufacturing sectors. In addition, firms were also categorized into upper and lower halves based on the median firm size and age, and firms with six or more criminal records were excluded. As shown in **Table 8**, the Comprehensive NI index consistently yields significantly negative estimates across all seven models (with the exception of banks and finance firms), which supports Hypothesis H₄ that national institutions help to reduce corporate crime. However, the regression coefficients show some sensitivity to sample constraints. Notably, the deterrent effect of national institutions on corporate crime is more pronounced among mining and manufacturing firms, as well as larger and younger firms, as compared to non-mining and non-manufacturing firms and smaller, older firms. Absence of statistically significant coefficient of national institutions in the case of banks is a setback because banks are sensitive to institutional weaknesses (El-Chaarani et al., 2022; Moro, 2016), but, due to statistical insignificance, the effectiveness of national anti-crime measures cannot be assessed.

Furthermore, board size shows a significant positive effect across all models, reinforcing the statistical robustness of the test results for Hypothesis H₁ that corporate

²¹ We are grateful to the reviewer for suggesting the inclusion of these two models as an additional robustness check.

²² Statistically insignificant coefficients associated with board composition variables vary depending on the type of crime, though.

crime occurs more in firms with large boards, possibly due to the lower monitoring capacity as board size increases. The effect is smaller for manufacturing firms but higher for agriculture firms and banks. The finding indicates that the board-size trade-off might work better for the latter two business categories. Especially in banks, the boards must be large enough with skills to oversee complex financial risks but small enough to maintain coordination and accountability to effectively deter misconduct (Faisal and Challen, 2021).

Conversely, Hypotheses H₂ and H₃, which pertain to the effects of outsider directorship and female representation on corporate boards, were not supported empirically in general. Still, some exceptions emerged. In banks and finance firms where a board chairman position is held by an outside representative, the occurrence of corporate crime increases substantially. The result underscores that in banks, the board's role is especially vital due to the high stakes involved; regulatory frameworks emphasize that bank boards should include a strong presence of independent directors with expertise in financial risk and compliance to effectively monitor management and mitigate misconduct (Johennesse and Budidarma, 2022). The same pattern is evidenced for smaller firms, while in larger ones, outside board chairmanship serves as a deterrent. These findings highlight the complexity of the relationship between board composition and corporate misconduct and reflect the results of Uzun et al. (2004) that merely increasing the number of outside directors or having an outside board chairman without considering other factors may not be sufficient to prevent corporate fraud. In order to explore the issue further, we also estimated models incorporating interaction terms between a dummy variable for the target sample, the Comprehensive NI Index, and the board composition variables. These additional results (Table 8) support the findings that we reported above.

Finally, we examine the effect of data structure on our estimation results. As shown in **Appendix Figure A.1**, a vast majority of the sample firms have never engaged in any criminal activity. This indicates that the data presented in this paper are zero-inflated count data. The Poisson regression model is a typical functional form for analyzing count data as dependent variables; however, applying this model to zero-inflated data exhibiting overdispersion (with variance exceeding the mean) may lead to incorrect estimations of errors in regression coefficients (Nakagawa and Hoshino, 2017). To examine the impact of this issue on the hypothesis testing results in Subsections 5.1 and 5.2, we conducted logistic regression using a binomial distribution model with the probability of a firm committing a crime as the dependent variable. We also performed Poisson complementary log–log regression of a hurdle model that combines a point mass at zero with a positive

count distribution (Zeileis et al., 2008). Assuming the probability π that a firm commits at least one offense ($\pi = P(Y > 0)$) and considering the probability distribution of the number of offenses before truncation as $p(y|\theta)$, the hurdle model can be expressed as:

$$P(Y = y) = (1 - \pi)I(y = 0) + \pi \frac{p(y|\theta)}{1 - p(0|\theta)} I(y > 0), \quad (4)$$

where $I(y = 0)$ and $I(y > 0)$ are indicator variables with a value of 1 if the logical expression within the parentheses is true, and 0 if it is false. As demonstrated by specification (4), the hurdle model is a regression model that employs a structure where a positive count is only observed if the hurdle of zero occurrences is overcome (Onuki, 2022).

The estimation results from the logistic regression model, which uses the probability of a firm engaging in criminal activity as the dependent variable, are detailed in **Table 9**. The regression coefficients are presented as odds ratios, reflecting the likelihood of a firm committing a crime relative to refraining from such activity. An odds ratio smaller than 1 (<1.0) indicates a deterrent effect on corporate crime, while an odds ratio greater than 1 (>1.0) suggests a factor that may facilitate or encourage corporate crime. As shown in the table, the results of Model [1] show that larger boards and their greater independence are linked with an increase in corporate crime. In addition, we show that foreign-controlled firms are less likely to face criminal charges. This is consistent with the view that, for example, foreign banks stimulate rule-of-law improvements, which spill over to non-financial firms via stricter disclosure norms and upgraded court capacity; the result is consistent with Hypothesis H₄.

The above robustness results are quantitatively fully consistent with those in Model [6] in **Table 2** concerning the effects of board composition. Moreover, Models [2] through [7] align precisely with their counterparts in **Table 4** (Models [1] through [6]), highlighting the deterrent effects of national institutions with respect to crime. These findings confirm that using the probability of a firm engaging in criminal activity as the dependent variable—where the zero-inflated nature of the data does not pose significant issues—produces hypothesis-testing results consistent with those reported earlier in this paper.

Lastly, **Table 10** displays the estimation results for the second term on the right-hand side of Eq. (4), utilizing the Poisson complementary log–log hurdle regression model. The impact of national institution and board composition variables on the positive count

distribution ($y > 0$) is not observed, except in Model [1].²³ These results indicate that neither national institutions nor board composition exerts a deterrent effect on repeated criminal activity by firms in emerging markets. This suggests that an alternative mechanism may drive corporate felonies. This finding also underscores the importance of exercising caution when interpreting the hypothesis test results.

6 Conclusions

In our analysis, we examined the corporate criminal records of 18,187 firms operating in 17 European emerging market countries and empirically analyzed the effects of board composition and national institutions on crime deterrence. Our analysis reveals that 872 firms—approximately 5% of the sample—committed a total of 1,734 crimes during the period of research (January 2020–September 2023). In our study, we explored the influence of board composition and national institutional quality on corporate crime in emerging European markets. The findings highlight several key patterns and implications.

Board composition and corporate crime are linked in non-trivial patterns. Larger board size and greater board independence exhibit significant associations with corporate crime in general. Moreover, in banks, the occurrence of corporate crime increases substantially when a board chairman position is held by an outside representative. These instances suggest that while outside directors can provide valuable independent oversight, their effectiveness in preventing corporate crime depends on their level of engagement, understanding of the company's operations, and the quality of information they receive. However, the effects are nuanced, with nonlinear patterns observed for board size and independence but not for female representation. Female CEOs and female board representation showed negative coefficients but lacked statistical significance, providing limited evidence for some of our hypotheses. Interaction effects revealed that the influence of board independence and outside chairmanship diminishes in countries with strong institutional frameworks, suggesting a conditional role for these factors.

Institutional quality at the state level was shown to be a corporate crime deterrent. National institutions exert a robust and consistent deterrent effect on corporate crime, and their impact is particularly pronounced for press freedom, the rule of law, and broader institutional indices. The deterrent effect is universal across country groups, with variations in magnitude depending on contextual factors such as firm size, age, and industry.

²³Although omitted due to space constraints, the estimation results for the first term on the right-hand side of Eq. (4) using the complementary log–log model aligned almost perfectly with the results of the logistic regression model reported in **Table 9**.

We also found synergistic effects between board composition and national institutions that highlight the importance of contextual factors. Specifically, in high-quality institutional environments, board independence and outside chairmanship contribute less to crime prevention, as robust institutions mitigate corporate misconduct.

Our baseline results hold with respect to a battery of robustness checks that confirm the consistency of the findings across different estimation techniques and subsamples. The deterrent effect of national institutions remains significant across models, while the influence of board composition varies by country context and crime type. Female CEOs emerge as particularly effective in deterring international crimes, although their overall impact on corporate crime is limited.

Further, our analysis suggests that structural factors such as board composition play a secondary role with respect to institutional quality in curbing corporate crime. The absence of significant effects on repeated criminal activity implies the need for alternative mechanisms, such as cultural or sector-specific interventions.

Our findings underscore the interplay between governance structures and institutional environments in addressing corporate misconduct. While national institutions remain the cornerstone of crime prevention, tailored governance practices can complement institutional frameworks, particularly in weaker institutional contexts. Future research could explore additional mechanisms driving corporate crime and refine the understanding of nonlinear and context-dependent governance effects.

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Table 1. Names, definitions, and descriptive statistics of variables used in empirical analysis

Variable name	Definition	Descriptive statistics (N=18187)				
		Mean	Median	S.D.	Min	Max
Dependent variables^a						
Corporate crimes	Number of corporate crimes registered in the Global Risk Information Database (GRID)	0.095	0	0.641	0	25
Criminal corporation	Dummy for firms with criminal records in the Global Risk Information Database (GRID)	0.048	0	0.214	0	1
Board composition variables^b						
Board size	Total number of board directors	5.783	4	6.187	3	146
Outside board chairmanship	Dummy for firms with an outside board chairman	0.298	0	0.457	0	1
Board independence	Proportion of outside/independent directors to total number of board directors (%)	37.620	14.286	41.648	0.000	100.000
Female CEO	Dummy for firms with a female CEO	0.038	0	0.191	0	1
Board female representation	Proportion of female directors to total number of board directors (%)	22.461	20.000	22.457	0.000	100.000
National institution variables^c						
Rule of Law	World Bank's Worldwide Governance Indicators Rule of Law index	0.480	0.406	0.370	-0.440	1.231
Voice and Accountability	World Bank's Worldwide Governance Indicators Voice and Accountability index	0.617	0.549	0.270	-0.236	1.195
Control of Corruption	World Bank's Worldwide Governance Indicators Control of Corruption index	0.224	0.059	0.447	-0.738	1.399
Access to Justice	Varieties of Democracy Project Access to Justice index	0.846	0.813	0.073	0.638	0.978
Press Freedom	Reporters without Borders' World Press Freedom index	74.124	72.680	4.872	64.890	86.700
Comprehensive NI index ^d	First principal component score of the above five national institution variables	0.000	-0.559	1.987	-4.587	4.725
Control variables^e						
Listing status	Dummy for listed companies	0.066	0	0.249	0	1
Ownership concentration	Average ownership share per shareholder/member	0.624	0.500	0.339	0.002	1.000
State ownership	Dummy for firms with the state as the ultimate owner at the 50% control threshold	0.054	0	0.226	0	1
Foreign ownership	Dummy for firms with a foreign investor as the ultimate owner at the 50% control threshold	0.313	0	0.464	0	1
Firm size	Natural logarithm of total assets in Euros	14.669	15.433	2.790	5.037	23.006
Firm age	Years in operation	26.146	24	18.576	1	355
Profitability	3-year average of profit margins	5.001	3.840	10.123	-86.943	87.147
Solvency	3-year average of solvency ratio	48.269	49.610	26.572	-91.383	99.680

Notes:

^a Observation period was from January 2020 to September 2023.^b Observation period was 2019.^c 2017–2019 average value; Higher values indicate higher institutional quality.^d Estimation results of principal component analysis are reported in Appendix Table A.4.^e Observation period of the variables of profitability and solvency was 2017–2019, while that of other variables was 2019.Sources: The number of corporate crimes is from the Global Risk Information Database (GRID). National institution variables are from the World Bank (<https://www.worldbank.org/en/home>), the Varieties of Democracy Project (<https://v-dem.net/>), and UNESCO (<https://www.unesco.org/>). Board composition and control variables are from the Orbis Company Information Database.

Table 2. Impact of board composition on corporate crimes: Baseline estimation

Model	[1]	[2]	[3]	[4]	[5]	[6]
Board composition variables						
Board size	0.02716 *** (0.0028)					0.02755 *** (0.0030)
Outside board chairmanship		0.49321 *** (0.1273)				0.03428 (0.1511)
Board independence			0.00629 *** (0.0021)			0.00565 ** (0.0023)
Female CEO				-0.16994 (0.2018)		-0.23052 (0.2172)
Board female representation					-0.00034 (0.0023)	-0.00016 (0.0025)
Control variables						
Listing status	0.28773 (0.2038)	0.33949 (0.2157)	0.42026 ** (0.2077)	0.61650 *** (0.2095)	0.61676 *** (0.2086)	0.09463 (0.2044)
Ownership concentration	-0.09113 (0.1557)	-0.16700 (0.1559)	-0.18466 (0.1564)	-0.16837 (0.1562)	-0.17028 (0.1566)	-0.09962 (0.1570)
State ownership	0.91012 *** (0.1440)	1.00171 *** (0.1441)	1.02241 *** (0.1418)	1.04900 *** (0.1419)	1.05224 *** (0.1422)	0.87840 *** (0.1451)
Foreign ownership	-0.07613 (0.1226)	0.00283 (0.1213)	0.01708 (0.1193)	-0.00583 (0.1200)	-0.00738 (0.1210)	-0.05337 (0.1247)
Firm size	0.06994 ** (0.0306)	0.07595 ** (0.0301)	0.07468 ** (0.0302)	0.07402 ** (0.0303)	0.07489 ** (0.0302)	0.06869 ** (0.0303)
Firm age	0.00566 *** (0.0017)	0.00693 *** (0.0016)	0.00690 *** (0.0015)	0.00714 *** (0.0015)	0.00706 *** (0.0015)	0.00548 *** (0.0017)
Profitability	0.00711 (0.0047)	0.00848 * (0.0049)	0.00902 * (0.0050)	0.00912 * (0.0050)	0.00902 * (0.0050)	0.00719 (0.0049)
Solvency	-0.00702 *** (0.0015)	-0.00716 *** (0.0015)	-0.00725 *** (0.0015)	-0.00720 *** (0.0015)	-0.00722 *** (0.0015)	-0.00702 *** (0.0015)
Industry-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	18187	18187	18187	18187	18187	18187
Log pseudolikelihood	-5694.56	-5768.91	-5769.27	-5788.70	-5789.65	-5673.92
Pseudo R ²	0.1736	0.1628	0.1628	0.1599	0.1598	0.1766
Wald test (χ^2)	1039.50 ***	966.47 ***	979.26 ***	943.87 ***	942.14 ***	1082.44 ***

Notes: Standard errors are computed using the Huber–White sandwich estimator and are reported in parentheses beneath the corresponding coefficients. The Wald test examines the null hypothesis that all regression coefficients are zero. *** and * denote statistical significance at the 1% and 10% levels, respectively.

Source: Authors' estimations. Constant terms are omitted for brevity. See Table 1 for definitions and descriptive statistics of the variables used.

Table 3. Impact of board composition on corporate crimes: Estimation of nonlinear effects

Model	[1]	[2]	[3]
Board composition variables			
Board size	0.08105 *** (0.0169)		
Board size_squared	-0.00060 ** (0.0003)		
Board independence		0.02608 *** (0.0073)	
Board independence_squared		-0.00022 ** (0.0001)	
Board female representation			0.00787 (0.0066)
Board female representation_squared			-0.00012 (0.0001)
Control variables	Yes	Yes	Yes
Industry-level fixed effects	Yes	Yes	Yes
Country-level fixed effects	Yes	Yes	Yes
N	18187	18187	18187
Log pseudolikelihood	-5635.49	-5745.78	-5785.78
Pseudo R ²	0.1822	0.1662	0.1604
Wald test (χ^2)	1044.99 ***	974.40 ***	951.17 ***

Notes: Standard errors are computed using the Huber–White sandwich estimator and are reported in parentheses beneath the corresponding coefficients. The Wald test examines the null hypothesis that all regression coefficients are zero. *** and ** denote statistical significance at the 1% level and the 5% level, respectively.

Source: Authors' estimations. Constant terms are omitted for brevity. See Table 1 for definitions and descriptive statistics of the variables used.

Table 4. Impact of national institutions on corporate crimes: Baseline estimation

Model	[1]	[2]	[3]	[4]	[5]	[6]
National institution variables						
Rule of Law	-0.45680 *** (0.1420)					
Voice and Accountability		-0.40025 ** (0.1603)				
Control of Corruption			-0.20962 ** (0.1004)			
Access to Justice				-2.16332 *** (0.7735)		
Press Freedom					-0.06748 *** (0.0107)	
Comprehensive NI index						-0.09285 *** (0.0254)
Board composition variables						
Board size	0.02443 *** (0.0027)	0.02354 *** (0.0027)	0.02311 *** (0.0027)	0.02419 *** (0.0027)	0.02350 *** (0.0027)	0.02402 *** (0.0027)
Outside board chairmanship	0.02993 (0.1653)	-0.00205 (0.1705)	-0.00601 (0.1716)	0.06487 (0.1640)	0.16939 (0.1554)	0.04424 (0.1634)
Board independence	0.00373 ** (0.0019)	0.00348 * (0.0019)	0.00349 * (0.0019)	0.00412 ** (0.0020)	0.00323 * (0.0018)	0.00376 ** (0.0019)
Female CEO	-0.12193 (0.2003)	-0.09665 (0.1986)	-0.10189 (0.1981)	-0.12414 (0.1996)	-0.10879 (0.2053)	-0.11220 (0.2003)
Board female representation	0.00150 (0.0024)	0.00170 (0.0024)	0.00163 (0.0024)	0.00162 (0.0023)	0.00131 (0.0023)	0.00135 (0.0024)
Control variables						
Listing status	0.14977 (0.1901)	0.21865 (0.1901)	0.26531 (0.1872)	0.11231 (0.2009)	0.17342 (0.1796)	0.15706 (0.1887)
Ownership concentration	-0.32759 ** (0.1586)	-0.33296 ** (0.1585)	-0.31333 ** (0.1573)	-0.31124 ** (0.1564)	-0.30029 * (0.1573)	-0.31753 ** (0.1573)
State ownership	0.78551 *** (0.1400)	0.79571 *** (0.1415)	0.81216 *** (0.1423)	0.80469 *** (0.1374)	0.80579 *** (0.1394)	0.77472 *** (0.1401)
Foreign ownership	-0.09851 (0.1269)	-0.09176 (0.1265)	-0.08717 (0.1268)	-0.09774 (0.1264)	-0.08206 (0.1271)	-0.10058 (0.1270)
Firm size	0.12546 *** (0.0226)	0.13151 *** (0.0229)	0.12727 *** (0.0229)	0.11894 *** (0.0227)	0.13874 *** (0.0224)	0.13086 *** (0.0227)
Firm age	0.00662 *** (0.0018)	0.00688 *** (0.0018)	0.00720 *** (0.0018)	0.00665 *** (0.0018)	0.00558 *** (0.0018)	0.00660 *** (0.0018)
Profitability	0.00588 (0.0047)	0.00564 (0.0047)	0.00553 (0.0047)	0.00611 (0.0047)	0.00601 (0.0047)	0.00595 (0.0047)
Solvency	-0.00669 *** (0.0015)	-0.00672 *** (0.0015)	-0.00660 *** (0.0015)	-0.00685 *** (0.0015)	-0.00692 *** (0.0015)	-0.00667 *** (0.0015)
Industry-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-level fixed effects	No	No	No	No	No	No
N	18187	18187	18187	18187	18187	18187
Log pseudolikelihood	-5974.30	-5987.81	-5991.41	-5980.26	-5914.11	-5969.71
Pseudo R ²	0.1330	0.1311	0.1305	0.1321	0.1417	0.1337
Wald test (χ^2)	790.80 ***	795.32 ***	796.86 ***	788.52 ***	830.33 ***	798.33 ***

Notes: Standard errors are computed using the Huber–White sandwich estimator and are reported in parentheses beneath the corresponding coefficients. The Wald test examines the null hypothesis that all regression coefficients are zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimations. Constant terms are omitted for brevity. See Table 1 for definitions and descriptive statistics of the variables used.

Table 5. Synergy effects between national institution and board composition

Board composition (dependent) variables	Board size	Outside board chairmanship	Board independence	Female CEO	Board female representation
Model	[1]	[2]	[3]	[4]	[5]
National institution variable (Comprehensive NI index)	-0.13899 *** (0.0365)	-0.17159 *** (0.0519)	-0.00373 (0.0585)	-0.07281 *** (0.0270)	-0.03318 (0.0359)
Board composition variable	0.02548 *** (0.0028)	0.38663 *** (0.1174)	0.00377 *** (0.0012)	-0.02581 (0.1889)	0.00096 (0.0022)
National institution variable x Board composition variable	0.00565 ** (0.0026)	-0.14079 ** (0.0574)	-0.00112 * (0.0006)	0.11991 (0.0924)	-0.00170 (0.0011)
Control variables	Yes	Yes	Yes	Yes	Yes
Industry-level fixed effects	Yes	Yes	Yes	Yes	Yes
Country-level fixed effects	No	No	No	No	No
N	18187	18187	18187	18187	18187
Log pseudolikelihood	-5976.05	-6033.96	-6046.61	-6066.71	-6062.46
Pseudo R ²	0.1328	0.1244	0.1225	0.1196	0.1202
Wald test (χ^2)	741.36 ***	662.17 ***	713.55 ***	665.50 ***	697.42 ***

Notes: Standard errors are computed using the Huber–White sandwich estimator and are reported in parentheses beneath the corresponding coefficients. The Wald test examines the null hypothesis that all regression coefficients are zero. *** denotes statistical significance at the 1% level.

Source: Authors' estimations. Constant terms are omitted for brevity. See Table 1 for definitions and descriptive statistics of the variables used.

Table 6. Estimation by country group and of models with interaction terms with dummy for Eastern European non-EU countries

Country group	Central and Eastern European EU member states	Eastern European non-EU countries	Central and Eastern European EU member states	Eastern European non-EU countries	17 European emerging markets	17 European emerging markets
Model	[1]	[2]	[3]	[4]	[5]	[6]
National institution variable						
Comprehensive NI index			-0.18613 *** (0.0334)	-0.85459 *** (0.2551)		-0.18657 *** (0.0336)
Interaction term with dummy for Eastern European non-EU countries						
Comprehensive NI index						2.12630 *** (0.4553)
Board composition variables						
Board size	0.02506 *** (0.0030)	0.07589 *** (0.0156)	0.02037 *** (0.0030)	0.06629 *** (0.0170)	0.02131 *** (0.0029)	0.02082 *** (0.0029)
Outside board chairmanship	0.05650 (0.1586)	0.13722 (0.4222)	0.14154 (0.1639)	0.18961 (0.4904)	0.00681 (0.1808)	0.16100 (0.1613)
Board independence	0.00752 *** (0.0023)	-0.00890 (0.0059)	0.00483 *** (0.0019)	-0.01079 * (0.0059)	0.00400 ** (0.0019)	0.00478 *** (0.0019)
Female CEO	-0.09890 (0.2164)	-14.72294 *** (0.4839)	-0.04476 (0.2067)	-14.45561 *** (0.4013)	0.03255 (0.2003)	-0.03902 (0.2067)
Board female representation	-0.00036 (0.0026)	0.00553 (0.0081)	0.00086 (0.0024)	0.00809 (0.0077)	0.00179 (0.0025)	0.00068 (0.0024)
Interaction term with dummy for Eastern European non-EU countries						
Board size					0.03237 * (0.0195)	0.02691 (0.0178)
Outside board chairmanship					-0.21884 (0.4945)	-0.13720 (0.4876)
Board independence					-0.00846 (0.0061)	-0.01660 ** (0.0067)
Female CEO					-16.34192 *** (0.3921)	-14.95811 *** (0.4778)
Board female representation					0.00939 (0.0078)	0.00968 (0.0084)
Dummy for Eastern European non-EU countries						
					-0.10186 (0.4422)	6.70725 *** (1.5358)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-level fixed effects	Yes	Yes	No	No	No	No
N	16954	1233	16954	1233	18187	18187
Log pseudolikelihood	-5200.06	-398.48	-5381.28	-412.00	-5970.86	-5827.40
Pseudo R ²	0.1751	0.3147	0.1463	0.2915	0.1335	0.1543
Wald test (χ^2)	1022.54 ***	3800.08 ***	833.00 ***	3595.38 ***	4336.76 ***	2111.18 ***

Notes: Standard errors are computed using the Huber–White sandwich estimator and are reported in parentheses beneath the corresponding coefficients. The Wald test examines the null hypothesis that all regression coefficients are zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimations. Constant terms are omitted for brevity. See Table 1 for definitions and descriptive statistics of the variables used.

Table 7. Estimation by crime type

Crime type	Economic crimes	Political and social crimes	International crimes
Model	[1]	[2]	[3]
National institution variable			
Comprehensive NI index	-0.07958 *** (0.0256)	-0.09360 ** (0.0391)	-0.27118 ** (0.1357)
Board composition variables			
Board size	0.02418 *** (0.0028)	0.02270 *** (0.0041)	0.02610 *** (0.0082)
Outside board chairmanship	0.22013 (0.1742)	-0.22919 (0.2194)	-0.18880 (0.6859)
Board independence	0.00324 (0.0020)	0.00394 (0.0025)	0.00970 (0.0087)
Female CEO	0.03145 (0.2259)	-0.48026 (0.3243)	-1.35004 *** (0.4867)
Board female representation	0.00215 (0.0024)	0.00020 (0.0038)	0.00038 (0.0155)
Control variables	Yes	Yes	Yes
Industry-level fixed effects	Yes	Yes	Yes
Country-level fixed effects	No	No	No
N	18187	18187	18187
Log pseudolikelihood	-3955.80	-2600.01	-214.64
Pseudo R ²	0.1331	0.1639	0.1405
Wald test (χ^2)	666.74 ***	818.51 ***	15018.45 ***

Notes: Standard errors are computed using the Huber–White sandwich estimator and are reported in parentheses beneath the corresponding coefficients. The Wald test examines the null hypothesis that all regression coefficients are zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimations. Constant terms are omitted for brevity. See Table 1 for definitions and descriptive statistics of the variables used.

Table 8. Robustness check with sample/estimation constraints

Sample/estimation constraints	Mining and manufacturing	Agriculture, forestry, fisheries; Construction; and services	Banks; Finance and insurance	All industries (With interaction terms for non mining and manufacturing industries)	Larger companies	Smaller companies	All firms (With interaction terms for smaller companies)	Older companies	Younger companies	All firms (With interaction terms for younger companies)	Excluding firms with 6 or more criminal records
Model	[1]	[2a]	[2b]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
National institution variable											
Comprehensive NI index	-0.13621 *** (0.0471)	-0.06695 ** (0.0276)	0.01376 (0.0654)	-0.14770 *** (0.0378)	-0.13190 *** (0.0375)	-0.04974 * (0.0293)	-0.12543 *** (0.0365)	-0.04429 * (0.0238)	-0.17118 *** (0.0368)	-0.04815 (0.0308)	-0.08909 *** (0.0188)
Interaction term with dummy for target sample group											
Comprehensive NI index				0.10727 ** (0.0462)			0.07676 * (0.0443)			-0.11468 *** (0.0445)	
Board composition variables											
Board size	0.01828 *** (0.0046)	0.02521 *** (0.0032)	0.02489 *** (0.0048)	0.01754 *** (0.0038)	0.04226 *** (0.0072)	0.01488 *** (0.0031)	0.03913 *** (0.0067)	0.02216 *** (0.0035)	0.02737 *** (0.0048)	0.02274 *** (0.0032)	0.02091 *** (0.0026)
Outside board chairmanship	-0.30038 (0.2744)	0.25550 (0.1882)	1.42372 ** (0.6231)	-0.23522 (0.2270)	-0.61082 *** (0.2217)	0.87673 *** (0.1985)	-0.50380 ** (0.2198)	-0.14025 (0.2123)	0.24547 (0.2670)	-0.00961 (0.1990)	0.14296 (0.1353)
Board independence	0.00604 * (0.0031)	0.00207 (0.0021)	0.00026 (0.0069)	0.00590 ** (0.0026)	0.00877 *** (0.0026)	-0.00251 (0.0022)	0.00916 *** (0.0025)	0.00323 (0.0023)	0.00402 (0.0030)	0.00295 (0.0023)	0.00155 (0.0015)
Female CEO	0.07710 (0.2777)	-0.19189 (0.2712)	-0.57526 (0.6466)	0.06194 (0.2514)	-0.39534 (0.3503)	0.01025 (0.2831)	-0.33626 (0.3263)	-0.30241 (0.3153)	0.22309 (0.2512)	-0.27718 (0.3076)	0.17120 (0.1879)
Board female representation	-0.00131 (0.0037)	0.00261 (0.0030)	-0.00435 (0.0098)	0.00169 (0.0035)	0.00460 (0.0035)	-0.00050 (0.0031)	0.00321 (0.0034)	0.00122 (0.0038)	0.00087 (0.0027)	0.00078 (0.0037)	0.00016 (0.0019)
Interaction terms with dummy for target sample group											
Board size				0.00790 * (0.0048)			-0.02178 *** (0.0073)			0.00363 (0.0056)	
Outside board chairmanship				0.63250 ** (0.2796)			1.20543 *** (0.2964)			0.12230 (0.3119)	
Board independence				-0.00522 (0.0034)			-0.01231 *** (0.0033)			0.00157 (0.0036)	
Female CEO				-0.25150 (0.3910)			0.36742 (0.4291)			0.40656 (0.3936)	
Board female representation				-0.00122 (0.0046)			-0.00416 (0.0046)			0.00080 (0.0046)	
Dummy for target sample group				-0.83016 ** (0.3879)			0.72090 *** (0.1900)			-0.35778 * (0.1877)	
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-level fixed effects	No	No	No	No	No	No	No	No	No	No	No
N	8522	9665	381	18187	9093	9094	18187	8506	9681	18187	18148
Log pseudolikelihood	-2413.12	-3523.91	-469.68	-5942.40	-3004.12	-2746.16	-5907.99	-3042.92	-2867.35	-5950.62	-4755.09
Pseudo R ²	0.1224	0.1433	0.2189	0.1376	0.1661	0.1644	0.1426	0.1622	0.1153	0.1364	0.1160
Wald test (χ^2)	434.85 ***	529.65 ***	125.14 ***	863.99 ***	749.21 ***	590.35 ***	897.68 ***	582.49 ***	430.74 ***	879.99 ***	1058.72 ***

Notes: Standard errors are computed using the Huber–White sandwich estimator and are reported in parentheses beneath the corresponding coefficients. The Wald test examines the null hypothesis that all regression coefficients are zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimations. Constant terms are omitted for brevity. See Table 1 for definitions and descriptive statistics of the variables used.

Table 9. Logistic regression estimation of the baseline model

Model	[1]	[2]	[3]	[4]	[5]	[6]	[7]
National institution variables							
Rule of Law		0.66342 *** (0.0657)					
Voice and Accountability			0.77864 ** (0.0928)				
Control of Corruption				0.89709 ** (0.0703)			
Access to Justice					0.07739 *** (0.0404)		
Press Freedom						0.93215 *** (0.0075)	
Comprehensive NI index							0.91847 *** (0.0166)
Board composition variables							
Board size	1.03788 *** (0.0055)	1.03568 *** (0.0049)	1.03449 *** (0.0048)	1.03426 *** (0.0047)	1.03586 *** (0.0048)	1.03457 *** (0.0049)	1.03508 *** (0.0048)
Outside board chairmanship	1.14065 (0.1573)	0.93211 (0.1152)	0.89873 (0.1130)	0.89459 (0.1130)	0.98439 (0.1212)	1.09329 (0.1340)	0.94577 (0.1163)
Board independence	1.00453 *** (0.0017)	1.00285 ** (0.0014)	1.00263 * (0.0014)	1.00264 * (0.0014)	1.00337 ** (0.0014)	1.00227 * (0.0014)	1.00287 ** (0.0014)
Female CEO	1.01300 (0.2056)	1.05681 (0.2037)	1.06980 (0.2051)	1.06687 (0.2043)	1.04369 (0.2007)	1.10575 (0.2164)	1.06637 (0.2057)
Board female representation	0.99909 (0.0018)	1.00021 (0.0018)	1.00049 (0.0018)	1.00050 (0.0018)	1.00020 (0.0018)	0.99991 (0.0018)	1.00007 (0.0018)
Control variables							
Listing status	1.12537 (0.2242)	1.21995 (0.1957)	1.34437 * (0.2141)	1.38674 ** (0.2189)	1.12217 (0.1873)	1.22816 (0.1895)	1.23147 (0.1962)
Ownership concentration	1.04976 (0.1285)	0.81006 * (0.0949)	0.80124 * (0.0937)	0.80658 * (0.0941)	0.82249 * (0.0966)	0.83576 (0.0983)	0.81736 * (0.0956)
State ownership	3.15742 *** (0.4029)	2.79898 *** (0.3452)	2.89364 *** (0.3571)	2.93391 *** (0.3610)	2.81829 *** (0.3431)	2.82937 *** (0.3431)	2.77414 *** (0.3429)
Foreign ownership	0.79382 ** (0.0743)	0.75765 *** (0.0695)	0.76484 *** (0.0698)	0.76727 *** (0.0698)	0.75518 *** (0.0694)	0.76741 *** (0.0709)	0.75656 *** (0.0695)
Firm size	1.06392 ** (0.0261)	1.12111 *** (0.0190)	1.12572 *** (0.0196)	1.12250 *** (0.0193)	1.11352 *** (0.0191)	1.13875 *** (0.0191)	1.12708 *** (0.0192)
Firm age	1.00833 *** (0.0015)	1.00912 *** (0.0015)	1.00940 *** (0.0015)	1.00960 *** (0.0015)	1.00898 *** (0.0015)	1.00803 *** (0.0015)	1.00911 *** (0.0015)
Profitability	1.00037 (0.0034)	0.99959 (0.0033)	0.99940 (0.0033)	0.99935 (0.0033)	0.99987 (0.0033)	0.99970 (0.0032)	0.99969 (0.0033)
Solvency	0.99611 *** (0.0014)	0.99665 ** (0.0014)	0.99660 ** (0.0014)	0.99666 ** (0.0015)	0.99653 ** (0.0014)	0.99637 ** (0.0014)	0.99665 ** (0.0014)
Industry-level fixed effects	Yes						
Country-level fixed effects	Yes	No	No	No	No	No	No
N	18187	18187	18187	18187	18187	18187	18187
Log pseudolikelihood	-2969.00	-3103.09	-3109.77	-3110.70	-3100.44	-3071.96	-3101.07
Pseudo R ²	0.1516	0.1133	0.1114	0.1111	0.1141	0.1222	0.1139
Wald test (χ^2)	940.14 ***	838.46 ***	821.38 ***	815.92 ***	847.01 ***	876.32 ***	851.02 ***

Notes: Coefficients are odds ratios. Robust standard errors are reported in parentheses. The Wald test examines the null hypothesis that all regression coefficients are zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimations. Constant terms are omitted for brevity. See Table 1 for definitions and descriptive statistics of the variables used.

Table 10. Poisson complementary log-log hurdle regression estimation of the baseline model

Model	[1]	[2]	[3]	[4]	[5]	[6]	[7]
National institution variables							
Rule of Law		-0.20861 (0.2125)					
Voice and Accountability			-0.29716 (0.2847)				
Control of Corruption				-0.19335 (0.1533)			
Access to Justice					-0.21210 (1.3826)		
Press Freedom						-0.01100 (0.0144)	
Comprehensive NI index							-0.03516 (0.0405)
Board composition variables							
Board size	0.01222 *** (0.0038)	0.00462 (0.0040)	0.00439 (0.0040)	0.00403 (0.0040)	0.00440 (0.0041)	0.00442 (0.0041)	0.00438 (0.0040)
Outside board chairmanship	-0.23492 (0.2022)	0.03738 (0.1807)	0.01361 (0.1803)	0.01739 (0.1784)	-0.00151 (0.1921)	0.03025 (0.1807)	0.03301 (0.1808)
Board independence	0.00326 (0.0029)	0.00198 (0.0021)	0.00192 (0.0021)	0.00196 (0.0021)	0.00216 (0.0022)	0.00185 (0.0021)	0.00196 (0.0021)
Female CEO	-0.02144 (0.2178)	-0.17760 (0.2146)	-0.17072 (0.2173)	-0.19195 (0.2149)	-0.19195 (0.2140)	-0.17332 (0.2144)	-0.17972 (0.2149)
Board female representation	0.00085 (0.0032)	0.00122 (0.0031)	0.00118 (0.0031)	0.00111 (0.0032)	0.00151 (0.0031)	0.00136 (0.0031)	0.00122 (0.0031)
Control variables							
Listing status	-0.21010 (0.1993)	-0.04638 (0.2064)	-0.01753 (0.1992)	0.02899 (0.1930)	-0.00797 (0.2214)	-0.01952 (0.1981)	-0.02567 (0.2012)
Ownership concentration	-0.26041 (0.1910)	-0.15463 (0.1997)	-0.16199 (0.2028)	-0.13325 (0.1950)	-0.15048 (0.1961)	-0.15302 (0.1987)	-0.15128 (0.1981)
State ownership	0.09816 (0.1626)	0.01656 (0.1530)	0.01367 (0.1529)	0.02282 (0.1530)	0.01649 (0.1532)	0.02566 (0.1560)	0.02037 (0.1539)
Foreign ownership	0.21788 (0.1365)	0.17889 (0.1402)	0.17397 (0.1398)	0.16981 (0.1412)	0.17990 (0.1390)	0.18568 (0.1404)	0.17850 (0.1400)
Firm size	0.01570 (0.0251)	0.03798 * (0.0228)	0.04240 * (0.0222)	0.04181 * (0.0225)	0.03746 (0.0238)	0.03813 * (0.0229)	0.03910 * (0.0226)
Firm age	-0.00164 (0.0027)	-0.00184 (0.0027)	-0.00172 (0.0027)	-0.00167 (0.0027)	-0.00157 (0.0027)	-0.00183 (0.0027)	-0.00179 (0.0027)
Profitability	0.00986 ** (0.0045)	0.00863 * (0.0050)	0.00825 * (0.0050)	0.00828 * (0.0050)	0.00812 (0.0051)	0.00844 * (0.0050)	0.00849 * (0.0050)
Solvency	-0.00641 *** (0.0017)	-0.00509 *** (0.0016)	-0.00504 *** (0.0016)	-0.00501 *** (0.0016)	-0.00506 *** (0.0016)	-0.00513 *** (0.0016)	-0.00507 *** (0.0016)
Industry-level fixed effects	Yes						
Country-level fixed effects	Yes	No	No	No	No	No	No
N	18187	18187	18187	18187	18187	18187	18187
Log pseudolikelihood	-4274.05	-4468.93	-4475.34	-4475.67	-4469.05	-4438.88	-4467.76
Wald test (χ^2)	1148.66 ***	1001.74 ***	975.46 ***	966.12 ***	1009.58 ***	1046.34 ***	1020.96 ***

Notes: Robust standard errors are reported in parentheses. The Wald test examines the null hypothesis that all regression coefficients are zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimations. Constant terms are omitted for brevity. See Table 1 for definitions and descriptive statistics of the variables used.

Appendix Table A.1. Composition of sample firms by listing status, number of employees, and industry

	Number of sample firms			Proportion (%)		
	17 European emerging markets	Central and Eastern European EU member states	Eastern European non-EU countries	17 European emerging markets	Central and Eastern European EU member states	Eastern European non-EU countries
Composition by listing status						
Listed companies	1206	795	411	6.6	4.7	33.3
Unlisted companies	16981	16159	822	93.4	95.3	66.7
Composition by number of employees						
Firms with less than 100 employees	6531	6142	389	35.9	36.2	31.5
Firms with 100 to 499 employees	8831	8199	632	48.6	48.4	51.3
Firms with 500 to 999 employees	1525	1422	103	8.4	8.4	8.4
Firms with 1000 or more employees	1300	1191	109	7.1	7.0	8.8
Composition by industry						
Agriculture, forestry, and fishing	762	721	41	4.2	4.3	3.3
Mining and quarrying	162	144	18	0.9	0.8	1.5
Manufacturing	7330	6924	406	40.3	40.8	32.9
Electricity, gas, steam, and air conditioning supply	352	312	40	1.9	1.8	3.2
Water supply, sewerage, waste management, and remediation activities	678	540	138	3.7	3.2	11.2
Construction	1303	1194	109	7.2	7.0	8.8
Wholesale and retail trade, repair of motor vehicles and motorcycles	3036	2860	176	16.7	16.9	14.3
Transportation and storage	1108	1015	93	6.1	6.0	7.5
Accommodation and food service activities	518	488	30	2.8	2.9	2.4
Information and communication	841	795	46	4.6	4.7	3.7
Banks; Financial and insurance activities	381	322	59	2.1	1.9	4.8
Real estate activities	281	272	9	1.5	1.6	0.7
Professional, scientific, and technical activities	815	778	37	4.5	4.6	3.0
Administrative and support service activities	620	589	31	3.4	3.5	2.5
Total	18187	16954	1233	100.0	100.0	100.0

Source: Authors' computations based on the Orbis Company Information Database. Appendix Table A2 provides country-level composition of sample firms.

Appendix Table A.2. Country-level composition of sample firms in 17 European emerging markets by listing status, number of employees, and industry

	Albania	Bosnia and Herzegovina	Bulgaria	Croatia	Czech	Estonia	Hungary	Latvia	Lithuania	Moldova	Montenegro	North Macedonia	Poland	Romania	Serbia	Slovakia	Slovenia	
Composition by listing status																		
Listed companies	0	113	65	106	11	13	13	12	21	67	31	60	353	149	140	28	24	
Unlisted companies	34	166	1,428	838	1,632	682	2,354	645	540	33	41	9	3,315	3,239	539	980	506	
Composition by number of employees																		
Firms with less than 100 employees	1	75	616	288	703	348	868	297	222	34	26	17	1,093	1,086	236	420	201	
Firms with 100 to 499 employees	22	157	669	497	750	296	1,119	300	272	52	36	40	1,855	1,727	325	460	254	
Firms with 500 to 999 employees	6	22	120	88	110	34	195	38	38	7	7	7	352	319	54	83	45	
Firms with 1000 or more employees	5	25	88	71	80	17	185	22	29	7	3	5	368	256	64	45	30	
Composition by industry																		
Agriculture, forestry, and fishing	0	3	61	24	229	13	92	37	28	3	0	3	37	99	32	95	6	
Mining and quarrying	0	9	23	6	7	7	13	5	4	4	2	2	34	33	1	9	3	
Manufacturing	1	91	601	303	701	292	933	198	183	44	8	37	1,633	1,459	225	391	230	
Electricity, gas, steam, and air conditioning supply	1	11	36	17	17	14	50	8	11	2	2	1	67	58	23	23	11	
Water supply, sewerage, waste management, and remediation activities	0	24	18	89	32	10	97	9	15	1	8	0	66	144	105	26	34	
Construction	3	26	113	82	101	37	117	59	86	13	6	2	241	262	59	68	28	
Wholesale and retail trade, repair of motor vehicles and motorcycles	20	55	219	147	170	136	384	149	117	8	14	4	793	519	75	147	79	
Transportation and storage	1	21	81	61	101	60	130	60	54	11	10	3	153	202	47	81	32	
Accommodation and food service activities	0	4	96	65	30	29	84	16	9	0	7	4	32	85	15	23	19	
Information and communication	1	7	108	42	59	41	109	39	11	0	5	2	160	159	31	40	27	
Banks; Financial and insurance activities	6	17	35	25	35	10	30	19	6	9	5	6	105	29	16	14	14	
Real estate activities	1	1	15	5	23	2	51	14	4	3	1	0	98	33	3	23	4	
Professional, scientific, and technical activities	0	3	45	41	84	21	163	20	17	1	3	1	155	165	29	41	26	
Administrative and support service activities	0	7	42	37	54	23	114	24	16	1	1	4	94	141	18	27	17	
Total	34	279	1493	944	1643	695	2367	657	561	100	72	69	3668	3388	679	1008	530	

Source: Authors' computations based on the Orbis Company Information Database

Appendix Table A.3. Types and categories of crimes committed by European emerging market firms registered in the Global Risk Information Database (GRID) from January 2020 to September 2023

Crime type ^a	Crime category ^b
Economic crimes	Bankruptcy and estate administration–related misconduct (7); Business crimes (376); Shams and frauds (80); Loan sharking (4); Money laundering (41); Regulatory action (403); Securities violations (19); Smuggling (4); Tax evasion (115)
Political and social crimes	Arson (1); Assault/battery (9); Bribery (167); Copyright infringement (18); Counterfeiting (2); Cybercrime (1); Data privacy/protection violation (19); Drug trafficking (2); Environmental crimes (40); Human trafficking (2); Misdemeanors/fraud (33); Murder (14); Nonspecific crimes (19); Organized crime (25); Perjury (213); Political asylum (2); Possession of stolen property (2); Prostitution (2); Robbery (1); Theft (80); Virtual currency (2)
International crimes	Denied entity (5); Iran connections (1); Sanctions connections (15); Spying (3); Terrorism (3); Watch list (Government-designated listing of persons/organizations involved in terrorist acts, proliferation of weapons of mass destruction, and other security and diplomatic issues) (6)

Notes:

^a Classification by the authors

^b Figures in parentheses are the total number of crime records

Source: Moody's Analytics (2021)

Appendix Table A.4. Estimation results of principal component analysis of the national institution variables

Eigenvalue of the correlation matrix				Eigenvectors of the first component	
Component no.	Eigenvalue	Difference	Cumulative percentage of total variance	Variables	Eigenvector
1	3.9500	3.372	0.790	Rule of Law	0.4831
2	0.5782	0.275	0.906	Voice and Accountability	0.4695
3	0.3027	0.198	0.966	Control of Corruption	0.4103
4	0.1047	0.040	0.987	Access to Justice	0.4347
5	0.0643	.	1.000	Press Freedom	0.4346

Source: Author's estimations. For definitions and descriptive statistics of the variables, see Table 1.

Appendix Table A.5. Breakdown of corporate crimes by country group

Country group	Number of sample firms (a)	Number of criminal corporations (b)	Proportion of criminal corporations (b/a, %)	Breakdown of criminal corporations by number of cases						Breakdown of corporate crimes by type						
				Number of firms			Proportion (all criminal corporations=100)			Total number of corporate crimes	Number of corporate crimes			Proportion (all corporate crimes=100)		
				1 case	2–5 cases	6 cases or more	1 case	2–5 cases	6 cases or more		Economic crimes	Political and social crimes	International crimes	Economic crimes	Political and social crimes	International crimes
Central and Eastern European EU member states	16954	811	4.8	515	261	35	63.5	32.2	4.3	1580	1000	553	27	63.3	35.0	1.7
Eastern European non-EU countries	1233	61	4.9	22	35	4	36.1	57.4	6.6	154	49	99	6	31.8	64.3	3.9

Source: Authors' computations based on the Global Risk Information Database (GRID) and Orbis Company Information Database

Appendix Table A.6. Univariate comparison between noncriminal and criminal corporations and among criminal corporations by number of cases

	Noncriminal corporations (a)	Criminal corporations				Comparison between noncriminal and criminal corporations (a, b) ^a	Multiple comparison between criminal corporations by number of cases (c, d, e) ^b
		All criminal corporations (b)	Corporations with 1 criminal case (c)	Corporations with 2–5 criminal cases (d)	Corporations with 6 or more criminal cases (e)		
Board composition variables							
Board size	5.562	10.169	9.503	10.628	15.846	-21.73 ***	4.77 ***
Outside board chairmanship	0.292	0.422	0.376	0.490	0.538	-8.20 †††	6.26 ***
Board independence	37.257	44.835	43.404	46.256	53.760	-5.25 ***	1.60
Female CEO	0.037	0.046	0.041	0.061	0.000	-1.29	1.84
Board female representation	22.472	22.245	22.142	22.306	23.208	0.29	0.05
National institution variables							
Rule of Law	0.484	0.396	0.405	0.383	0.375	6.88 ***	0.41
Voice and Accountability	0.619	0.578	0.593	0.553	0.561	4.39 ***	2.72 *
Control of Corruption	0.226	0.182	0.203	0.145	0.172	2.81 ***	1.80
Access to Justice	0.846	0.830	0.829	0.831	0.832	6.59 ***	0.11
Press Freedom	74.195	72.728	72.592	73.037	72.238	8.69 ***	0.99
Comprehensive NI index	0.022	-0.435	-0.395	-0.495	-0.532	6.63 ***	0.31
Total number of sample firms	17315	872	537	296	39		

Notes: The numbers in the figure in columns (a) to (e) represent the mean value of the variable in question.

^a ***: The means are significantly different between the two at the 1% level by *t*-test; †††: The ratios are significantly different between the two at the 1% level by the test of difference in proportions.

^b *** : The ratios are significantly different between the three groups of criminal corporations at the 1% level by ANOVA; **: at the 5% level; *: at the 10% level.

Source: Authors' estimations. See Table 1 for definitions and descriptive statistics of the variables used.

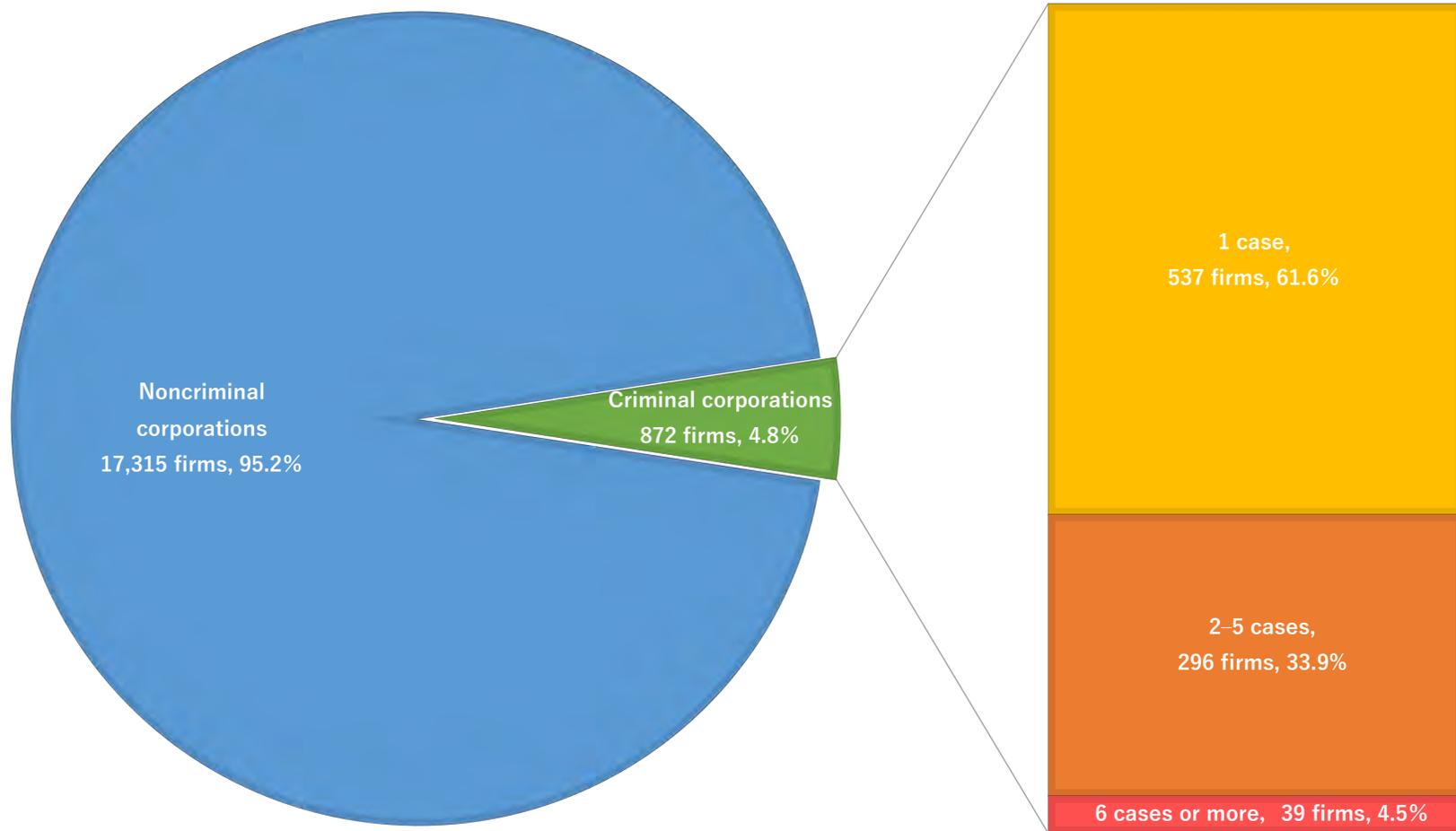
Appendix Table A.7. Correlation coefficients between the number of corporate crimes and board composition variables and national institution variables

	17 European emerging markets	Country group		Crime type		
		Central and Eastern European EU member states	Eastern European non-EU countries	Economic crimes	Political and social crimes	International crimes
Board composition variables						
Board size	0.1353 ***	0.1296 ***	0.1936 ***	0.1331 **	0.0761 ***	0.0169 **
Outside board chairmanship	0.0540 ***	0.0526 ***	0.0523 *	0.0512 ***	0.0328 ***	0.0066
Board independence	0.0350 ***	0.0352 ***	0.0118	0.0294 ***	0.0254 ***	0.0092
Female CEO	0.0025	0.0059	-0.0369	0.0099	-0.0073	-0.0062
Board female representation	0.0002	-0.0006	0.0107	0.0041	-0.0051	0.0005
National institution variables						
Rule of Law	-0.0365 ***	-0.0396 ***	-0.1223 ***	-0.0221 ***	-0.0368 ***	-0.0155 **
Voice and Accountability	-0.0265 ***	-0.0304 ***	-0.1045 ***	-0.0137 *	-0.0289 ***	-0.016 **
Control of Corruption	-0.0185 ***	-0.0202 ***	-0.1664 ***	-0.0160 **	-0.0109	-0.0155 **
Access to Justice	-0.0284 ***	-0.0366 ***	-0.1043 ***	-0.0224 ***	-0.0210 ***	-0.0163 **
Press Freedom	-0.0433 ***	-0.0414 ***	-0.0987 ***	-0.0281 ***	-0.0423 ***	-0.0118
Comprehensive NI index	-0.0346 ***	-0.0385 ***	-0.1262 ***	-0.0230 ***	-0.0319 ***	-0.0169 **

Notes: ***: Correlation coefficient with the number of corporate crimes is statistically significant at the 1% level; **: significant at the 5% level; *: significant at the 10% level.

Source: Authors' estimations. See Table 1 for definitions and descriptive statistics of the variables used.

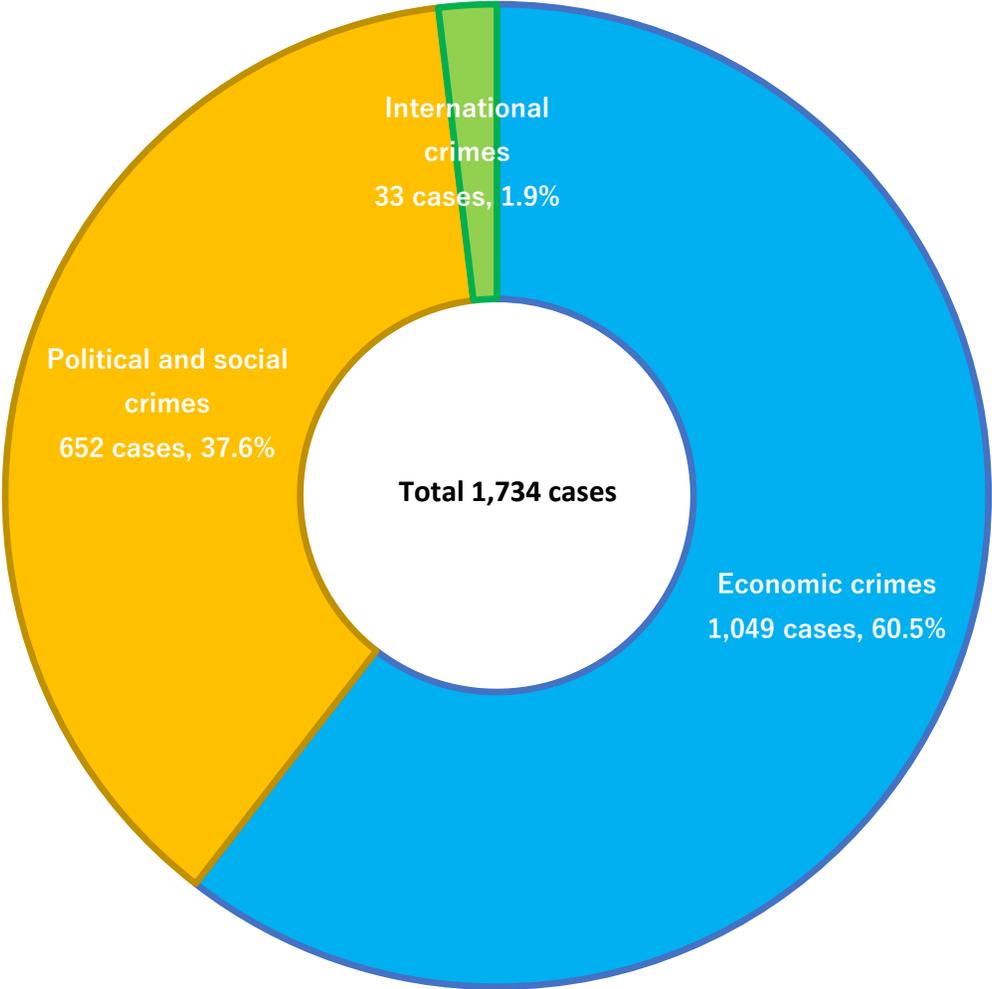
Appendix Figure A.1. Proportion of criminal corporations and their number of crimes among 18,187 enterprises in 17 European emerging markets



Notes: This figure shows the proportion of criminal corporations and their number of crimes in 17 European emerging markets. The sample consists of 18,187 firms. In this figure, criminal corporations are defined as companies with one or more criminal records registered in the Global Risk Information Database (GRID) operated by Moody's Analytics during the period from January 2000 to September 2023. Appendix Table A.3 shows the types and categories of crimes committed by the sample firms.

Source: Authors' illustration based on the Global Risk Information Database (GRID) and Orbis Company Information Database

Appendix Figure A.2. Breakdown of corporate crimes committed by 872 firms in 17 European emerging markets by type



Notes: This figure shows the breakdown of corporate crimes committed by 872 firms in 17 European emerging markets, by type, based on criminal records registered in the Global Risk Information Database (GRID) operated by Moody's Analytics during the period from January 2000 to September 2023. Appendix Table A.3 shows the detailed categories of crimes committed by these 872 sample firms.

Source: Authors' illustration based on the Global Risk Information Database (GRID) and Orbis Company Information Database