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ORIGINAL ARTICLE

The impact of corporate governance mechanisms on mitigating banks' propensity for risk-taking

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Abstract

This study aims to examine the impact of enhanced corporate governance procedures on the level of risk-taking exhibited by banks. Between the years 2002 and 2019, a comprehensive selection of banks was gathered from a total of eight countries and categorized into two legal systems: common-law (Canada, the United States, the United Kingdom, and Australia) and civil-law (Japan, France, Germany, and Italy). By classifying our sample into systemic and non-systemic banks and employing traditional risk-taking metrics such as the z-score and the volatility of daily stock returns, we provide evidence of a substantial decline in banks' propensity for risk-taking in the years subsequent to the global financial crisis. This decrease can be attributed to the implementation of enhanced bank governance practices, which have been deemed more efficacious by the Basel Committee on Banking Supervision. Furthermore, it is worth noting that empirical data supports the notion that macroeconomic and institutional factors specific to each country, such as GDP per capita, government quality index, unemployment rate, and social trust, significantly influence the risk-taking tendencies exhibited by banks. The findings of our study demonstrate robustness when subjected to various sensitivity tests conducted for each research question.

Keywords Bank risk-taking · Bank governance mechanisms · Global financial crisis · Global systemically important banks (G-SIBs)

JEL Classification G01 · G21 · G28 · G34 · M41

Introduction

The risk-taking behavior of banks has been the focus of research over the past 2 decades ([67] [61, 75], etc.). The 2008 global financial crisis prompted several comments regarding the adequacy of regulatory and supervisory procedures in protecting the global banking system against systemic and other threats. During the crisis, numerous efforts were taken to protect the financial markets, and these actions were then continued in subsequent years. In this study, we seek to categorise the banking institutions in our sample as either systemic or non-systemic based on the five criteria established by the Basel Committee on Banking Supervision (BCBS). Our objective is to examine the extent of risk-taking by banks during the post-global financial crisis period (2010–2019) in comparison to the pre-crisis period (2002–2006). Additionally, we examine the impact of various corporate governance mechanisms on banks' risk-taking incentives during these two time periods.

Acknowledging the importance of previous studies about the impact of the bank risk-taking channel on the conditions of monetary policy easing [27, 38, 46, 47], we shed light on the causes of banks' risk-aversion after the global financial crisis by highlighting the impact of more efficient bank governance instruments on risk-taking incentives.

Accounting-based risk-taking measures utilized in this study are (a) the Z-score [37, 61, 82], (b) the standard deviation

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of the daily returns of a bank's shares in 1 year [23]. Using a sample of 125 banks from eight countries (Canada, the United States, the United Kingdom, Australia, Japan, France, and Germany) over the period 2002–2019, we assess the impact of the improvement in banking governance mechanisms on banks' risk-taking behavior. To evaluate our hypotheses, we gather data pertaining to financial, regulatory, governance, macroeconomic, and institutional factors from a total of eight databases (Bank Focus, Bloomberg, BoardEX [1, 16, 30, 62, 102]).

Initially, we observe a significant decrease in the propensity of banks to engage in risky activities in the years after the financial crisis. During both examination periods, it was observed that systemic banks had a comparatively lower risk tolerance in comparison to non-systemic banks. Furthermore, an adverse association is observed between indicators of effective bank governance and risk-taking behaviours. The accuracy of this conclusion can be attributed to the improvements made in corporate governance procedures within banks during the period of 2010–2017 (e.g., more independent, and small boards of directors, more years of joint tenure between the CEO and chairman, a greater age difference between these two executives, etc.).

The findings of our study contribute to the existing body of research in several significant ways. First, this study attempts to examine the extent of risk-taking by banks during both the pre-crisis and post-crisis periods, by analyzing the influence of different corporate governance procedures. In light of the global financial crisis, empirical evidence suggests that banks tend to participate in moderate risk-taking endeavors when operating under more efficient corporate governance standards. Second, the existing literature [75] is expanded by examining the relationship between countries' secrecy, an inverse measure of societal trust, and bank risk-taking. Our findings suggest that countries with a higher level of secrecy engage in greater risk-taking, and that banks in these countries have a higher chance of insolvency. Third, the literature on bank risk (e.g., [26, 40, 41, 61, 82]) is further enhanced through an analysis of various macroeconomic and institutional factors that may potentially impact banks' propensity for risk-taking.

In the following section, we will review the pertinent literature on the relevant themes and construct our two hypotheses. In "Research design and data" section, we describe the research methodology and data in detail. The empirical data are presented in "Empirical results" section, numerous sensitivity tests are discussed in "Sensitivity analysis" section, and our conclusions are given in "Conclusion" section.

Background considerations and hypothesis development

Global financial crisis and bank risk taking

One of the worst financial crises to have ever affected the global economy was the one that occurred in 2007, if not the worst. The onset of the 2007 financial crisis can be traced back to the initial collapse of the US subprime mortgage market, which subsequently spread to the bond market, interbank market, and finally resulted in a substantial disruption of the worldwide financial system. This disruption gave rise to enormous concerns over liquidity [50]. Because of the broad interconnectedness of countries' financial markets, the financial crisis quickly spread from wealthy countries to the rest of the world, allowing for a variety of research focusing on bank failures (e.g., Delis and Kouretas [36], [35, 67, 74]).

In their research, Delis and Kouretas (2011) 36] use a sample of European banks from 2001 to 2008 to argue that the severity and nature of the global financial crisis (2007–2009) remind us that the efficient functioning of the banking system is not solely a matter of liberalization and integration. In addition, the development of banks' funding strategies prior to and during the global financial crisis is related to these institutions' financial stability. In this line of research, Vazquez and Federico [99] emphasize that banks with weaker structural liquidity and higher leverage prior to the global financial crisis have a greater likelihood of failing during that crisis. Using a sample of 11,000 banks in the United States and Europe from 2001 to 2009, they demonstrate that, in the pre-crisis period, small banks with a domestic orientation were relatively more exposed to liquidity risk, whereas global banks were more susceptible to risk-taking due to excessive leverage.

In order to improve the financial stability of banks, Basel III and the Dodd-Frank Act advocated the implementation of a more stringent supervisory and regulatory framework, as well as greater market discipline. Using a sample of commercial banks from 34 OECD countries during the period 2002–2012, Kim et al. [78] find that bank diversification improves financial stability in the pre-crisis period but increases its volatility during the global financial crisis. This result contradicts the regulators' contention that diversification reduces bank risk. Ali and Iness [7] examine the relationship between capital inflows and banks' financial stability in the period surrounding the global financial crisis (2000–2014) using disaggregated data for 85 developing countries. The authors provide empirical evidence indicating that during the pre-crisis period spanning from 2000 to 2007, the financial stability of banks exhibited enhancement when they experienced an

increase in the allocation of capital flows towards emerging nations. In contrast, the financial stability of banks experienced a decline subsequent to the global financial crisis (2010–2014) due to an influx of foreign capital into these countries. According to Khan et al., their study encompassed a global sample of 4749 banks spanning the years 1986 to 2014. The findings of their research indicate that banks exhibiting lower levels of liquidity risk tend to engage in higher levels of risk-taking behaviour. During the period of the global financial crisis, financial institutions characterised by low liquidity risk demonstrated a correspondingly diminished likelihood of experiencing failure. Hence, the association between risk propensity and the liquidity status of a bank holds significant importance. Anginer et al. [10] argue that a stronger association between banks' risk and the quality of regulatory capital is observed in countries characterized by stringent regulatory frameworks, less consolidated and competitive banking markets, and heightened levels of private monitoring.

Significant entanglements exist between creditor rights and risk-taking. Using a sample of approximately 2400 institutions from 69 countries, Houston et al. [61] concluded that in regimes with substantial protection of creditors' rights, banks tend to take more risks and the likelihood of an economic crisis is quite high. The authors discovered that complete disclosure among creditors results in high profitability, a low risk of insolvency, a decreased likelihood of an economic meltdown, and subsequently high growth rates. In a different study, Jin et al. [64], utilizing a large sample of US banks for the period 2000–2010, investigate whether bank managers' opportunistic use of loan loss reserves affects their solvency and earnings quality. The authors find that banks with high levels of abnormal reserves for loan losses prior to the global financial crisis had a lower risk of insolvency from 2000 to 2006 and a lower likelihood of insolvency from 2007 to 2009.

Kanagaretnam et al. [74] investigate how cultural differences between countries influence conservatism in accounting practices and the risk of insolvency in these regions using an international sample of banks from 70 nations between 2000–2006 and 2007–2009 and two indicators of the sampled countries' cultural dimensions (individualism and avoidance of uncertainty). The authors conclude that banks from countries with low individualism and high uncertainty avoidance take lower risk than banks from countries with high individualism and low uncertainty avoidance. Aspects of various cultures (such as a high degree of individualism and a low aversion to uncertainty) encourage banks to take more risks, which frequently resulted in bank failures during the global financial crisis, the authors find.

Indisputable consensus exists that the global financial crisis was precipitated by excessive risk-taking by banks and inadequate capital buffers as a hedge against unexpected losses [28]. Reduced lending standards, erroneous credit ratings, and the availability of complex structured securities prompted banks to assume excessive risk. Since the global financial crisis, high capital buffers, a minimum leverage ratio to supplement the minimum risk-adjusted capital requirements, and the introduction of Tier 1 capital high-quality capital have been prerequisites for improved bank regulation and supervision [39].

With respect to those justifications, we can state our initial hypothesis as follows:

H_1 In the period following the Global Financial Crisis, banks demonstrated a decline in their propensity towards implementing risk-taking strategies in comparison to the period preceding the Financial Crisis.

Banking governance and risk-taking

The corporate governance practices implemented by banks exhibit significant differences when compared to those of other types of firms. The primary causes are shareholder and creditor conflict of interest, banking regulations, secrecy, and the complexity of the bank's operations [70]. Undoubtedly, one of the lessons learned from the global financial crisis was the need to better comprehend how to design banks' governance mechanisms so that they represent not only the interests of bank shareholders but also those of bank creditors and taxpayers, in order to more effectively control bank risk-taking [18, 48, 79, 98].

Zhou et al. [105] conducted a study to investigate the potential impact of the age difference between the chairman of the board and the CEO on banks' propensity for excessive risk-taking. The study focused on a sample of 100 European banks spanning the period from 2005 to 2014. The authors posit that the inclusion of greater diversity within the boards of banking institutions is a constructive strategy for promoting corporate governance. This is due to the belief that the incorporation of varied perspectives enhances the autonomy and effectiveness of the board. In their study, Zhou et al. [105] build upon the previous research conducted by Goergen et al. [54]. They introduce the concept of a "generation gap" in the banking industry, which is defined as an age difference exceeding 20 years between the chairman of the board and the chief executive officer. The authors provide evidence to support the notion that this generation gap has a constraining effect on risk-taking incentives within the banking sector. In the research they conducted, Goergen et al. [54] examined the association between the chairman of the board and the chief executive officer within a dataset of 150 companies that were listed on the German stock exchange over the period from 2005 to 2010. This study showcases the authors' findings that a positive relationship exists between

the age difference of the chairman of the board and the chief executive officer, and the level of systematic supervision exercised by the board of directors, as well as the market value of the bank. Furthermore, Goergen et al. [54] discovered, by employing the 2007 global financial crisis as an exogenous shock, that there was a notable decrease in the quantity of board meetings throughout the post-crisis era. Additionally, these banks saw a substantial decline in market value throughout the crisis. Laeven and Levine [82] examine the relationships between ownership structure, the regulatory and supervisory framework, and bank risk-taking attitude in another study involving 279 banks from 48 countries. The authors examine the conflicts between bank owners and managers regarding the level of risk-taking and demonstrate that the level of risk-taking is positively associated with shareholder power within the corporate governance structure of these banks.

Poshakwale et al. [95] conducted a study that examined the impact of statutory internal control and financial reporting rules on compliance costs, risk-taking behavior, and the quality of financial reporting in European Union (EU) banks. The study utilized a sample of all listed banks from the EU, the United States, and Canada, covering the period from 2004 to 2013. In a pragmatic experiment, it was seen that the introduction of legally mandated internal control measures and laws pertaining to the creation of financial reports resulted in a significant rise in both compliance expenses and the propensity for undertaking risks.

Numerous researchers have focused on the connection between board independence and bank risk-taking [52]. Using a cross-country sample of large banks from 2004 to 2014, Vallascas et al. investigate the effect of board independence on a bank's risk-taking attitude. During the period 2010–2014, an increase in board independence reduced the risk-taking of the large banks that received government bailouts during the global financial crisis. Gaganis et al. [52] also investigated whether macroprudential policies and bank governance interact to influence risk-taking. Using a sample of 356 banks from 50 countries during the years 2002–2017, the authors demonstrate that the effect of banks' corporate governance on risk-taking is significantly influenced by macroprudential policies. Specifically, Gaganis et al. [52] find that when low or no macroprudential rules are adopted, corporate governance procedures either have a negative impact on the financial stability of banks or have no impact at all. The authors argue that when banks implement macroprudential regulations, corporate governance has a positive and substantial effect on the financial stability of those institutions.

Andreou et al. [9] conducted a comprehensive analysis on a substantial dataset comprising 100,976 observations of US banks spanning the years 1994 to 2010. The study focuses on evaluating the impact of CEOs' managerial capacity on the control of risk-taking incentives and the generation of adequate liquidity within these banks. The authors' conclusion posits that managers that exhibit a high level of competence tend to uphold a significant degree of liquidity inside their banks, while embracing elevated levels of risk. During periods of economic downturn, proficient managers adopt measures to curtail the generation of supplementary liquidity in order to mitigate the extent of leverage on their banks' financial statements. In their study, Bennett et al. [23] undertake an additional investigation to analyze the impact of CEO compensation on the financial performance and risk propensity of banks within the global financial crisis. In this study, the authors examine a dataset consisting of 371 banks from 69 countries during the period of 2007 to 2008. The findings of the study indicate that banks which had CEOs who maintained foreign capital buffers greater than equity in 2006, as determined by leverage levels, exhibited a reduced inclination towards risk-taking and achieved higher levels of profitability during the financial crisis. According to Bennett et al. [23], it is suggested that bank shareholders should consider the interests of their creditors and make necessary adjustments accordingly.

Based on the preceding discussion, it can be inferred that the efficacy of corporate governance processes has a role in mitigating banks' propensity for engaging in risky behavior [54, 105]. As a result, subsequent to the global financial crisis, banks implemented improvements to their internal control systems in alignment with legal frameworks and supervisory authorities. The mentioned modifications have considerably reduced the motivations for participating in risky behaviors. Consequently, our second hypothesis can be formulated as follows:

H_2: There exists a positive relationship between the efficacy of bank governance processes and the adoption of moderate risk-taking techniques by banks, notably in the years following the Global Financial Crisis.

Bank governance, regulation and supervision

The significance of strong corporate governance in ensuring the appropriate operation of the banking sector and the overall economy has been emphasized by the Basel Committee for Banking Supervision [14]. Supervisors demonstrate a strong inclination towards solid corporate governance due to its crucial role in ensuring the secure and efficient operation of a bank. Ineffectiveness in this area can potentially have negative implications on the bank's risk profile. Banks that are effectively governed play a significant role in upholding an efficient and economically viable supervisory process, hence reducing the necessity for regulatory intervention. The Basel Committee for Banking Supervision [15] has put

up a set of thorough standards aimed at enabling regulators to assess the quality of corporate governance in banks. These assessments can be conducted by means of periodic evaluations of written documents and reports, interviews with board members and bank personnel, examinations, self-assessments conducted by the bank, and various forms of on-site and off-site monitoring. In addition to regular communication with the bank's board of directors, senior management, individuals overseeing risk, compliance, and internal control activities, as well as external auditors, it is imperative that the evaluations encompass these stakeholders [13]. It is essential for supervisors to evaluate whether the board of directors and senior management have established mechanisms to effectively monitor the bank's strategic goals. These mechanisms should encompass various aspects such as risk appetite, financial performance, capital adequacy, capital planning, liquidity, risk profile, risk culture, controls, remuneration practices, and management selection and evaluation. In addition, it is recommended that supervisors evaluate the procedures and standards employed by banks in the appointment of board members and senior management. Supervisors should acquire relevant information pertaining to the qualifications and characteristics of these individuals, if deemed appropriate [11]. When evaluating the comprehensive corporate governance of a bank, it is important for supervisors to additionally make an effort to evaluate the efficacy of board and senior management governance, specifically in relation to the bank's risk culture. The purpose of evaluating governance effectiveness is to ascertain the degree to which the board and senior management exhibit behaviors that are effective in promoting good governance [14].

About systemic banks

The framework established by the Basel Committee on Banking Supervision (BCBS) for assessing the systemic significance of commercial banks aligns with the guidelines put forward by the Financial Stability Board (FSB) [49]. This method employs five factors, each carrying equal weight, to ascertain the systemic importance of these banks. These criteria include cross-jurisdictional activity, size, interconnection, substitutability, and complexity [21]. Global non-systemic banks (non-G-SIBs) are banks that have a low ranking in each of these five categories (non-G-SIBs). In the domestic financial sector in which it operates, however, such a bank could be considered systemic. Domestic systemically important banks (D-SIBs) is the designation given to these institutions (see [19, 20]). Prior to the global financial crisis, banks engaged in securitization activities, which resulted in a network of interconnected financial liabilities and claims. In the years that followed, claims became concentrated within a small number of banks, resulting in the emergence of new, powerful, and intricately interconnected banks that, should one of them fail, could bring the entire financial system to its knees [8, 92]. For the purposes of this study, we will classify as systemic banks that appear on either the list of domestically systemically significant banks (D-SIBs) or the list of globally systemically significant banks (G-SIBs).

Based on the FSB, the European Banking Authority (EBA), the Federal Deposit Insurance Corporation (FDIC), and the Office of the Superintendent of Financial Institutions, we classify the banks in our sample into systemic banks (Global or Domestic SIBs (G(D)-SIBs)) and non-systemic banks (OSFI). According to Mourouzidou-Damtsa et al. [88], European systemic banks were less healthy prior to the global financial crisis than banks globally. According to Bubeck et al., negative interest rates encourage systemic banks to assume greater risk in both securities and loans. According to Poledna et al. [94], systemic banks have substantial capital buffers, low leverage, and a limited loan portfolio. Consequently, after the implementation of Basel III requirements, systemic banks restrained their risk-taking behavior. Mohanty et al. [87] contends that banks' risk-taking increased from the pre-crisis period to the post-crisis period due to the financial contagion (phenomenon) that emerged from the European sovereign debt turmoil. Tabak et al. argue that systemically significant banks that perceive themselves as too-big-to-fail (TBTF) should take on more risk regardless of the impact on their performance, with the knowledge that any potential loss would be covered by the government. Analyzing the evolution of bailout expectations during the global financial crisis, Hett and Schmidt [59] support the notion that the probability of a bailout is higher for systemic banks than for non-systemic banks. Based on this argument, we anticipate that systemic banks will employ more aggressive risk-taking strategies than non-systemic banks. Using a panel data set of 4351 commercial banks from 104 countries for the period 1989–2007, Cubillas et al. [33] conclude that systemic banks (or TBTF banks) exhibit lower risk-taking incentives than non-systemic banks.

On the presumption that systemic banks significantly contribute to global systemic risk [86], we also test hypotheses H_1 and H_2 for systemic and non-systemic banks. Specifically, we argue that the risk-taking of systemic banks appeared to be lower than that of non-systemic banks before and after the global financial crisis. Moreover, it is postulated that within systemic banks, the presence of effective bank governance is associated with a decrease in risk-taking behavior.

Research design and data

Risk-taking measures

During the global financial crisis, the key intervention of regulation and supervision authorities has reduced

risk-taking in the banking industry. We evaluate the risk-taking of banks using two traditional measures of risk.

The initial metric is the Z-score, a measure of a bank's stability that indicates the distance from insolvency [22, 26, 61, 82, 88, 96]. Laeven and Levine [82] define insolvency as a condition in which losses exceed equity. Therefore, the probability of insolvency is P(ROA > CAR) P(ROA > CAR. When income follows a normal distribution, the inverse of the probability of insolvency is therefore (ROA + CAR)/[(ROA)]. ROA is the standard deviation of ROA calculated for each bank using a 3-year rolling window of data. In accordance with the literature, we define the inverse of the default probability as the Z-score:

$$\text{Z - score} = \frac{\text{ROA} + \text{CAR}}{\sigma(\text{ROA})}$$

The Z-score indicates the number of standard deviations below the mean by which a bank's income must fall enough for equity capital to equal zero [61, 26]. Consequently, a greater Z-score indicates a more stable bank. Since the Z-score is highly skewed, its natural logarithm is multiplied by − 1 and a higher value indicates greater risk-taking [40, 72, 74, 75, 82].

The volatility of stock returns (STDEVRET) reflects a price-based bank risk measure [23] and is calculated as the standard deviation of daily stock returns for the periods 2001–2019.

Testing the relation between banks' risk-taking and corporate governance mechanisms

Numerous studies have examined the impact of differences in board characteristics on the risk-taking of banks [5, 22, 51, 91, 98]. A crucial characteristic is the size of the board of directors. Larger boards with greater human capital can supervise managers more effectively in order to curb their risk-taking behavior. On the other hand, in large boards where the CEO has a high degree of control and makes high-risk decisions, decision-making can be problematic. During the global financial crisis (2007–2009), large boards of directors posed a high risk of insolvency for banking institutions [2, 22, 51, 91, 100].

Akbar et al. [5] investigate the relationship between board structure and risk-taking behavior for UK financial firms and demonstrate that board independence and dual roles of CEO and chairman of the board influence the risk-taking attitude of these companies. They conclude that the lack of executive directors and powerless CEOs on the boards restricts risk-taking in these companies.

In contrast, research focusing on the period preceding the global financial crisis indicates a negative correlation between the size of a bank's board of directors and the risk taken on by the institution [6, 44, 45]. The "friendliness" of bank boards in terms of providing strong protection of shareholder rights while balancing the interests of shareholders and directors is an additional important characteristic of bank boards. During the global financial crisis, banks with "friendly" boards of directors exhibited extremely low profitability and a high risk-taking incentive [3, 11, 22, 44, 91].

In addition, the diversification of the bank's board in terms of gender, independence, capacity, and age may influence risk-taking behavior. For instance, Berger et al. [24] find that banks with a majority of female board executives face a greater risk in their loan portfolios. The ability of the board based on the tenure, experience, and education of the executives can have a significant impact on their willingness to take risks [98]. For instance, the advisory and supervisory roles of the board of directors may depend on the tenure and experience of the executives in relation to risk-taking [43, 58, 63].

Overall, research demonstrates that banks whose boards of directors are comprised of executives with a high level of expertise have low risk in their loan portfolios [24], whereas banks whose executives on their boards lack financial experience incur high losses [58].

To examine the impact of corporate governance mechanisms on banks' risk-taking, we estimate the following equation based on prior research [54, 77, 105, 90, 103, 97]:

$$\begin{aligned}
\text{DRISK} =& \delta_0 + \delta_1\text{BIND} + \delta_2\text{BSIZE} + \delta_3\text{B_AGE} \\
&+ \delta_4\text{CEOTEN} + \delta_5\text{CEORET} \\
&+ \delta_6\text{CHAIR_TEN} + \delta_7\text{EXCEO} + \delta_8\text{CH_CEO_JOINT} \\
&+ \delta_9\text{ABSCH_CEOGAP} + \delta_{10}\text{DUAL} + \delta_{11}\text{G(D)SIB} \\
&+ \delta_{12}\text{SIZE} + \delta_{13}\text{TLNS} + \delta_{14}\text{LEVERAGE} + \delta_{15}\text{LLP} \\
&+ \delta_{16}\text{NIIG} + \delta_{18}\text{PE} \\
&+ \sum_{i=19}^{21} \delta_i(G(D)\text{SIB} * \text{GOVERNANCE MECHANISMS}) \\
&+ \sum_{i=22}^{29} \delta_i(\text{MACROECONOMIC} - \text{INSTIT.FACTORS}) \\
&\delta_{30}\text{SECRECY} + \sum_{k=1}^{K-1} \delta_k\text{SPECIALIZATION} \\
&+ \sum_{j=1}^{J-1} \delta_j\text{YEAR} + u \quad (1)
\end{aligned}$$

where MACROECONOMIC – INSTITUTIONAL FACTORS = *f*(LNGDP, CRRI, GOVQID, HHINDEX, LAW_ENF, UNEMPL, ASDID, LORIGIN).

DRISK represents the risk-taking of banks as measured by Z-Score and STDEVRET.

In model (1), board independence (BIND), board size (BSIZE), board age (B AGE), CEO power, and chairman tenure (CHAIR TEN) are controlled for. According to the existing literature, CEO power is comprised of two components: CEO tenure (CEOTEN) and CEO distance from retirement (CEORET) [77, 2, 90]. We view age as a factor that has an incremental impact on the investment outlook, decision-making, and data analysis of banks [29, 103, 97].

In addition, we consider whether the chairman was previously the CEO of the same bank (EXCEO), whether the CEO is younger than the chairman (YCEO), and whether the chairman and CEO are the same individual (DUAL). Lastly, based on Goergen et al. [54] and Zhou et al. [105], we investigate the effect of the chairman and CEO's joint tenure and the age gap between the chairman and CEO on the bank's risk-taking. Table 7 of the appendix provides a comprehensive definition of Variables.

In our research, we account for cross-sectional variations in bank characteristics that may impact the relationship between risk-taking, the global financial crisis, and bank type. In accordance with Demirgüc-Kunt and Huizinga [40], Houston et al. [61], Andreou et al. [9], Khan et al., Danisman and Demirel [35], Dal Maso et al. [34], and others, we control for bank size (SIZE), the number of total loans outstanding (TLNS), the equity-to-asset ratio (EQTA), the loan loss provision ratio (LLP), the bank net interest income growth (NIIG) and, the price-to-earnings ratio (P/E). G(D) SIB is a dummy variable representing globally or domestically significant banks.

We include a few country-level variables to isolate the effects of the global financial crisis and bank type from the effects of other country characteristics that may influence banks' risk-taking. Demirgüç-Kunt and Huizinga [40] and Dal Maso et al. [34] provide evidence that the economic prosperity and market development of a nation influence the financial health of its banking industries. Specifically, Demirgüç-Kunt and Huizinga [40] demonstrate that a high GDP per capita is associated with decreased risk-taking, whereas Dal Maso et al. [34] demonstrate that a highly competitive banking sector is associated with increased risk-taking among domestic banks. On the basis of these arguments, we consider the following macroeconomic and institutional variables: LNGDP is per capita GDP [75], CRRI represents creditor rights [42, 61, 75], GOVQID is the Government Quality Index [75], HHINDEX is the domestic banking sector's competition index [26], LAW_ENF is the law enforcement index [82], UNEMPL is the unemployment rate.

According to Cole and Ariss [31], banks in common law regions have a greater proportion of risky loans in their asset portfolios than banks in civil law countries. Wang and Sui and Kanagaretnam et al. [75] provide evidence that banks from common-law countries are associated with less risky policies than banks from civil-law nations. Considering these findings, we introduce in our research the legal origin variable LORIGIN [81], which is a dummy variable with a value of 1 if a bank is from a common law country and a value of 0 if it is from a civil law country. The anti-self-dealing index (ASDID) refers to the issue of investor expropriation [41].

Prior research has demonstrated that the individualism and uncertainty aversion dimensions of national culture are positively and negatively associated with banks' risk-taking incentives, respectively [74, 75, 88, 69] Specifically, [69] examine the impact of cultural factors on bank failure during the period 2007–2009 and reveal the financial difficulties banks faced during the financial crisis. Kanagaretnam et al. [75] identify a strong inverse relationship between societal trust and bank risk-taking. In our research, we use SECRECY, an alternative measure of societal trust [60, 75], to examine the potential relationship between trust and banks' risk-taking. SECRECY is the opposite of TRUST, which equals uncertainty avoidance plus power distance minus individualism [60, 75]. Table 7 of the appendix provides a comprehensive definition of Variables.

All our models are estimated using robust regression analysis, which generates less biased estimates than OLS. Additionally, the continuous variables utilized in the interaction terms are mean-centered to prevent multicollinearity issues [4, 34].

Sample selection and limitations

We obtain bank accounting data from eight systemic countries whose banking industries significantly influence the global banking system: the United Kingdom, the United States of America, Canada, Australia, Japan, Germany, France, and Italy, for the period 2002–2019, from eight databases (Bank Focus, Bloomberg, BoardEX, [1, 16, 30, 62, 102].

The distribution sample by year and country is shown in Table 1 below. In addition, we divide the sample banks into those that are on the G-SIBs or D-SIBs list and those that are not (see Table 2).

Table 1 Development of a sample by country and year

Countries	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Australia	45	45	45	40	40	40	41	41	42	42	42	43	44	45	45	45	45	45	775
Canada	9	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	178
France	10	10	10	10	10	10	10	9	9	9	9	9	9	9	9	9	9	9	169
Germany	10	10	10	10	10	10	10	10	10	9	9	9	9	9	9	9	9	9	171
Italy	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	180
Japan	28	28	28	28	27	26	25	25	25	25	25	25	25	25	25	25	25	25	465
UK	11	12	11	11	10	8	8	8	8	8	8	8	8	8	8	8	8	8	159
U.S.A	50	50	45	41	38	44	42	40	40	41	42	42	42	42	43	42	43	44	771
Total	173	174	169	160	155	158	156	153	154	154	155	156	157	158	159	158	159	160	2868

Empirical results

Descriptive statistics and correlations

The descriptive statistics of the variables used in our models are shown in Table 3. The average Z-score is −4.03, and the average stock return volatility is 2.01. According to Table 3, 40.51% of the banks in our sample are either globally or domestically systemically significant. The average governance quality index is 1.39, the GDP per capita natural logarithm is 10.66, and the average capital index is 6. In conclusion, the average unemployment rate in our sample countries between 2004 and 2017 was 7.29%.

In addition, Table 3 reveals that the average level of board independence is 71.45%, the average board size is approximately 13 members, and the average age of board members is 57.5 years. In addition, the average CEO tenure is nearly 7 years, and 33.45% of CEOs are over the age of sixty. In addition, the average tenure of a chairman in that position and bank is 5.25 years, and 14.52% of bank chairmen possess prior experience as chief executive officers within the same banking institution. 72.64% of the CEOs in our sample are younger than the chairman, and 9.44% of the CEOs are also board chairs. The average tenure of the chairman and chief executive officer is 3.24 years, and the average age gap between the chairman and CEO is 11.35 years.

Table 4 demonstrates that board independence, the joint tenure of the chairman and CEO, and the absolute age difference between these two executives are negatively and significantly correlated (at the 10% level or higher) with risk-taking measures, indicating that more effective corporate governance mechanisms are associated with lower risk-taking incentives. Both risk-taking metrics are negatively and significantly (at the 1% level) correlated with the risk disclosure index. Table 4 reveals that the correlations between the two risk-taking measures are less than 1, indicating that each of these measures reflects a distinct aspect of a bank's risk-taking.

The impact of bank governance mechanisms on banks' risk-taking

Table 5 displays the estimation results from the equation's regression (1). It is evident from our findings that banks have exhibited a reduction in risk-taking practices throughout the post-crisis period, as compared to the period preceding the financial crisis. This observation provides support for our first hypothesis (H1). Furthermore, while examining Table 5, it becomes obvious that there exists an inverse relationship between the level of independence exhibited by a bank's board of directors and the amount of risk undertaken. On the other hand, there is a positive association between the size of boards of directors and a higher inclination towards engaging in risky behavior. Table 5 demonstrates that a bank's risk-taking decreases as the CEO's authority increases. Moreover, there is an adverse relationship between risk-taking behavior and the length of tenure of a chairman. In fact, the chairman's prior experience as chief executive officer of the same bank contributes to the limitation of risk-taking.

The variables CH_CEO_JOINT and ABSCH_CEOGAP are negatively and significantly (at the 5% level or better) associated with the two risk-taking variables during the entire study period, as well as during the pre-crisis and post-crisis periods. Therefore, the greater the number of years of joint tenure between the CEO and chairman of a bank, as well as the greater the absolute age difference between them, the lower the propensity for risk-taking. The risk-taking practices of banks where the chairman and CEO are the same individual are greater than those of banks where the two executives are independent, as shown in Table 5. The findings confirm our second hypothesis (H_2) and are generally consistent with previous research (e.g., [98, 105]). Furthermore, our research aligns with the recommendations of the Basel Committee on Banking Supervision, which promotes the significant independence of the Board

Table 2 Sampled global (or domestic) systemically important banks and non-global systemically (or domestic) important banks

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
G(D)-SIBs	31	34	39	42	46	51	59	60	64	69	72	78	80	82	84	**89**	**90**	92	1162
Non G(D)-SIBs	142	140	130	118	109	107	97	93	90	85	83	78	77	76	75	69	69	68	1706
Total	173	174	169	160	155	158	156	153	154	154	155	156	157	158	159	158	159	160	2868

of Directors, the limited number of directors on the Boards, the discretion of the Chairman of the Board and the CEO, and other strategies for enhancing bank governance.

Based on the interaction terms, we can conclude that the effectiveness of bank governance mechanisms in limiting risk-taking appears to be greater for systemic banks. Specifically, systemic banks with a high level of board independence, a long tenure shared by the chairman and CEO, and a large age gap between the two executives are associated with lower risk-taking than non-systemic banks with the opposite corporate governance characteristics. Compared to non-systemic banks with smaller boards, systemic banks with larger boards appear to engage in more aggressive risk-taking strategies.

Moreover, the results depicted in Table 5 illustrate that banks originating from countries with a considerable gross domestic product (GDP) per capita, a substantial stock market capitalization, a strong anti-self-dealing index, and a legal system grounded in common law exhibit reduced incentives to partake in risky behavior, as opposed to banks hailing from nations characterized by divergent attributes. Between the years 2002 and 2019, it was observed that banks originating from nations characterized by intense competition among domestic banks, robust creditor rights, and a high level of confidentiality exhibited a greater propensity for undertaking risky activities compared to banks hailing from countries with opposing characteristics. These results are consistent with prior research (e.g. [74, 75, 82]). Finally, the findings presented in Table 5 demonstrate a statistically significant positive relationship between the variable SECRECY and both the z-score and STDEVRET measures. The relationship is observed across the whole sample period, as well as both the pre- and post-crisis periods. These findings provide empirical evidence that gives support to the notion that societal trust has a positive impact on financial transparency, pro-social behavior, and a reduction in management rent-seeking. Consequently, these factors contribute to a decrease in bank risk-taking.

Sensitivity analysis

A reexamination of the relation between banks' risk-taking and corporate governance mechanisms

To reconsider hypotheses H_1 and H_2, we employ a model that includes traditional corporate governance variables (such as the independence between the CEO and the chairman, the expertise of the board's executives, the managers' compensation schemes, etc.). The following model (2) is based on the research of Ellul and Yerramilli [43] and Jermias and Gani [63]:

Table 3 Descriptive statistics

Variable	Mean	Median	SD	Min	Max	Observations
Z-SCORE	−4.0267	−3.5025	2.6094	−13.2029	2.9824	2455
STDEVRET	2.0159	1.5902	1.3904	0.3869	13.9489	2455
G(D)SIB	0.4051	1.0000	0.3269	0.0000	1.0000	1162
SIZE	8.1500	8.4024	1.7454	3.9740	11.2012	2845
TLNS	0.6918	0.6829	0.2367	0.0000	1.8479	2842
LEVER	9.2425	1.4086	29.9389	−121.7602	159.6207	2846
LLP	1.7111	0.0101	3.9192	−2.6957	39.4105	2843
NIIG	0.8168	0.0024	6.9543	−23.8970	117.0195	2841
PBV	1.2915	1.1756	0.8095	0.0688	7.4303	2846
PE	20.8907	13.4953	56.0569	0.8979	95.0000	2845
GOVQID	1.3978	1.1928	0.8711	−0.2429	2.7025	2860
LNGDP	10.6654	10.6704	0.1782	10.2218	11.0488	2860
CRRI	1.6270	1.0000	1.2628	0.0000	4.0000	2860
CAPITAL_ID	6.6109	7.0000	1.4472	3.0000	8.0000	2860
ASDID	0.5567	0.6410	0.1977	0.2714	0.9500	2860
SECRECY	0.2142	0.070	0.3366	−0.1900	0.8300	2860
HHINDEX	0.1268	0.0550	0.1796	0.0365	0.6569	2860
LAW_ENF	8.3515	8.3300	1.0006	5.0000	10.0000	2860
UNEMPL	0.0729	0.0730	0.0214	0.0340	0.1260	2860
CAP_GDP	0.9005	1.0572	0.3858	0.2134	1.5321	2860
LORIGIN	0.5877	1.0000	0.4925	0.0000	1.0000	2860
BIND	0.7145	0.4943	0.2417	0.1887	1.0000	2843
BSIZE	13.2798	9.2594	4.1823	3.0000	23.0000	2843
B_AGE	57.4512	58.7891	5.2512	42.4591	72.2484	2843
CEOTEN	6.9846	4.8550	5.5647	1.0000	39.0000	2843
CEORET	0.3345	0.0000	0.4826	0.0000	1.0000	2843
CHAIR_TEN	5.2560	4.1567	3.9672	1.0000	27.0000	2843
EXCEO	0.1452	0.0000	0.3367	0.0000	1.0000	2843
CH_CEO_JOINT	3.2460	3.1250	2.1457	0.0000	18.0000	2843
YCEO	0.7264	0.0000	0.2426	0.0000	1.0000	2843
ABS_CH_CEO_GAP	11.3460	8.5000	6.3248	0.0000	31.0000	2843
DUAL	0.0944	0.0000	0.1785	0.0000	1.0000	2843

This table depicts the descriptive statistics of our research's fundamental variables. Z-SCORE equals the natural logarithm of [(ROA + CAR)/(ROA)]. ROA is earnings before taxes and loan loss provisions divided by assets, CAR is capital-asset ratio, and (ROA) is the 3-year rolling standard deviation of σ(ROA). [37, 61, 82]. The score is multiplied by −1, so a higher z-score indicates greater risk-taking. STDEVRET is the annual standard deviation of daily returns, returns are calculated as the natural logarithm of the ratio of daily equity market price series (ln(Pt/Pt − 1)). {[23]}. STDEVROA is the standard deviation of the 3-year rolling return on assets ratio. PCRISIS is a dummy variable whose value is 1 for the years 2010–2014 and 0 for the years 2004–2007. G(D) SIB is a dummy variable whose value is one if the institution is a Global or Domestic Systemically Important Bank and zero otherwise. SIZE equals the logarithm of total assets. TLNS is the total loans of the bank divided by total assets. The LEVER ratio is equal to the bank's net debt divided by its earnings before taxes, depreciation, and amortization. LLP is the loan loss provision ratio, which is calculated by dividing loan loss provisions by lagged total loans. NIIG is the Net Interest Income Growth, which is equal to the change in net interest income from year t − 1 to year t divided by total assets that have been lagged. Price-to-book ratio (PBV) is equal to the bank's share price divided by its earnings per share. The price-to-earnings ratio is calculated by dividing the current stock price by the annual earnings per share. GOVQID is the governance quality index, which is the first component of (a) Corruption Control, (b) Governance Effectiveness, (c) Regulatory Quality, (d) Political Stability, and (e) Voice and Accountability. Each year's LNGDP is the natural logarithm of the Gross Domestic Product (GDP) per capita. CRRI is the index of creditor rights, which ranges from 0 to 4. Higher CRRI values indicate greater creditor rights in a country. CAP GDP is an index of each country's stock market capitalization to GDP Cihak et al. [30]. CAPITAL _ID is an index of capital buffer regulations. This index ranges from 0 to 10, with higher values indicating more stringent capital buffer regulation regimes. ASDID is the Anti-self-dealing index developed by Djankov et al. [41]. SECRECY equals the sum of the scores for uncertainty

Table 3 (continued)

avoidance and power distance minus the score for individualism. HHINDEX is the Herfindahl–Hirschman Index equal to the sum of all banks' market share values squared (in terms of total assets). LAW ENF is the law enforcement index, with values between 0 and 10 indicating greater law enforcement. Data from the 2019 Annual Report on Economic Freedom around the World. UNEMPL is the countrywide unemployment rate (World Bank). LORIGIN is a value of 1 if the legal origin is common law and 0 otherwise. Data from La Porta et al. [81]. BIND is the proportion of outside directors to the total number of bank board directors. BSIZE represents the total number of bank board directors. B AGE is the average age of the entire board of directors. The number of years the CEO has held the position of CEO. CEORET is a dummy variable whose value is 1 if the CEO is older than 60, and 0 otherwise. The Chairman tenure is represented by CHAIR TEN, which is equal to the number of years the Chairman has held the specific position at the same bank. EXCEO is a dummy variable equal to 1 if the chairman has previously served as the bank's CEO. CH CEO JOINT represents the Chairman-CEO tenure and is equal to the number of years that the chairman and CEO have worked together on the board. The value of YCEO is 1 if the CEO is younger than the Chairman, and 0 otherwise. ABSCH CEOGAP represents the absolute Chairman-CEO age difference, which is the Chairman's age minus the CEO's age. DUAL is a dummy variable with the value 1 if the CEO and Chairman are the same individual, and 0 otherwise

Table 4 Correlation matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) ZaSCORE	**1.00**	0.57[a]	− 0.22[a]	0.09	− 0.05	0.35[a]	0.53[a]	0.28[a]	− 0.43[a]	0.54[a]	0.11	− 0.06[c]
(2) STDEVRET	0.58[a]	**1.00**	− 0.38[a]	0.02	− 0.15[b]	0.41[a]	0.50[a]	0.28[a]	− 0.54[a]	0.55[a]	0.10	− 0.05[a]
(3) G(D)SIB	− 0.17[b]	− 0.36[a]	**1.00**	0.16[b]	0.40[a]	− 0.50[a]	0.26[a]	− 0.12[c]	− 0.47[a]	− 0.29[a]	0.28[a]	0.06
(4) BSIZE	0.21[a]	0.18[b]	0.02	**1.00**	0.09	− 0.23[a]	0.11	− 0.11	0.03	0.22[a]	0.05	0.15[b]
(5) B_AGE	0.01	− 0.13[c]	0.78[a]	− 0.04	**1.00**	− 0.17[b]	0.12	0.26[a]	− 0.31[a]	− 0.14[b]	0.23[a]	0.04
(6) CEOTEN	0.12	0.17[b]	− 0.41[a]	− 0.09	− 0.22[a]	**1.00**	0.15[b]	0.23[a]	0.37[a]	0.21[a]	0.12	0.07
(7) CEORET	0.21[a]	0.21[a]	0.04	0.02	0.02	0.19[a]	**1.00**	− 0.42[a]	− 0.50[a]	− 0.60[a]	0.05	0.13[c]
(8) CHAIR_TEN	0.25[a]	0.30[a]	− 0.12	− 0.06	0.31[a]	0.11	− 0.12	**1.00**	0.37[a]	0.11	− 0.02	0.03
(9) EXCEO	0.33[a]	0.46[a]	− 0.50[a]	0.03	− 0.22[a]	0.18[a]	− 0.16[b]	0.42[a]	**1.00**	0.51[a]	− 0.09	− 0.12[c]
(10) CHCEOJOINT	− 0.48[a]	− 0.53[a]	− 0.18[a]	0.15[b]	− 0.11	− 0.06	− 0.13[c]	0.02	0.31[a]	**1.00**	0.07	− 0.01
(11) YCEO	0.06	0.02	0.17[b]	0.04	0.10	0.12[c]	0.25[a]	− 0.08	− 0.19[a]	− 0.11	**1.00**	0.24[a]
(12) ACHCEOGAP	− 0.07[b]	− 0.05[a]	0.02	0.03	-0.03	0.04	0.02	− 0.05	− 0.04	− 0.12	0.30[a]	**1.00**

This table illustrate the correlations among the basic variables of our research. Spearman correlations reported above the diagonal while Pearson correlations below the diagonal. The superscripts a, b and c denote statistical significance at 1%, 5% and 10% respectively

$$
\begin{aligned}
\text{DRISK} = {} & \varphi_0 + f\{\text{BOARDIN, CCS, BOARD\_SIZE, BCAP, BEXP, COMPENS}\} \\
& + \varphi_7 \text{G(D)SIB} + g(\text{MBR, TLNS, DAR, RLL, GRWT, PBV}) \\
& + \sum_{i=14}^{18} \varphi_i (\text{G(D)SIB} * \text{CORP.GOVERNANCE CHARACTERISTICS}) \\
& + \sum_{j=19}^{24} \varphi_j \text{MACRO\_INSTIT. VARIABLES} + \varphi_{25} \text{SECRECY} \\
& + \sum_{k=1}^{K-1} \varphi_k \text{SPECIALIZATION} + \sum_{j=1}^{J-1} \varphi_j \text{YEAR} + \text{u} \quad (2)
\end{aligned}
$$

where MACROECONOMIC − INSTITUTIONAL FACTORS = h(LNGDP, CRRI, GOVQID, HHINDEX, LAW_ENF, UNEMPL, CAP_GDP, LORIGIN).

Table7 of the appendix provides a comprehensive definition of Variables.

Table 6 illustrates a decrease in the degree of risk-taking activities by banks during the aftermath of the crisis in comparison to the pre-crisis era. This finding provides confirmation for our first hypothesis (H_1). Furthermore, the data shown in Table 6 illustrates an association between reduced risk-taking behavior and the implementation of more efficient bank governance mechanisms. The findings have revealed an association between reduced tendency for risk-taking and specific governance factors, such as increased board capital (BCAP), enhanced board experience (BEXP), higher board independence (BOARDIN), and the distinct separation of the chairman of the board and the CEO (CCS). In contrast, financial institutions characterized by expansive boards and substantial CEO remuneration are inclined to engage in higher levels of risk-taking. Furthermore, in the post-crisis era, these relationships are more important in systemic banks.

Table 5 The impact of effective bank governance mechanisms on risk-taking (Z-SCORE and STDEVRET)

Dependent variable: DRISK	Full sample		Pre-crisis		Post-crisis	
	Z-SCORE	STDEVRET	Z-SCORE	STDEVRET	Z-SCORE	STDEVRET
INTERCEPT	2.0752**	3.6421*	1.7543*	1.4440***	8.0926	0.6390
	(2.02)	(1.76)	(1.88)	(6.37)	(1.03)	(0.90)
BIND	−0.6422***	−0.3321**	−0.1068***	−0.3594**	−0.0679***	−0.1654**
	(−2.76)	(−2.18)	(−3.23)	(−2.18)	(−4.06)	(−2.03)
BSIZE	0.0361***	0.0456***	0.3170**	0.0489**	1.1988**	0.9426**
	(2.85)	(4.11)	(2.34)	(2.28)	(2.14)	(2.35)
B_AGE	0.0221*	0.0342	0.0124*	0.0713***	0.0340	0.0953
	(1.77)	(1.54)	(1.83)	(4.24)	(1.28)	(1.02)
CEOTEN	−0.2443**	−0.1741	−0.2055*	−0.0239***	−0.2467**	−0.1604***
	(−2.16)	(−1.46)	(−1.83)	(-2.92)	(−2.36)	(−2.88)
CEORET	−0.6612***	−0.4213**	−0.6132**	−0.1161	−0.7882**	−0.1154***
	(−2.73)	(−2.21)	(−2.12)	(−1.52)	(−2.02)	(−8.78)
CHAIR_TEN	−0.1663	−0.1055	−0.0941	−0.1239	−0.0122	−0.0774
	(−1.22)	(−1.54)	(1.03)	(−1.46)	(−1.44)	(−0.96)
EXCEO	−0.4253***	−0.0942*	−0.1258**	−0.6292**	−0.0813	−0.0487**
	(−3.63)	(−1.68)	(−2.01)	(−1.98)	(−1.15)	(−2.11)
CH_CEO_JOINT	−0.1603***	−0.2971**	0.3313***	−0.1389**	−0.1266***	−0.0450***
	(−3.83)	(−2.36)	(−2.98)	(−2.14)	(−3.02)	(−2.72)
ABSCH_CEOGAP	−0.7604***	−0.8326***	−0.4447***	−0.5176***	−0.7663***	−0.4597***
	(−4.28)	(−3.18)	(−2.99)	(−2.84)	(−2.69)	(−3.08)
DUAL	0.4055**	0.3213*	0.4481	0.0376*	0.0991	0.0074**
	(2.15)	(1.92)	(1.42)	(1.89)	(1.22)	(2.14)
G(D)SIB	−0.9041***	−1.5622**	−1.0683***	−0.3874***	−2.6937***	−0.3216**
	(−2.74)	(−2.09)	(−3.24)	(−4.03)	(−4.82)	(−2.43)
SIZE	−0.0887**	−0.0112*	−0.4412*	−0.0709*	−0.0632**	−0.0036
	(−2.03)	(−1.72)	(−1.89)	(−1.74)	(−2.21)	(−0.90)
TLNS	0.0488***	0.0321**	0.0941**	0.0359**	0.0455*	0.0249***
	(3.66)	(2.45)	(2.51)	(2.24)	(1.87)	(3.07)
LEVERAGE	0.1633***	0.1427**	0.0545**	0.1439**	0.0422***	0.0035*
	(4.17)	(2.04)	(2.12)	(2.04)	(3.02)	(1.83)
LLP	0.0219**	0.1049**	0.0841***	0.0587**	0.0408***	0.0513***
	(2.09)	(2.21)	(2.83)	(2.11)	(2.77)	(2.88)
NIIG	1.0542**	0.0943*	0.0417***	1.2084	0.0081*	0.0037***
	(1.99)	(1.68)	(2.63)	(1.50)	(1.91)	(6.22)
PE	−0.0421**	−0.0343***	−0.0566*	−0.0135	−0.2419***	−0.0193**
	(−3.71)	(−2.94)	(−1.93)	(−1.51)	(−3.36)	(−2.04)
*G(D)SIB*BIND*	*−0.0952***	*−0.0451***	*−0.0506***	*−0.0234*	*−0.0127***	*−0.1246****
	(−4.21)	*(−2.36)*	*(−2.08)*	*(−1.42)*	*(−2.64)*	*(−2.76)*
*G(D)SIB*BSIZE*	*0.1024**	*0.2240***	*0.1005**	*0.1713**	*0.1992***	*0.8752***
	(1.87)	*(2.06)*	*(1.81)*	*(1.93)*	*(2.44)*	*(2.05)*
*G(D)SIB*CH_CEO_JOINT*	*−0.1053****	*−0.1241****	*−0.0959***	*−0.0982*	*−0.1224****	*−0.0749***
	(−3.12)	*(−2.77)*	*(−2.02)*	*(−1.55)*	*(−3.28)*	*(−2.42)*
*G(D)SIB*ABSCH_CEOGAP*	*−0.3244****	*−0.1968***	*−0.2808****	*−0.2439****	*−0.4527****	*−0.0097****
	(−2.78)	*(−2.05)*	*(2.98)*	*(−2.82)*	*(−2.87)*	*(−2.27)*
LNGDP	−1.6422***	−1.9310**	−2.0673***	−2.6284**	−1.4701***	−0.0133**
	(−2.77)	(−2.20)	(−3.37)	(−2.49)	(−3.68)	(−2.25)
CRRI	0.4209	0.1123***	0.9432**	0.5089	0.7069***	0.0170**
	(1.42)	(2.71)	(2.03)	(1.48)	(2.49)	(2.58)

Table 5 (continued)

Dependent variable: DRISK	Full sample		Pre-crisis		Post-crisis	
	Z-SCORE	STDEVRET	Z-SCORE	STDEVRET	Z-SCORE	STDEVRET
GOVQID	−0.3278**	−0.2883**	−0.0995**	−0.4421	−0.0988*	−0.0878**
	(−2.32)	(−2.47)	(−2.36)	(−1.32)	(−1.71)	(−2.16)
HHINDEX	2.4431**	1.0563**	1.9408***	5.9617**	0.5704**	0.0175***
	(2.00)	(2.43)	(3.03)	(2.41)	(1.98)	(2.91)
LAW_ENF	−0.0994*	−0.1011**	−0.1217**	−0.4441	−0.1222**	−0.0189**
	(−1.85)	(−1.98)	(−2.16)	(−0.62)	(−2.15)	(−2.19)
UNEMPL	2.4511***	3.4782***	1.7421**	4.3090***	4.4407***	0.4750***
	(2.71)	(3.06)	(2.44)	(2.70)	(7.20)	(2.68)
ASDID	−0.7211**	−0.6826*	−0.6238**	−0.5403	−0.6012***	−0.6429***
	(−2.20)	(−1.84)	(−2.37)	(−1.08)	(−2.96)	(−2.67)
LORIGIN	−0.1423**	−0.0955***	−0.0704**	−0.0187*	−0.0248**	−0.0297**
	(−2.24)	(−4.42)	(−2.49)	(−1.78)	(−2.05)	(−2.11)
SECRECY	2.4118***	3.2243***	2.9734***	8.5116**	3.9716**	0.8075**
	(4.74)	(3.06)	(2.91)	(2.44)	(2.11)	(2.49)
Specialization fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	*1,154*	*1,154*	*816*	*816*	*987*	*987*
Adj. R^2	*42.402%*	*43.784%*	*43.022%*	*47.688%*	*44.162%*	*49.057%*

This table illustrates the results from the estimation of the model (1) below:

$$\begin{aligned}\text{DRISK} = {} & \delta_0 + \delta_1 \text{BIND} + \delta_2 \text{BSIZE} + \delta_3 \text{B\_AGE} + \delta_4 \text{CEOTEN} + \delta_5 \text{CEORET} + \delta_6 \text{CHAIR\_TEN} + \delta_7 \text{EXCEO} + \delta_8 \text{CH\_CEO\_JOINT} + \delta_9 \text{ABSCH\_CEOGAP} \\ & + \delta_{10} \text{DUAL} + \delta_{11} \text{G(D)SIB} + \delta_{12} \text{SIZE} + \delta_{13} \text{TLNS} + \delta_{14} \text{LEVERAGE} + \delta_{15} \text{LLP} + \delta_{16} \text{NIIG} + \delta_{18} \text{PE} + \sum_{i=19}^{21} \delta_i (\text{G(D)SIB} * \text{GOVERNANCE MECHANISMS}) \\ & + \sum_{i=22}^{29} \delta_i (\text{MACROECONOMIC} - \text{INSTIT.FACTORS}) + \delta_{30} \text{SECRECY} + \sum_{k=1}^{K-1} \delta_k \text{SPECIALIZATION} + \sum_{j=1}^{J-1} \delta_j \text{YEAR} + u(1)\end{aligned}$$

where MACROECONOMIC − INSTITUTIONAL FACTORS = *f*(LNGDP, CRRI, GOVQID, HHINDEX, LAW_ENF, UNEMPL, ASDID, LORIGIN)

The Appendix section of the document contains definitions for the variables used, and the Z-statistics are shown directly beneath the estimated coefficients. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively (two-tailed)

The Italian writing style has been utilised to differentiate the interaction variables and other regression results from the rest of the variables

The analysis of the interaction terms reveals that systemic banks characterized by high levels of board capital, extensive board experience, and board independence exhibit a reduced inclination towards risk-taking as compared to non-systemic banks. Ultimately, the influence of macroeconomic and institutional factors on the risk-taking tendencies of banks remains consistent with the findings presented in Table 5. Nevertheless, it is important to acknowledge that in nations characterized by a significant stock market capitalization, financial institutions tend to exhibit a pronounced inclination towards engaging in risky activities.

Additional tests using alternative banks' risk—taking measures

We re-evaluate our two models using four alternative measures of bank risk-taking. Specifically, we test hypotheses H_1 and H_2 utilizing the volatility on net interest margin (STDEVNIM), the variability of return on assets (STDEVROA), and two alternative Z-scores, the adjusted Z-score (Adj Zscore) and the alternative Z-score (Alt Zscore). The STDEVNIM represents the variability of a bank's net interest margin and, like the STDEVROA, reflects the bank's operational risk-taking [68, 74, 82]. Adj Zscore equals the sum of (1 + Adj.ROE) divided by the standard deviation of the adjusted return on equity ratio (STDEVAdj.ROE). Adjusted return on equity (Adj. ROE) is the ratio of earnings before income taxes and loan loss provisions to total equity [53].

Table 6 The impact of effective bank governance mechanisms on risk-taking (Z-SCORE and STDEVRET)

Dependent variable: DRISK	Full sample		Pre-crisis		Post-crisis	
	Z-SCORE	STDEVRET	Z-SCORE	STDEVRET	Z-SCORE	STDEVRET
INTERCEPT	−9.2405*	−4.0507**	−3.4680*	−6.0816**	−5.6458***	−3.7651*
	(−1.93)	(−2.04)	(2.12)	(−2.25)	(−3.09)	(−1.91)
BOARDIN	−0.0478**	−0.0836**	−0.0789	−0.0489**	−0.0906***	−0.1247***
	(−2.49)	(−2.22)	(−2.27)	(−2.36)	(−3.18)	(−2.81)
CCS	−0.1096**	−0.2508**	−0.0968**	−0.2503**	−0.0967	−0.2504***
	(−2.11)	(−2.19)	(−2.32)	(−2.48)	(−1.26)	(−3.23)
BOARD_SIZE	0.2145	0.1504	0.3204	0.1878	0.7642	0.0107
	(1.12)	(1.27)	(1.04)	(1.16)	(1.41)	(1.51)
BCAP	−0.6878**	−0.2745***	−0.4247***	−0.9046**	−0.1741***	−0.1604***
	(−2.36)	(−3.11)	(−2.87)	(−2.20)	(−2.64)	(−3.16)
BEXP	−0.1251**	−0.2897**	−0.0976**	−0.1604***	−0.1080**	−0.0245**
	(−2.07)	(−2.44)	(−2.48)	(−2.80)	(−2.33)	(−2.71)
COMPENS	0.0759	0.0295	0.4006	0.0247	0.1504**	0.6056*
	(1.42)	(1.30)	(1.51)	(1.45)	(2.00)	(1.87)
G(D)SIB	−0.2804***	−0.5247**	−0.3870***	−0.9074***	−0.4040**	−0.3241***
	(−2.78)	(−2.52)	(−2.97)	(−2.89)	(−2.32)	(−3.05)
MBR	−0.0970*	−0.0805**	−0.1267**	−0.7689***	−0.1650**	−0.0108
	(−1.82)	(2.36)	(−2.11)	(−3.04)	(−2.49)	(−1.47)
TLNS	1.2607**	0.8873**	0.2172**	1.0734**	0.6626*	0.0893**
	(2.46)	(2.37)	(2.44)	(2.27)	(1.84)	(1.98)
DAR	0.0903**	0.1403*	0.0150***	0.0479	0.0347**	0.6208***
	(2.21)	(1.93)	(2.82)	(1.48)	(2.18)	(2.75)
RLL	0.0721*	0.0648*	0.0506**	0.0481**	0.416**	0.0572**
	(1.89)	(1.76)	(2.01)	(2.08)	(2.17)	(2.21)
GRWT	−0.0416**	−0.0311**	−0.0480***	−0.0219	−0.0109*	−0.0098*
	(2.24)	(2.38)	(2.98)	(−1.48)	(−1.76)	(−1.92)
PBV	−0.0428***	−0.0214**	−0.0949	−0.0954**	−0.1309*	−0.0462**
	(−3.44)	(2.31)	(2.43)	(−2.08)	(−1.92)	(−2.07)
*G(D)SIB*BOARDIN*	*−0.0124***	*−0.2127***	*−0.0756***	*−0.0567***	*−0.097853****	*−0.0145***
	(−2.94)	*(−2.33)*	*(−2.24)*	*(−2.38)*	*(−2.97)*	*(−2.56)*
*G(D)SIB*CCS*	*−0.1578***	*−0.2120***	*−0.1197**	*−0.2648*	*−0.2014**	*−0.2075*
	(−2.46)	*(−2.11)*	*(−1.88)*	*(−1.45)*	*(−1.91)*	*(−1.60)*
*G(D)SIB*BOARD_SIZE*	*0.0516***	*0.2007***	*0.0404**	*0.1891***	*0.0296****	*0.0904****
	(2.19)	*(2.21)*	*(1.83)*	*(2.25)*	*(2.84)*	*(2.96)*
*G(D)SIB*BCAP*	*−0.2409***	*−0.3009****	*−0.1704***	*−0.2405***	*−0.0988*	*−0.0156***
	(2.36)	*(−2.73)*	*(−2.28)*	*(−2.47)*	*(−1.53)*	*(−2.47)*
*G(D)SIB*BEXP*	*−0.1672***	*−0.1820***	*−0.1529***	*−0.2045***	*−0.1972****	*−0.1649****
	(−2.19)	*(−2.34)*	*(−2.40)*	*(−2.08)*	*(−2.98)*	*(−2.86)*
LNGDP	−1.0095**	−0.9071***	−0.2548**	−1.5460***	−1.6463***	−0.0454**
	(−2.24)	(−2.86)	(−2.17)	(−2.72)	(−3.94)	(−2.48)
CRRI	0.2533	0.0986	0.0455	0.0940	0.0671	0.0036
	(1.11)	(0.84)	(1.32)	(1.37)	(1.23)	(1.40)
GOVQID	−1.9574**	−2.4068**	−2.8464***	−2.1236**	−2.4511***	−3.2139***
	(−2.26)	(−−2.53)	(−2.82)	(−2.27)	(−3.19)	(−3.92)
HHINDEX	2.0804**	1.8454**	2.3149***	3.2698***	1.2429**	0.0276**
	(2.24)	(2.29)	(2.91)	(3.74)	(2.20)	(2.45)
LAW_ENF	−0.0956**	−0.1221**	−0.2578**	−0.3977**	−0.3439***	−0.0476***
	(−2.12)	(−2.46)	(−2.26)	(−2.49)	(−3.04)	(−2.64)

Table 6 (continued)

Dependent variable: DRISK	Full sample		Pre-crisis		Post-crisis	
	Z-SCORE	STDEVRET	Z-SCORE	STDEVRET	Z-SCORE	STDEVRET
UNEMPL	2.9642***	4.2497**	2.0373***	3.9804**	4.0168***	1.2901**
	(2.76)	(2.41)	(2.95)	(2.19)	(3.79)	(2,04)
CAP_GDP	0.0079**	0.0024*	0.0096**	0.0078*	0.0097	0.0094*
	(1.99)	(1.86)	(2.02)	(1.94)	(1.56)	(1.88)
LORIGIN	−1.0540**	−1.2473***	−1.8406***	−1.5613**	−0.9982**	−1.0200**
	(−2.16)	(−2.85)	(−2.89)	(−1.98)	(−2.45)	(−2.17)
SECRECY	2.0655***	2.9803**	2.0636***	4.7605**	3.8713**	1.9437***
	(2.94)	(2.10)	(3.79)	(2.53)	(2.48)	(3.14)
Specialization fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	*1,061*	*1,061*	*803*	*803*	*981*	*981*
Adj. R^2	*45.446%*	*46.377%*	*45.972%*	*48.126%*	*48.240%*	*47.972%*

This table depicts the results from the estimation of the model (2) below:

$$\begin{aligned}\text{DRISK} =& \varphi_0 + f\{\text{BOARDIN, CCS, BOARD\_SIZE, BCAP, BEXP, COMPENS}\} + \varphi_7 \text{G(D)SIB} \\ &+ g(\text{MBR, TLNS, DAR, RLL, GRWT, PBV}) \\ &+ \sum_{i=14}^{18} \varphi_i (\text{G(D)SIB} * \text{CORP.GOVERNANCE CHARACTERISTICS}) \\ &+ \sum_{j=19}^{24} \varphi_j \text{MACRO\_INSTIT. VARIABLES} + \varphi_{25} \text{SECRECY} \\ &+ \sum_{k=1}^{K-1} \varphi_k \text{SPECIALIZATION} + \sum_{j=1}^{J-1} \varphi_j \text{YEAR} + u\end{aligned}$$

Where $\text{MACROECONOMIC} - \text{INSTITUTIONAL FACTORS} = h(\text{LNGDP, CRRI, GOVQID, HHINDEX, LAW\_ENF, UNEMPL, CAP\_GDP, LORIGIN})$

The Appendix section of the document contains definitions for the variables used, and the Z-statistics are shown directly beneath the estimated coefficients. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively (two-tailed)

The Italian writing style has been utilised to differentiate the interaction variables and other regression results from the rest of the variables

Alt Zscore is the ratio of the return on assets ratio (ROA) plus the capital-to-assets ratio to the standard deviation of daily stock returns (Poshakwale et al., [95]) [55]. Because the alternative Z-scores are highly skewed, we calculate the natural logarithm and multiply both by -1 so that a greater value indicates a greater propensity for risk-taking. Results not tabulated indicate that our initial findings, as presented in Tables 5 and 6, remain valid even when employing alternative variables to measure bank risk-taking.

Conclusion

This study aims to analyze the impact of corporate governance practices on the level of risk-taking exhibited by banks throughout the period spanning from 2002 to 2019. Specifically, we consider the influence of these behaviors both before and after the occurrence of the global financial crisis. The objective of our study is to analyze the influence of corporate governance measures on mitigating banks' propensity for risk-taking, while also considering their role in informing supervisory regimes. It is contended that the risk-taking strategies employed by banks were constrained subsequent to the global financial crisis. The investigation of these potentialities was carried out by analyzing an extensive sample of banks from eight countries, particularly the United States, the United Kingdom, Canada, Australia, Germany, France, and Italy. The analysis encompassed the time frame ranging from 2002 to 2019.

The study's empirical findings suggest that there was a fall in banks' risk-taking behavior in the years following the global financial crisis. This decline can be attributed to the implementation of improved bank governance procedures and the banks' compliance to the new regulatory framework. This study provides evidence that

a decrease in risk-taking behavior is linked to enhanced bank governance indicators, which may be attributed to the implementation of stricter regulatory and supervisory measures within the global banking sector following the global financial crisis. Our findings stand up to several additional tests and provide unwavering support for the assumptions made in this study.

Regulatory and supervisory authorities have demonstrated ongoing interest in devising solutions aimed at mitigating the occurrence of future crises. The enhancement of banks' governance and risk management has become imperative in response to the global financial crisis, resulting in the implementation of more rigorous regulatory frameworks [13]. This research provides authorities with vital insights into the effectiveness of bank governance procedures. The integration of these mechanisms, alongside increased capital requirements, limitations on activities, requirements for entry, and the implementation of deposit insurance systems and other measures, collectively contribute to the enhancement of financial stability within the global financial system.

Based on the preceding argument, strong coordination between regulators and intergovernmental representatives of banks is essential. Due to the increased expertise of regulators and supervisors, the presence of efficient bank governance procedures may also lead to a reduction in risk-taking by banks.

The limitations of our study should be considered when interpreting the results. First, omitted national-level variables may influence our findings. While our models incorporate several variables at the country level, it is important to acknowledge that there may exist more variables that could have influenced our findings. Second, while our tests primarily rely on bank-level analysis, the SECRECY variable is derived from Hofstede's country-level cultural variables. These measures of Hofstede's are constant over time. In conclusion, it is important to highlight that the observed correlations between bank governance mechanisms and risk-taking should not be automatically attributed to causal relationships.

Appendix

See Table 7.

Table 7 Variables definition

Category	Variable	Definition
Panel A: Bank risk-taking variables		
Bank risk-taking metrics	DRISK $= \begin{cases} Z-Score \\ STDEVRET \end{cases}$	Z-Score is the natural logarithm of the ratio [(ROA + CAR)/σ(ROA)] [37, 61, 82]. ROA is earnings before taxes and loan loss provisions divided by assets, CAR is capital-asset ratio and σ(ROA) is the standard deviation of ROA over a rolling 3-year window. Due to the high skewness of this metric, we use the natural logarithm of this score and multiply it by − 1 so that greater z-score values indicate greater risk-taking STDEVRET is the standard deviation of daily returns in a year; Returns are calculated as the natural logarithm of the ratio of the daily equity market price series $\{\ln(P_t/P_{t-1})\}$. {[23]}
Panel B: Corporate governance variables		
Board of directors' variables	BIND	Board independence is the proportion of outside directors to the total number of bank board directors
	BSIZE	Board size is the total number of directors serving on a bank's board of directors
	B_AGE	The average age of the entire board of directors
	Board independence.: BOARDIN	This variable ranges from 1 to 6, with higher values indicating greater independence of the board. BOARDIN = 1 if the board is consisting of executives from the same bank. BOARDIN = 2 if most board executives are from the same bank and affiliated banks. BOARDIN = 3 if the percentage of Board Independence (number of outsider executives divided by the total number of Board executives) falls between 50 and 66.66%. BOARDIN = 4 if the percentage of board independence falls between 66.66 and 75%. BOARDIN = 5 4 if the percentage of the Board's Independence falls between 75 and 90%, and BOARDIN = 6 if the percentage of the Board's Independence exceeds 90% or if the Board has only one executive and no outside affiliates
	Board's size: BOARD_SIZE	BOARD SIZE is between 1 and 5, with higher values indicating a larger board membership. BOARD SIZE = 1 if the number of board members is less than 6, BOARD SIZE = 2 if the number of board members is between [6,8], BOARD SIZE = 3 if the number of board members is between [9,12], BOARD SIZE = 4 if the number of board members is between [13,15], and BOARD SIZE = 5 if the number of board members is greater than 15
	Board capital: BCAP	BCAP is the number of directors who also serve as: (1) CEOs or board members of other banks, (2) university professors, and (3) government officers, as a percentage of the total number of directors
	Board expertise: BEXP	BEXP is the number of board members who hold certificates in banking, accounting, or finance as a percentage of the total number of board members
CEO and Chairman variables	CEO power = $\begin{cases} CEOTEN \\ CEORET \end{cases}$	CEO tenure equals the number of years the CEO has held the position of CEO CEO retirement is a dummy variable with a value of 1 if the CEO is over age 60 and 0 otherwise
	CHAIR_TEN	Chairman tenure equals the number of years the Chairman has held the assigned position in the same bank
	EXCEO	EXCEO is a dummy variable equal to 1 if the chairman has previously served as the bank's CEO
	CH_CEO_JOINT	The Chairman–CEO joint tenure is equivalent to the number of years the chairman and CEO have worked together as members of the board

Table 7 (continued)

Category	Variable	Definition
	YCEO	Younger CEO is a dummy variable equal to 1 if the bank's CEO is younger than the board chairman, and 0 otherwise
	ABSCH_CEOGAP	Absolute Chairman–CEO age gap is the absolute value of the age difference between the chairman and the chief executive officer of a bank
	DUAL	Duality is a dummy variable equal to 1 if the CEO is also the bank's board chairman, and 0 otherwise
	CEO and Chairman Separation: CCS	CCS ranges from 1 to 3, with higher values indicating greater separation between the duties of CEO and chairman. Specifically, CCS = 1 if CEO and Chairman roles are combined, CCS = 2 if CEO and chairman roles are combined but the existing governance structure provides clarified roles between them, such as a lead director, and CCS = 3 if CEO and chairman roles are independent
	CEO compensation: COMPENS	COMPENS is the natural logarithm of the total annual compensation of the CEO
	Institutional shareholders: INSTIT	INSTIT is the ratio of the number of shares held by institutional shareholders to the total number of outstanding common shares
Panel C: Bank-level variables		
Bank-level characteristics	SIZE	The natural logarithm of total assets
	TLNS	Total loans divided to total assets
	LEVERAGE	The leverage ratio equal to net debt divided by the earnings before taxes, depreciation, and amortization of the bank
	LLP	Loan loss provisions divided by total loans
	NIIG	Net interest income growth equal to change in net interest income from year t – 1 to t divided by lagged total loans
	P/E	The price-to-earnings ratio equal to bank's share price divided by the bank's earnings per share
	MBR	The market-to-book ratio is equal to the market capitalization divided by the book value of assets
	DAR	The debt-to-asset-ratio for a particular bank
	RLL	The reserves for loan losses ratio equal to reserves of loan losses divided by the total loans outstanding
	GRWT	The difference in total assets between years t – 1 and t
	P/BV	The price-to-book ratio for a particular bank
	G(D)SIB	Dummy variable that equals one if the bank belongs to the Global or the Domestic Systemically Important Banks, zero otherwise
Panel D: Macroeconomic and institutional variables		
Macroeconomic and institutional factors	LNGDP	Natural logarithm of GDP per capita [62]
	CRRI	Creditor rights index which ranges from 0 to 4. Higher CRRI indicates higher creditor rights [42, 61, 75]
	GOVQID	The Governance Quality Index is the first principal component calculated from the variables (1) Control of Corruption, (2) Governance Effectiveness, (3) Regulatory Quality, (4) Political Stability and (5) Voice and Accountability
	HHINDEX	The Herfindahl–Hirschman Index equal to the sum of the squared market share value (in term of total assets) of all banks in the country
	LAW_ENF	Law enforcement index that ranges from 0 to 10, with higher values indicating greater law enforcement. Data from the Economic Freedom of the World 2019, Annual Report
	UNEMP	Unemployment rate per country (World Bank)

Table 7 (continued)

Category	Variable	Definition
	ASDID	ASDID is anti-self dealing index as measured by Djankov et al. [41]
	LORIGIN	Dummy variable that equals one if the legal origin is common law, zero otherwise. Data from La Porta et al. [81]
	SECRECY	Inverse social trust measure calculated by summing uncertainty avoidance and power distance and subtracting individualism [60, 75]
	CAP_GDP	The ratio of each country's stock market capitalization to its gross domestic product [30]

Declarations

Conflict of interest On behalf of all authors, the corresponding author (Chris Magnis) states that there is no conflict of interest.

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