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Chapter

Internal Controls and Credit Risk in European Banking: The Basel Committee on Banking Supervision Framework Approach

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Abstract

Poor corporate governance practices have been cited as contributory to the 2007 global financial crisis. The chapter explores a qualitative self-regulation approach to address a major risk facing banks using the Basel Committee on Banking Supervision (BCBS) framework of internal controls. The study examines the effect of the qualitative principles of the BCBS internal control framework on credit risk. Corporate institutions use internal control frameworks to address the most operational risks, but the current study hypothesizes a possible relation with the credit risk. This research covers banks from selected EU countries covering some period before and after the 2007 financial crisis using a fixed-effect model. We report a significant relationship between board functions and activities, board structure and board monitoring, and credit risk. The results indicate that investment in high-risk assets, bank profitability and board chair being ex-CEO increases credit risk in European banking. The chapter extends the scope of a previous work that used the elements of the COSO internal control framework on a single country. This quantitative measure of qualitative constructs of the framework complements existing research that uses algorithms and simulations to study credit risk.

Keywords: Basel Committee on Banking Supervision Framework, Board of Directors, credit risk, European banking, internal controls

1. Introduction

The aftermath of the 2007 global financial crisis led to the tightening of corporate governance practices among financial institutions. As the apex of the internal governance system, board of directors have a duty in ensuring adherence and compliance with sound banking practices. The internal control framework of the Basel Committee on Banking Supervision (BCBS) reiterates the role of board of directors and senior management in ensuring that there is efficiency, compliance and standard reporting of banking activities. Prior to the 2007 global financial crisis, the BCBS had reported the importance of bank internal controls. The breakdown of internal control systems is attributable to weak management oversight, accountability and control culture, inadequate risk assessment of banking activities, failure

of control structures and activities, ineffective share and flow of internal information and ineffective internal audit and monitoring activities [1].

Some researchers argue that poor risk management practices and weak corporate governance systems partially or significantly account for the 2007 global financial crisis [2, 3]. The crisis led to high rates of non-performing loans which affected several economies in the US and Europe. In a briefing to the European Parliament, the authors lament the rate of non-performing loans leading to credit risk among EU countries during and after the global financial crisis [4]. Prior research identifies factors such as low profitability, bank size and high concentration of banks in lending as key determinants of credit risk in the banking industry [5]. This study explores qualitative self-regulation approach using the BCBS internal control framework to investigate how internal controls affect credit risk in European banking. This chapter extends prior research about the banking industry in Spain where the authors find significant relation between the elements of internal controls using the COSO framework [6]. The study differs from existing ones in several ways. Whilst previous study focuses on a single country, the current chapter covers several countries within the EU thus making it broader and wider. The work of Akwaa-Sekyi and Moreno [6] uses single variables to measure the elements of internal controls but the current study uses several variables which cover the principles of internal controls. Unlike the previous study which uses the COSO framework, this chapter uses bank-related framework suggested by the BCBS. To the best of our knowledge, this is the first chapter to use the BCBS internal control framework to study its relationship with credit risk within the European banking.

This chapter derives motivations from three sources. The first motivation for this study comes from Cho and Chung [7]. They find that banks with weak internal control weakness report high provision for loan losses and loan loss reserves which exacerbates credit risk. Anytime banks intensify efforts to strengthen internal control weaknesses, there were reductions in provisions and loan loss reserves [7]. Based on their findings, we propose the use of the BCBS internal control framework to minimize bank credit risk. Second, prior research by Uhde et al. [8] motivates this chapter. In reviewing existing literature Uhde et al. [8] underscore the relevance of a framework that combines board structure and composition to ensure effective board monitoring. We concur with this integrated framework approach and therefore propose the joint effect of board functions and activities, board structure and board monitoring to minimize bank credit risk. Finally, the work of Karkowska and Acedański [9] motivates this chapter. The authors conclude that there is no much change in the corporate governance and bank stability nexus after the financial crisis and therefore suggest the need to strengthen corporate governance practices. This implies there is still room for banks to improve upon their corporate governance practices to deepen and sustain investor confidence in the banking system. For this reason, we suggest an internal control framework that is quite exhaustive in addressing the menace of investor losses such as credit risk. Failures to detect breakdowns in internal controls lead to massive fraud which puts shareholder investment in jeopardy and lack of confidence in the banking sector. The chapter seeks to fill these research gaps by analyzing how internal governance of the BCBS framework of internal controls affects credit risk.

The contributions of this chapter are not far-fetched. First, this chapter extends the literature on the relationship between board functions and activities and bank credit risk. The findings suggest that effective board functions and activities minimize bank credit risk. Second, this study proffers evidence to support the agency and institutional theories to monitor managerial behavior likely to result in investment losses through credit risk. The result complements existing research that independent board structure minimizes credit risk. Another contribution of this

chapter to the agency theory is how board chair being ex-CEO increases bank risks. Prior research [10–12] uses CEO duality which is defined as situations where existing CEOs double as board chair. Our study uses current chair being ex-CEO to determine the effect of previous position (ex-CEO) in influencing board functions. We find that board chair being ex-CEO increases bank credit risk which is contrary to the views of John et al. [12] that CEO duality increases corporate governance. One other strength of this chapter is its complementarity to existing and widely used quantitative approaches to managing credit risk. The chapter encourages the use of internal governance mechanisms to address a major problem in banking. The rest of the sections cover hypotheses development, methodology, results and discussion, and conclusion.

1.1 Basel Committee of Banking Supervision framework for internal control systems

Following significant losses in banking organizations, the concerns to minimize such occurrences triggered the coming together of experts from various countries to develop a framework that will guide the conduct of banking business. The motivation behind the development of the framework for internal control systems is to address and enhance supervisory issues that encourage sound risk management practices [1]. The confidence in an effective and functioning control system is its ability to prevent and enable earlier detection of catastrophic but avoidable potential losses. Thus the framework is meant for member countries worldwide to use in evaluating internal control systems among banks albeit the situational circumstances pertaining to different countries. The Basel Committee on Banking Supervision which is a subcommittee of the risk management committee of the Bank for International Settlements outline 13 principles for assessing internal control systems captioned under five main areas or elements. The broad areas include management oversight and the control culture, risk recognition and assessment, control activities and segregation of duties, information and communication and monitoring activities.

1.2 Thirteen principles of the BCBS internal control framework

- The role of board of directors includes reviewing policies, have understanding and ability to manage risks and ensure that senior management complies. The board has a duty to ensure the establishment and maintenance of internal control systems.
- Senior management has a duty to ensure the implementation of board developed policies, develop processes for identifying, measuring, monitoring and controlling risks and internal control systems through delegation and segregation of duties.
- Board of directors and senior management must exemplify a culture of ethical behavior and integrity and respect for internal controls by full engagement
- Regular, effective and continuous assessment of all material risk exposures of the bank
- Appropriate control structure at all business levels, ensuring enforcement of compliance and approval limits, reconciliation and verification systems, physical controls

- Ensure segregation of duties and elimination of potential conflict of interest in the conduct of business
- Detailed and comprehensive internal financial, operational and compliance data, external market information (events and conditions) which is reliable, timely and easily accessible in a consistent and user-friendly format
- Reliable and secured information systems independently monitored and supported by adequate contingency arrangements
- Effective flow and share of information across personnel in functional areas and departments and units
- Periodic ongoing and daily monitoring of key risks by internal audit and business lines
- Independent and competent internal audit ensuring adherence to internal control systems and reporting to senior management and board of directors
- Reporting material internal control weakness to senior management and board
- Supervisors should ensure that all banks irrespective of size have effective internal controls that are consistent with the complexity and risks of business

The reasons behind the enforcement of these principles are to ensure that internal control systems achieve performance, information and compliance objectives [1]. The Basel framework is a risk-based approach which grants some independence to banks to manage their own risks and to ensure safe and sound bank practices through effective balancing of supervisory and principle-based regulatory approaches [13]. Well-functioning internal controls serve as bedrock for capital adequacy under prudential risk management regulation.

To ensure sound governance and protection shareholder and other stakeholder interests, board of directors exercise oversight responsibilities over senior management. Board of directors owe it a duty to ensure a culture of control, adherence to principles and statutes exist to put management in check. This function has been given alternative names such as “tone at the top” by researchers. The International Federation of Accountants [14] emphasizes the tone at the top and culture and ethical framework as vital to the implementation of internal controls. The federation attributes serious accounting scandals to a situation of poor tone on the part of top management. Hansen et al. [15] and Hermanson et al. [16] report that the tone at the top should be assessed and reported periodically to ensure that management and upper management continuously conform to systems put in place. They admit the importance of the tone at the top and culture of control as very key to ensuring effective internal controls among public and non-public organizations. The board must be seen to be doing more than just enough to ensure good tone and corporate culture that minimizes risk [17]. Financial organizations must pursue a risk culture that seeks to improve oversight structures and risk metrics and good compliance [18]. Effective implementation of board policies sustains and fuels management oversight and control culture. Schwartz [19] identifies board policies among other dimensions of effective corporate culture. Management oversight and control culture covers the roles and responsibilities of board of directors, executive management and the maintenance of high honesty and ethical culture.

Risk recognition and assessment involves the determination, identification and evaluation of risks or unfavorable events likely to impede the achievement of organizational objectives. Under risk management, companies should specify suitable objectives, identify and analyze risks, assess fraud risk and identify and analyze significant change. The expertise and experience of management and board members and their ability to identify, measure, monitor and evaluate risks goes a long way to reduce the consequences of bank risks. These functions means ensuring acceptable rates of risk weighted asset density [20], diversification and enforcement of internal controls to address operational risks.

The BCBS framework emphasizes the use of relevant information and communication to internal (functional areas and employees) and external users (stakeholders) through various reports (Abbas and Iqbal [21]). Banks earn reputational capital by providing reliable timely information to internal and external stakeholders [22]. Information flow, information sharing and representation on various committees within banks improves upon the risk culture [18] and transparency. Board meetings and committee functions helps information production. The control activities comprise selecting and developing control activities in general and over technology and deploying policies and procedures. It concerns taking precautionary measures and determining acceptable risk tolerance levels through policies, checks, and balances [21]. Bank control activities were found to significantly minimize credit risk [6]. Monitoring is about conducting on-going and/or separate evaluations and evaluating and communicating deficiencies [23]. The use of internal and external audit units, enforcement of internal control policies and adherence to regulatory measures improve bank monitoring. The agency problem can be linked to major banking activities which increases the probability risk exposure. Bank complexity and opacity (especially in the credit creation function) have the tendency to exacerbate the agency problem [24]. Bank managers in their effort to originate, fund, service and monitor credit supply may engage in certain actions or inactions that will impair the loan portfolio leading to the loss of assets. It is to avert such occurrences that effective internal control systems that minimizes such losses should be in place and effectively enforced.

1.3 Credit risk

Credit risk is crucial for bank management because of its relationship with other risks such as operational, market, and liquidity risks. Players in the financial services industry especially large-sized institutions use unproven and untested credit risk models and this could be cited as one of the causes of the 2007 financial crisis [3]. A publication on the role of credit risk in bank management and corporate governance, Lang and Jagtiani [3] argue that over-reliance on advanced quantitative credit risk models did not prove successful during the mortgage crisis. Thus, a multi-approach that adopts qualitative approaches to complement prudential quantitative models will enhance bank risk management. The chapter proposes this multi-approach by employing the BCBS framework for internal controls to address bank credit risk. Credit risk is a destination point for loan default and non-performing loans. Series of loan defaults transform into non-performing portfolio before it gets to the stage of credit risk. **Figure 1** shows the credit risk trajectory.

In this trajectory (**Figure 1**), unpaid loans transform into default, then prolonged default graduates into non-performing loans which leads to credit risk and eventually the effect on related market participants could lead to financial crisis. The final destination of this trajectory is financial crisis, which affects the wider industry players because of the interconnectedness of the banking model. In the event of increasing default, there is increase in portfolio credit risk [25]. Bank



Figure 1.
The credit risk trajectory. Source: Author's construct.

credit risk management strategies should therefore be comprehensive to address issues of default and prevent increasing non-performing loans. Most literature on credit risk uses ratios such as non-performing loans to total loans, provision for loan losses and loan loss reserves [5, 6, 26] to measure credit risk.

2. Hypotheses development

In spite of the distinctive nature of the principles of internal controls according to the BCBS framework, they overlap and reinforce each other. For this reason, the author proposes three broad thematic areas which comprise board activities and functions, board structure and board monitoring.

2.1 Board functions and activities

The functions and activities of board of directors affect their supervisory and fiduciary role in protecting the interest of shareholders. The activities and functions of the board of directors affect managerial behavior. From the institutional theory, Zucker [27] explains that it is a complex view of the organization and how it responds to normative pressures from the internal and external environment that compels the organization to take legitimate stance to respond to such pressures. Institutional theories emphasize standard systems and procedures for the conduct of business to ensure survival of the organization. Scott [28] outlined three factors of institutionalization which comprises cognitive elements (systems and cultural foundations of society), normative elements (expectation from acceptable behavior) and enforcement processes (assessment, surveillance and sanctioning). Relating this theory to the BCBS internal controls framework, it implies drafting, implementing and improving policies that lead to acceptable behavior. It connotes a policy of creating, exemplifying and sustaining a culture of ethical behavior and compliance. The BCBS framework emphasizes enforcing sound internal control measures and this is a function of the expertise of the audit committee. The expertise of the board provides assurance for quality and efficiency in discharging board functions [29]. Board of directors carry out their activities by attending meetings and participating in committee tasks. The activities of board members are also about the number of meetings held within the financial year. We expect audit committee expertise, board policy functions and number of board meetings to significantly reduce credit risk. We therefore hypothesize that:

H1: Board functions and activities minimize credit risk.

2.2 Board structure

The structure of a board determines their effectiveness and efficiency with which they carry out their activities. Different studies use different variables to measure board structure. For example, Farag and Mallin [30] models board

structure in terms of unitary and dual boards and CEO duality and report no significant relation with bank fragility. Studying the UK financial sector, Akbar et al. [10] use board size, board independence and combined role of CEO and board chair as variables for board structure. The results from the UK study show that there is little evidence of CEO duality. The regression results confirm low risk taking behavior. Other authors use board size, board independence and board member affiliations as proxy for board structure [9]. The authors report that independent board structure reduces bank risks. The inconclusiveness in the findings stimulates further investigation into board structure. The structure of board of directors should ensure minimizing the agency problem through segregation of duties (as enshrined in the BCBS internal control framework). The structure, composition and characteristics of board of directors could be relevant in their oversight and control functions [31]. Board characteristics such as board composition, independence, size, and gender diversity are efficient in monitoring and control of management [32]. The authors explain that these board characteristics motivate board members in the quest to control and maintain a risk culture and sound bank management to the satisfaction of stakeholders. The current study measures board structure by non-executive board members, board diversity, and board chair being ex-CEO. We expect that boards with non-executive members, few cases of board chair being ex-CEO and boards with adequate female representation can demonstrate higher degree of independence. This leads to the hypothesis that:

H2: Independent board structure reduces credit risk whilst boards with weak independence increase credit risk.

2.3 Board monitoring and control

Board monitoring has undergone several evolutions in corporate governance research [33]. The authors emphasize the role of the internal audit in responding to the agency problem through effective monitoring. The agency theory provides strong theoretical foundation to internal control research. The theory (traceable to the late 20th century and attributable to Jensen and Meckling) provides an underlying explanation of internal controls with the assumption that institutional behavior emanates from individual pursuit of self-interest and that there should be separation of ownership from control in order to minimize possible conflict of interest between the agent and the principal. The theory emphasizes separation of ownership from control, protection of minority interests, reducing conflict of interest and minimization of information asymmetry [34]. Jensen and Meckling [34] explain that the firm is a nexus of contracts among individual factors of production with conflicting objectives. Thus the best way of unifying these conflicts of interest is the use of contracts that minimizes the agency costs and enhances performance to maximize the value of the firm. A managerial tool put in place to check management and employee misbehavior through auditing, budgeting, compensation and other forms of control have proven successful in minimizing the agency costs [33, 35, 36]. Some high level of transparency and reporting is mandatory in order to effectively deal with information asymmetry. Internal control frameworks through the internal audit unit ensure the reporting and compliance objectives. Board audit committees reinforce the monitoring functions by ensuring compliance and adherence to internal controls [37]. Upadhyay et al. [37] conclude that board monitoring committees mitigate costs. We measure board monitoring by audit committee independence. Firms prefer using control-based approaches through audit committees with emphasis on high risk areas [38]. We propose the use of risk assessment and control by ensuring appropriate risk-weighted assets to total assets ratio to check possible insolvency. The use of risk weighted density

(ratio or risk weighted assets to total assets) has a positive relation with bank credit risk [20]. From the discussions above, two hypotheses emerge:

H3: Higher risk weighted density increases bank credit risk.

H4: Effective board monitoring reduces bank credit risk.

2.4 Control variables

Bank management practices such as profitability motives affect the level of credit risk. Mixed findings exist in the relationship between credit risk and bank profitability. Studying the drivers of credit risk in the Indian banking industry, the authors find negative relation between ROA and credit risk [5]. The authors explain that banks engage in more prudent lending practices with improved borrower monitoring mechanisms to minimize the level of credit risk. Their findings confirm the work of Ghosh [39]. Others use credit risk as explanatory variable and conclude that there is a relation between credit risk and bank profitability in the US and Asia [26]. We argue that, the pursuit of profitability motives in the presence of weak internal control systems exacerbate bank credit risk exposure. In the model, we use return on assets (ROA) as proxy for profitability motives. The size of banks determines the volume of activities including loan portfolio which can determine credit risk. The BCBS internal control framework emphasizes coordinated effort between internal and external controls such as the regulator. Central banks use regulatory tools such as capital adequacy ratio and bank reserves to minimize bank risks.

3. Data and methodology

The initial sample comprises listed banks of countries within the European Union from Datastream and Worldscope databases. The websites of individuals and central banks of respective banks and countries provide further information about the banks under study. The period under study spans from 2004 to 2016. The chapter seeks to cover some period prior to the crisis, during and after the crisis. Based on data availability author analyzed the time period around the financial crisis, therefore some years before and some years after the crisis were taken into account. The databases compile bank-level data on corporate governance and financial performance variables. The analyses exclude banks with less than 5 years of data on the variables of interest. This makes the panel data unbalanced. Even though the data shows an initial 586 bank-year observations in the descriptive statistics, the regressions use 368 observations for the analyses.

3.1 Internal controls variables

The study classifies the 13 principles of the BCBS internal controls framework under three headings namely board activities and functions, board structure and board monitoring. The model is found below:

$$CR_{i,t} = \alpha + \beta \sum_{j=1}^3 BodFtns_{i,t} + \theta \sum_{j=1}^3 BodFtns_{i,t} + \delta \sum_{j=1}^2 BodMonit_{i,t} + \gamma Contr + \varepsilon_{i,t} \quad (1)$$

Where CR represents credit risk, $i = 1 \dots 56$ banks, $t = 2004 \dots 2016$ α is the constant, β , θ , δ , γ are coefficients to be estimated and ε is the error term. $BodFtns$ represents the set of variables on board activities and functions which affect credit risk, $BodStruc$ represent the set of variables on board structure, $BodMonit$ represent

the set of variables on board monitoring activities and *Contr* represent the set of control variables.

$$BodFtns = f(\text{Audit Committee expertise, Board policy function, Number of board meetings}) \quad (2)$$

$$BodStruc = f(\text{Board diversity, Non – executive members, Chairman is ex – CEO}) \quad (3)$$

$$BodMonit = f(\text{Audit committee independence, Risk Weighted Assets to Total Assets}) \quad (4)$$

$$Contr = f(\text{Capital adequacy ratio – Tier 1, Bank profitability, Bank size}) \quad (5)$$

An extended model which comprises all the variables (including control variables) follows:

$$\begin{aligned} CR_{i,t} = & \alpha + \beta_1 \text{Audit Committee expertise}_{i,t} + \beta_2 \text{Board policy functions}_{i,t} \\ & + \beta_3 \text{Number of board meetings}_{i,t} + \theta_1 \text{Board diversity}_{i,t} + \theta_2 \text{Non} \\ & \text{– executive member}_{i,t} + \theta_3 \text{Chairman is ex – CEO}_{i,t} \\ & + \delta_1 \text{Audit committee independence}_{i,t} + \delta_2 \text{Risk weighted assets to total assets}_{i,t} \\ & + \gamma_1 \text{Capital adequacy ratio – Tier 1}_{i,t} + \gamma_2 \text{BankSize}_{i,t} + \gamma_3 \text{Bank profitability}_{i,t} \\ & + \varepsilon_{i,t} \end{aligned} \quad (6)$$

The chapter uses the OLS, fixed effect and random effect estimation techniques. Sometimes, the assumptions of OLS may lead to biases and misleading standard errors hence the use of fixed and random effect models. The fixed effect model assumes that certain individual characteristics within may bias the model [40]. Torres-Reyna [40] explains this as the rationale behind the correlation between the error term and predictor variables. The fixed effect model removes the effect of time-invariant characteristics thereby perfectly estimating the true effect of the explanatory variables. In addition to addressing possible endogeneity issues associated with panel data, we include control variables at bank and country levels to suppress the possible effect of such characteristics. Random effect models have superiority in higher-level estimations. In order to select whether fixed or random effect models is suitable for estimation, we perform the Hausman test.

4. Results and discussion

The results comprise descriptive statistics, correlation matrix and regression results for OLS, fixed effect, random effect and Hausman specification test.

Table 1 shows the descriptive statistics (number of observations, means, standard deviation, minimum and maximum values) for the variables. The result shows high credit risk (mean = 0.948). Variables on board functions such as audit committee expertise (mean = 0.516) and board policy function (mean = 0.610) are average or just above average. This is a good sign for effective internal controls. The structure of the board shows good representation of females, more than average non-executive members and some banks having board chair who were former CEOs. Thus the banks have a balanced board which enables effective board activities. There is evidence of board monitoring and control as can be seen from audit committee independence and control activities. The mean risk-weighted assets

Variable	Obs	Mean	Std.Dev.	Min	Max
Net loans total loans	586	0.948	0.147	0	1.892
Audit committee independence	503	75.827	28.665	0	100
Audit committee expertise	586	51.62	30.667	3.46	89.04
Board policy functions	586	61.041	23.166	0.4	77.78
Board diversity	563	60.202	28.377	11.81	100
Non-executive members	532	66.63	19.392	3.99	100
Capital adequacy ratio-Tier 1	555	10.725	3.458	-7.3	26.9
Chairman is ex-CEO	586	0.169	0.375	0	1
Number of board meetings	486	13.403	7.603	0	68
RWA to total assets	586	0.483	0.395	0	4.932
ROA	539	0.836	1.245	-12.42	4.99
Bank size	586	19.44	1.479	16.624	22.579

Table 1.
Descriptive statistics.

(RWA) to total assets is almost 50%. This is an indication of high risk and it is therefore not surprising that credit risk is high among the banks sampled for the study.

Table 2 shows the correlation matrix for the variables. High correlation coefficients (for example, 0.8 and above) are indications of high collinearity and this may cause problems in econometric estimations. The coefficients of the independent variables show that the variables are not highly correlated among themselves. This is an indication that the variables do not suffer multicollinearity problems.

We estimate the first model using OLS technique. Among board function variables, a number of board meetings show very significant relation with credit risk. Non-executive board members and chairman being ex-CEO are board structure variables that show significant relations with credit risk. Board activities (number of board meetings) shows significant positive relation with credit risk in the OLS model but the sign changes in the panel data analysis. Overall explanatory power of the OLS model is 26% which is far higher than those of fixed and random effects. Perhaps, this account for some of the biases of using OLS models instead of fixed and random effect models because OLS assumes that all the observations in the dataset are conditionally independent. This brings about bias and misleading standard errors. The study addresses bank heterogeneity using fixed and random effect models in a model that encompasses individual and time-specific effects. Based on the assumption that individual bank error term correlates with the predictor variables, we employ fixed effects model to cater for time-invariant omitted variables.

The difficulty in choosing fixed or random effect models is addressed by performing Hausman specification test. The significant variables for both fixed and random effect models are almost the same and consistent. The directions of association of the significant variables are the same. The use of Hausman specification test faces some criticisms. For example, when the between effect R^2 is larger than the within effect R^2 , it is not appropriate to employ the fixed effect estimation technique even when Hausman test recommend the fixed effect model. The current study does not suffer such complications. In spite of the criticisms against the Hausman test, it is still widely used and accepted in research. The result from the Hausman test found in **Table 3** recommend the use of fixed effect model because

Variables	Net loans to total loans	Board policy function	Number of board meetings	RWA to total assets	Audit comm indep	Audit comm expertis	Non-exec. Board	Board diversity	Chairman is ex-CEO	CAR-Tier 1	ROA	Bank size
Net loans to total loans	1.000											
Board policy function	0.054	1.000										
Numb of board meetings	0.159***	-0.034	1.000									
RWA/Total Assets	0.176***	-0.203***	0.054	1.000								
Audit com independence	0.208***	0.223***	0.086	0.175***	1.000							
Audit com expertise	0.041	0.133***	0.039	-0.089**	0.090**	1.000						
Non-exec board	-0.128***	-0.043	-0.037	-0.003	-0.061	0.036	1.000					
Board diversity	0.039	0.198***	-0.058	-0.217***	0.158***	0.185***	0.106**	1.000				
Chairman is ex-CEO	0.064	0.060	-0.062	-0.042	0.036	0.042	0.021	0.095**	1.000			
Capital adequacy ratio 1	0.003	0.032	0.033	-0.187***	-0.169***	0.239***	0.010	0.250***	-0.179***	1.000		
ROA	0.161***	-0.160***	-0.190***	0.081*	0.083*	-0.041	0.064	-0.048	-0.039	0.132***	1.000	
Bank size	0.052	0.214***	-0.175***	-0.319***	0.252***	0.221***	0.054	0.567***	0.157***	0.184***	0.027	1.000

* $p < 0.1$.

** $p < 0.05$.

*** $p < 0.01$.

Table 2.
Correlation matrix.

Variables	b	B	(b-B)	sqrt (diag(V_b-V_B))
	Fixed	Random	Difference	SE
Audit committee expertise	0.0000728	0.0000751	-2.25e-06	—
Board policy function	-0.0004016	-0.0003986	-2.93e-06	—
Number of board meetings	-0.0018262	-0.0017807	-0.0000454	—
Non-executive board members	-0.0002097	-0.0002187	9.04e-06	—
Audit committee independence	-4.89e-06	5.24e-06	-0.0000101	—
RWA/Total assets	0.0478272	0.0536965	-0.0058693	—
Chairman is ex-CEO	0.0074286	0.0072844	0.0001442	—
Board diversity	-0.0000737	-0.0000732	-5.15e-07	—
Capital adequacy ratio-Tier 1	-0.000748	-0.0006744	-0.0000736	—
ROA	0.00425	0.0041675	0.0000825	—
Bank size	0.0120867	0.0122416	-0.0001548	0.0013089

b = consistent under H_0 and H_a ; obtained from *xtreg*.

B = inconsistent under H_a , efficient under H_0 ; obtained from *xtreg*.

Test: H_0 : difference in coefficients not systematic.

$\chi^2(11) = (b - B)'[(V_b - V_B)^{-1}](b - B) = 7316.20$

$Prob > \chi^2 = 0.0000$

($V_b - V_B$ is not positive definite)

Table 3.
Results for Hausman specification test.

the probability χ^2 value is significant ($p < 0.05$). **Table 3** shows the results for Hausman test to choose whether fixed effects or random effects model is appropriate for estimation. When the p-value is significant (95% confidence interval), we reject the null hypothesis that random effect model is preferable. The result for the test shows high significance at 99% confidence interval. This implies the use of the fixed effect model for econometric estimation.

Apart from audit committee independence and board diversity, all the variables in model show some level of significance within 90–99% confidence interval. From **Table 4**, all the variables for board function show significant relation for the fixed and random effect models. This is unlike the OLS model which show significance for only number of board meetings. The fixed effect model caters for individual bank level biases that may influence credit risk. Even though all the countries are found within the European Union and may have some standardizations, there are still bank and country-specific factors which account for differences. This is why we assume that bank error terms do not correlate with the constant [40] thereby justifying the choice of fixed effects. The R^2 results for within the entities are 41% for the fixed effect model. This indicates higher within entity variations. It is interesting to find that the R^2 values for the fixed and random effect models are not different.

The expertise of the audit committee is within average which is a sign for good board function. However, this is unable to translate into credit risk mitigation. Contrary to the expectations that the expertise of the audit committee would minimize credit, the results indicate positive relation. The existence of quality audit committee does not guarantee effective risk reduction. Sun and Liu [41] caution that when members of the audit committee are too busy, the level of total and idiosyncratic risks is higher. Perhaps, members of the audit committee have a lot on their hands to deal with thereby making them less efficient in their functioning.

	OLS (1)	Fixed effects (2)	Random effects (3)
	Net loans to total loans	Net loans to total loans	Net loans to total loans
Audit committee expertise	0.000 (0.000)	0.000* (0.000)	0.000* (0.000)
Board policy function	0.000 (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Number of board meetings	0.003*** (0.001)	-0.002*** (0.000)	-0.002*** (0.000)
Non-executive board members	-0.001*** (0.000)	-0.000** (0.000)	-0.000*** (0.000)
Audit committee independence	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
Risk weighted assets to total assets	0.418*** (0.052)	0.048*** (0.017)	0.054*** (0.017)
Chairman is ex-CEO	0.039** (0.017)	0.007** (0.003)	0.007** (0.003)
Board diversity	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Capital adequacy ratio-Tier 1	0.005** (0.002)	-0.001** (0.000)	-0.001* (0.000)
ROA	0.004 (0.006)	0.004*** (0.001)	0.004*** (0.001)
Bank size	0.031*** (0.007)	0.012*** (0.005)	0.012*** (0.004)
Obs.	368	368	368
R ² within		0.408	0.408
R ² between		0.015	0.021
R ² overall	0.258	0.025	0.032

Standard errors are in parenthesis.
 * $p < 0.1$.
 ** $p < 0.05$.
 *** $p < 0.01$.

Table 4.
 Results for OLS, fixed and random effect models.

Board policy functions cover the development and implementation of internal controls, a culture of ethical behavior and compliance. The result shows high significant negative relation with credit risk. These conditions create a favorable environment for management oversight. Formulation and implementation of board policies ensure compliance with sound ethical behavior and enforcement of internal controls creates favorable environment to mitigate bank risks. The number of board meetings significantly reduces credit risk. It is not enough for board members to organize meetings but when members regularly attend and participate in board

activities. Regular board meetings improve the information and communication prowess of institutions which earns reputational capital [21, 22]. The result amplifies the institutional theory that normative elements and implementation of policies of acceptable behavior through compliance make institutions better governed. The development and implementation of board policies and engagement in board activities among sampled banks help reduce credit risk. Policies which ensure active participation of board activities, practicing a culture of ethical behavior and enforcement of internal control systems helps minimize bank losses. In this chapter, we find that board policies and board meetings have significant inverse relation with credit risk. Since two of the three variables adequately meet the expectation of the chapter, we maintain the acceptance of the hypothesis that board activities and functions minimize bank credit risk.

The results sustain the hypothesis that independent board structure reduces credit risk, whereas boards with weak independence increase credit risk. The variables for board structure for example non-executive board members show significant negative relation with credit risk. Non-executive board members have greater independence which makes them effective in their monitoring role. The inverse relation between non-executive board members and credit risk indicates effective control and prevention of actions that can trigger high credit risk. The result confirms the agency theory that non-executive board members help minimize the conflict of interest likely to exist. The positive relation between chair being ex-CEO and credit risk is not unexpected. Usually, such board members are influential and might exert superior powers which might increase bank credit risk. There is the tendency for over-confidence and unnecessarily entrenched leading to high credit risk. The result is consistent with Fernando et al. [25] who hold the opinion that dual board chair and CEO undermines board effectiveness in dealing with risks and monitoring managerialism. The BCBS internal control framework advocates for segregation of duties to ensure efficiency. It is not surprising the result shows positive relation between board chair being ex-CEO and credit risk. Board diversity (the proportion of female board members) shows negative but insignificant relation with credit risk. Even though not significant, board diversity is inversely related to credit risk. Having females on the board helps reduce credit risk. A board structure that compromises on its independence may have difficulty in effectively protecting and safeguarding the assets of shareholders. This assertion confirms earlier research by Karkowska and Acedański [9] that independent board structure decreases bank risks.

The chapter supports the hypothesis that higher risk weighted density increases bank credit risk. Board monitoring reduces credit risk of sampled banks. On the use of risk control mechanisms, risk-weighted assets to total assets shows significant positive relation with credit risk and therefore confirmatory to literature [20]. The mean RWA to total assets is almost 50% which is an indication of management investing in high risk investments. It is therefore not surprising that banks experienced high credit risk during the period under study. Relating the result to the control variable on bank profitability, the risk-return theory is confirmed. Banks engage in risky assets and this could explain why profitability (ROA) shows significant positive relation with credit risk. The European Union has experienced high non-performing loans (NPLs) during and after the global financial crisis, a situation which worsens banks credit portfolio performance. Bank control activities need to be intensified to check managerial recklessness in generating NPLs and subsequent credit risk which might lead to financial crisis.

The result for board monitoring shows that, audit committee independence reduces credit risk but not significantly. The hypothesis that board monitoring reduces bank credit risk is accepted in spite of the fact that in the case of the

sampled banks, the result is not significant. Even though there is 75% score of audit committee independence among sampled banks, there is no evidence of significant relation with credit risk. It is good if variables show significant relation with outcome variables but when the direction of association is consistent with researcher's expectation, it is still worth reporting. The result casts doubts on the monitoring functions of the board and need to be given much attention than previously. The audit committee has consistently shown ineptitude in significantly minimizing credit risk among the sampled banks. From earlier result, the expertise of the audit committee could not significantly minimize credit risk and same has been reported on audit committee independence.

The results of the control variables meet the expectations of the authors. Bank profitability shows significant positive relation with credit risk. This means that the ambitious pursuit of profitability may lead to high credit risk and this is contradictory to earlier studies [5, 39]. The positive relation of bank profitability with credit is not surprising because of presence of board chair being ex-CEOs. There is the tendency for over-confidence and heavy reliance of experience to the neglect of strictly enforcing internal control mechanisms. The results from **Table 4** show that bank size significantly increases credit risk. Contrary to [5] who find no significant relation between bank size and credit risk, our study reports significant positive relation with credit risk. For the purpose of catering for country-wide controls from external bodies such as regulators, the model introduces capital adequacy ratio-tier 1 into the equation. The results show significant negative relation with credit risk, thus confirming the effectiveness of regulatory controls to ensure bank compliance and discipline. Perhaps, banks have learnt lessons from the financial crisis. The result reinforces the institutional and agency theories used as the theoretical underpinnings of this study.

Beside the Basel II framework which uses the Supervisory Review and Evaluation Process (SREP) to enforce capital requirements as risk management tool, banks are encouraged to develop and monitor other risk management techniques [42]. The use of the BCBS internal control framework through the governance systems complements the capital requirement models of bank risk management. The framework addresses issues of compliance, reporting and efficiency. The inclusion of capital adequacy ratio (also as a compliance mechanism) as proxy for regulatory control makes the chapter's conceptual model efficient in addressing credit risk in European banking. The results show that sampled banks invest in risky assets, have desire for profitability and therefore the board needs to intensify internal control measures in order to minimize credit losses.

5. Conclusion

The study sought to analyse how board functions and activities, board structure and monitoring affect credit risk in European banking. Based on the BCBS internal control framework, we model the 13 principles of the BCBS framework under three headings namely board functions and activities, board structure and board monitoring. The results show that integrated internal control frameworks are complementary and proven to effectively mitigate bank credit risks. The study concludes that developing and implementing board policies on supervision, risk control culture, compliance and enforcement of internal controls minimizes credit risk in European banking. A board structure that ensures independence, diverse and board chair not being ex-CEO may reduce bank losses through credit risk. Board monitoring is effective when regulatory controls are used to complement existing internal control mechanisms. From the results, board policies, board activities, non-

executive boards and external regulations significantly reduce credit risk. Whilst audit committee independence and board diversity reduce credit risk but not significantly, audit committee expertise, board chair being ex-CEO, investments in risky assets, profitability and bank size significantly increase credit risk. The model for the chapter shows that the principles of the BCBS framework combines with regulatory compliance requirements to ensure credit risk reduction. The chapter supports the agency and institutional theories. The BCBS internal control framework provides reliable mechanism for controlling credit risk.

The study has implications for bank practice. Credit risk continues to be a thorny issue in the banking industry especially within the EU. Our study provides a diversified approach to addressing this market failure. The chapter shows that complementing regulatory controls with self-governing practices like internal controls reduce bank risks. This research is not devoid of limitations. But for the availability of data, the study could have substantially covered three periods (before, during and after the crisis). Despite these limitations, the methodology is consistent with existing research and all assumptions and diagnostic tests were statistically confirmed. These limitations cast no doubts about the findings of our study. The chapter suggests future research to consider internal control practices in the periods before, during and after the 2007 global financial crisis. It is further suggested that, various internal control frameworks could be compared to analyze their effects on other risks such as market, liquidity and operational risks. Future research could also consider using dynamic models such as system GMM to study corporate governance and bank risks.

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