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The trilogy between CEO overpower, green credit, and core competence: Evidence from commercial banks in Vietnam

Khoa Dang Duong [a], Phuc Huu Truong [a], Diep Van Nguyen [b], Ai Ngoc Nhan Le [c,*]

[a] Faculty of Finance and Banking, Ton Duc Thang University, Ho Chi Minh City, Viet Nam
[b] Faculty of Finance and Banking, Ho Chi Minh City Open University, Ho Chi Minh City, Viet Nam
[c] Faculty of Finance and Banking, Van Lang University, Ho Chi Minh City, Viet Nam

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ABSTRACT

This paper investigates the interconnection between Chief Executive Officer (CEO) power, green credit, and core competence of commercial banks in Vietnam. Our data sample consists of 373 annual observations from 2010 to 2021. We employ a dynamic system Generalized Method of Moments to analyze an unbalanced panel comprised of 373 annual observations from 2010 to 2021. The findings indicate an inverse U-shape relationship between CEO overpower and commercial banks' core competence. Moreover, the study reports that banks with green lending activities reduce core competence by about 0.1598 points more than other banks. In addition, the results indicate that CEO power moderates the relationship between green credit and core competence. Our findings align with stewardship, management entrenchment, first-mover advantage, stakeholder theories, and prior literature. The study has practical implications for policymakers to develop the banking system sustainably in emerging markets.

1. Introduction

Bank competence is essential to economic growth because it ensures that the banking sector operates in a stable, efficient, and transparent manner. Previous studies have focused on emerging and developed markets such as the United States (US), Europe (EU), and China. However, there are few empirical studies in the frontier market, such as Vietnam, due to the data limitation. Vietnam is also transitioning into renewable energy [13], so the Vietnamese government has issued several policies and regulations to promote renewable energy and green credit. For instance, Decision No. 1393/QD-TTg (2012)[1] of the Prime Minister to encourage Small and Medium Enterprises (SMEs) to deploy production and business activities according to green growth criteria using financial

* Corresponding author. Faculty of Finance and Banking, Van Lang University, 69/68 Dang Thuy Tram Street, Binh Thanh District, Ho Chi Minh City, Viet Nam.
E-mail addresses: duongdangkhoa@tdtu.edu.vn (K.D. Duong), b20i0138@student.tdtu.edu.vn (P.H. Truong), diep.nv@ou.edu.vn (D.V. Nguyen), ai.lnn@vlu.edu.vn (A.N.N. Le).

[1] Following Decision No. 1393/QD-TTg (2012) - the Prime Minister's Approval of the National Green Growth Strategy.

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instruments, credit; Directive No. 03/2015/CT-NHNN (2015)[2] to promote green credit growth and managing environmental and social risks in credit granting activities; Decision No. 1124/QD-NHNN (2022)[3] to encourage bank credit in low-carbon production and consumption industries.

In addition, the State Bank of Vietnam reports that the outstanding credits allocated to green projects have surged to nearly VND 500,000 billion, constituting approximately 4.2% of the total outstanding loans in the economy in 2022. This credit is predominantly directed towards specific sectors, including renewable energy and clean energy projects, which account for the largest share at 47%, followed by green agriculture at over 30%. Notably, outstanding green credit has experienced a commendable average annual growth rate of more than 25% from 2017 to 2021, surpassing the overall average credit growth rate. Nevertheless, despite this positive trajectory, the proportion of green credit remains modest because green loans represent only 4.32% of the total outstanding loans in the economy. The State Bank of Vietnam disclosed that 19 local financial institutions have proactively developed strategies to manage environmental and social risks associated with their lending practices. In tandem with these initiatives, preferential and supportive policies have been implemented to incentivize banks to finance eco-friendly projects. Such policies encompass the provision of preferential loans, the application of reduced interest rates, and even compensation for interest rate differentials. Furthermore, local commercial banks with a substantial proportion of green loans are given priority access to external credit from international organizations and development partners. This strategic measure encourages and facilitates financial institutions' endeavors to engage in sustainable lending practices, aligning with broader global efforts to address environmental challenges.

However, implementing green credit policies in Vietnam has potential risks such as credit, market, and regulatory risks. While these loans are meant to support environmentally friendly projects, there is no guarantee that the projects will be financially successful or that the borrowers will be able to repay the loans. Moreover, commercial banks providing green loans may face market risks related to fluctuations in the demand and pricing of sustainable products and services. Furthermore, changes in environmental regulations or tax incentives can impact the bank's profitability and sustainability strategy. In contrast, commercial banks can get several significant privileges by taking advantage of being the pioneer, such as gaining a reputation [1] and seeking new green customers with lower competition than in the traditional lending market. Since the green credit market in Vietnam is still in its early stages, its impact on the core competence of commercial banks in Vietnam remains an open question.

In addition, powerful CEOs with a strong influence on the decision-making processes have the authority to shape the bank's strategic priorities and influence its culture and values. When a CEO recognizes the importance of sustainability and takes a stakeholder-focused approach, the bank's commitment to environmental and social responsibility may be strengthened. By prioritizing sustainability, commercial banks can solve the conflicts between stakeholders and become more attractive to them, including customers, investors, and regulatory bodies, due to stakeholder theory. According to Zhou et al. [2], financial institutions that increase their allocation of green loans will significantly enhance their reputation, credibility, and support from various stakeholders, particularly the government. Therefore, estimating the relationship between green credit, powerful CEOs, and the core competence of commercial banks in Vietnam is worth evaluating.

Our study contributes to the growing literature on green credits in the following ways. Specifically, this study complements the studies of Del Gaudio et al. [3], Fang et al. [4], Galán and Tan [5], Griffith et al. [6], Onali et al. [7], Shen and Cannella Jr [8], Ting et al. [9], Lian et al. [10]; Luo et al. [1], Lian et al. [10], Yin et al. [11], Zhou et al. [12]. First, none of the scholars in the field of banking studies utilized the dynamic system Generalized Method of Moments (GMM) estimator, except Yin et al. [11], despite its potential to address endogeneity concerns in banking studies. We follow Duong et al. [13] to employ a two-step GMM method to mitigate endogeneity issues. Second, prior studies utilize individual proxies of CEO powers, and these cannot generalize the effects of powerful CEOs on banks' core competence due to mixed impacts. Therefore, this study follows Luo et al. [1], Altunbaş et al. [14], Brodmann et al. [15], and Duong et al. [16] to construct the CEO power index and core competence index by Principal Component Analysis (PCA) approach. This study is the first attempt to analyze the interconnection between green credit, powerful CEO, and core competence of commercial banks in a transitional market in Asia, where there are different market microstructures than in emerging and developed markets [16].

This study provides the following interesting results. First, the results suggest an inverted U-shaped relationship between CEO power and core competence with a turning point of 1.1038. The findings are consistent with stewardship theory, entrenchment theories, and studies of Griffith et al. [6]; Shen and Cannella Jr [8]. Second, the study reports that green lending reduces core competence. Commercial banks with green lending would have the core competence decreased by 0.1598 points compared to other banks. The findings are consistent with Del Gaudio et al. [3], Galán and Tan [5], and Zhou et al. [12]. Third, we determine that CEO power moderates the relationship between green credit and the core competence of commercial banks in Vietnam. Specifically, powerful CEOs who implement green credit can increase their banks' core competence by 0.2019 points to other banks. The findings

[2] According to Directive No. 03/2015/CT-NHNN (2015), the Governor of the State Bank of Vietnam has mandated that various financial institutions, including State Bank units and commercial banks, undertake the following responsibilities in Vietnam: From 2015 onward, the banking sector must focus on eco-friendly lending, resource efficiency, and environmental well-being for sustainable long-term growth. Financial institutions should align their operations with green growth objectives allocate resources to credit projects that are environmentally and socially responsible, aiding enterprises in achieving sustainable, eco-friendly, and long-term economic development.

[3] According to the Decision No. 1124/QD-NHNN (2022), the Governor of the State Bank has emphasized the importance of researching and implementing favorable policies and support mechanisms, in conjunction with administrative measures, to encourage financial institutions to promote green credit, green banking, and industries with low carbon emissions. This approach aims to channel banking capital into sectors focused on low carbon production and consumption.

align with the first-mover advantages and stakeholder theories.

The remainder of this study has the following structure. Section 2 provides theories. Section 3 reviews the literature and develops the hypotheses. Section 4 presents the research methodology, including data collection, econometric models, and estimation. Section 5 reports estimation results. Section 6 discusses our main findings. Finally, Section 7 is the conclusion.

2. Theoretical framework

2.1. Management entrenchment theory

The management entrenchment theory states that when management is free of checks on its control, the business's value decreases. This theory suggests that firm performance declines as managers accumulate ownership, leading to management entrenchment issues. Griffith et al. [6] suggest that managers may strive to increase personal usefulness rather than shareholder value. As a result, instead of continually adopting leverage choices that are value-maximizing for shareholders, managers may select the degree of leverage that maximizes their benefit due to agency conflicts.

2.2. Stewardship theory

The stewardship theory argues that a joint board leadership structure can promote robust and unambiguous leadership and enhance internal efficiencies through the unity of command [17]. As a result, superior returns to shareholders than the separation of the roles of chair and CEO. In addition, Jensen and Meckling [18] propose that the owner-manager interest converges with shareholders as managerial ownership increases. Therefore, there is an increasing incentive for the owner-manager to maximize the firm's value as executive ownership increases (convergence-of-interest hypothesis).

2.3. First-mover advantage theory

The theory of first-mover advantage suggests that commercial banks in Vietnam will have certain advantages when they deploy green credit. Commercial banks gain additional competitiveness and privileges as pioneers in the green credit market. Green lending drives banks to attract new green customers, which helps them explore the new market [11]. They also have the advantage of a loyal customer base that helps increase market share in the future and the ability to build high barriers for other competitors.

2.4. Legitimacy theory

The theory of legitimacy suggests that organizations should comply with the values or norms of the society in which they operate. Green lending is a business strategy of interacting ethically with stakeholders, including borrowers, government agencies, and local communities. As societies have a higher awareness of environmental, social, and corporate governance (ESG), green banks gain support from the local government and community to develop a sustainable competitive advantage compared to other competitors in the market [12].

2.5. Stakeholder theory

In line with stakeholder theory, environmental regulation may help banks resolve conflicts with stakeholders and achieve healthy and sustainable growth [19]. Green lending is a stakeholder management strategy incorporating environmental and climate change factors, maximizing stakeholder interests [12]. Powerful CEOs can drive the integration of sustainable principles and practices across the bank's operations, policies, and decision-making processes. This includes incorporating environmental and social considerations into risk management frameworks, investment strategies, and lending practices. Such integration further strengthens the bank's commitment to sustainability and ability to obtain green credit. According to this theory, a powerful CEO can shape the bank's strategic priorities and influence its culture and values. When a CEO recognizes the importance of sustainability and adopts a stakeholder-oriented approach, it can drive the bank's commitment to environmental and social responsibility. By focusing on sustainability, the bank can solve the conflicts between stakeholders and become more attractive to them, including customers, investors, and regulatory bodies. A bank that makes more green loans will gain an outstanding reputation, trust, and assistance from stakeholders, particularly the government [2]. This can create a positive reputation and increase the bank's access to green credit, as financial institutions and investors are more likely to provide funding or incentives to banks that demonstrate a genuine commitment to sustainability. By aligning the bank's core competence with sustainability goals, the CEO can enhance the bank's competitiveness in the market and attract customers seeking sustainable financial solutions. Therefore, stakeholder theory suggests that powerful CEOs in green banks positively develop core competence.

3. Literature review and research hypothesis

3.1. CEO power and core competence

Previous research has yielded mixed results regarding determining the link between CEO Power and bank financial performance.

Fang et al. [4] report that CEO power significantly improves lending quality and reduces the non-performing loan (NPL) ratio. This phenomenon is plausible because CEOs with enormous stakes are more incentivized to supervise bank lending closely. In addition, longer tenure provides CEOs with a more remarkable authority to make strategic decisions [4]. Ting et al. [9] also indicated that CEO power enhances bank performance because increasing authority empowers CEOs to execute their strategies efficiently. In contrast, Onali et al. [7] found a negative impact of CEO power on dividend payout ratios and performance, implying that entrenched CEOs are not incentivized to increase payout ratios to discourage minority shareholder monitoring.

Given the mixed findings in prior research across emerging and developed markets and the scarcity of studies exploring the relationship between these variables in transitional markets, this study posits the following hypotheses. These hypotheses function as competing theories that underpin the empirical analysis of this study, facilitating a rigorous investigation into whether CEO power exerts a positive or negative influence on core competence within the context of Vietnam, a transitional market.

Hypothesis 1. CEO power positively affects banks' core competence in Vietnam.

Hypothesis 2. CEO power negatively affects banks' core competence in Vietnam.

In addition to the linear relationship results, Griffith et al. [6] found an inverted U-shaped relationship between CEO ownership and bank performance. They argue that the CEO may accept lower returns to reduce firm-specific risk due to inadequate diversification. Therefore, convergence of interest and entrenchment impact performance, but the marginal impact of these factors varies with the level of CEO ownership. Shen and Cannella Jr [8]. also found an inverted U-shaped relationship, which stated that longer CEO tenure first increases and then decreases performance. They proposed that longer CEO tenures would be associated with solid organizational inertia, leading to difficulty when the successors wish to initiate strategic change. However, if a CEO's tenure is too short, the firm may not have recovered sufficiently from the disruption of the previous succession.

Considering the inherent complexity and non-linearity between CEO power and bank performance due to the management entrenchment theory, this study proposes the following hypothesis to scrutinize potential non-linear dynamics between these variables within the specific context of Vietnam, a transitional market.

Hypothesis 3. CEO power has an inverted U-shape relationship with banks' core competence in Vietnam.

3.2. Green credit and core competence

Yin et al. [11] report that green credit increases banks' profitability because green credit policy allows banks to capture the new market due to the first-mover advantage theory. Lian et al. [10] stated that green credit improves commercial banks' financial performance. This improvement is derived from the positive effect of green credit on profits of interest-bearing assets. Moreover, significant support through government environmental policies due to the legitimacy theory empowers the positive impact of green credit on the financial performance of banks. In contrast, Zhou et al. [12] found that implementing a green credit policy reduces credit risk for state-controlled banks and increases credit risk for private banks. The reason is that commercial banks need more access to the information and expertise necessary to evaluate the credit risk of green loans. Besides, the leading state-controlled banks have established specific internal green loan policies, guidelines, procedures, and due diligence requirements in the loan process. Therefore, there are information and expertise asymmetries between these banks. In addition, Galán and Tan [5] and Del Gaudio et al. [3] found that green credit reduces bank efficiency because the revenue from green loans does not compensate for rising costs in the short run compared to traditional loans. Green credits require higher fees for screening and monitoring resources and provisions for non-performing loans, eroding the profits.

Considering the recent significant growth of the green credit market in Vietnam, driven by regulatory directives and policies from both the government and the State Bank of Vietnam, it is noteworthy that green lending in the country is still at a nascent stage. Consequently, the impact of green credit on the core competence of commercial banks in Vietnam remains an open question. Therefore, this study formulates the following hypotheses to investigate the nexus between green credit and the core competence of commercial banks in Vietnam, a transitional market in Asia.

Hypothesis 4. Green credit positively affects banks' core competence in Vietnam.

Hypothesis 5. Green credit negatively affects banks' core competence in Vietnam.

3.3. CEO power, green credit, and core competence

The first-mover advantages theory suggests that the benefits from green credit can increase the reputation because the Vietnamese government has been promoting a green economy. Specifically, the Vietnamese government has continuously promoted bank credit in the production industries using renewable energy and low carbon consumption. Moreover, the most significant advantage compared to banks with traditional lending activities is competitiveness and reputation because the market in this field is still new, and green loans drive banks to seek new green customers, which helps them explore the new market [11]. The stakeholder theory suggests that environmental regulation may assist banks in resolving stakeholder disputes and achieving sustainable growth [19]. As a stakeholder management strategy, green lending combines environmental issues into loans to fulfill stakeholders' interests [12]. A powerful CEO can push the incorporation of sustainability concepts, shape strategic goals, and influence the bank's culture. Prioritizing sustainability attracts support from stakeholders, making the bank more desirable to consumers, investors, and regulators while also boosting the bank's image and access to green loans. By aligning the bank's core competence with sustainability goals, the CEO may increase the

bank's performance. Moreover, green lending is recognized as helping banks reduce credit risk by reducing the non-performing loan ratio [1,20]. Therefore, this study suggests that powerful CEOs in commercial banks who focus on green credit can lead the bank to achieve more competitiveness, reputation, and sustainable development. In the context of Vietnam, this study proposes the following hypothesis.

Hypothesis 6. Powerful CEOs in green banks positively affect banks' core competence in Vietnam.

On the other hand, powerful CEOs who focus on the green lending market may have the following limitations. Firstly, the revenue obtained from these operations does not compensate for their higher costs, such as those derived from using more screening and monitoring resources in the short run. Moreover, the loan recovery cycle for green credit is often protracted, which raises banks' liquidity risk to some extent [1]. Finally, commercial banks with less access to information and expertise necessary to evaluate the credit risk of green lending will suffer from the information and expertise asymmetries, increasing credit risk [12].

Hypothesis 7. Powerful CEOs in green banks negatively affect banks' core competence in Vietnam.

4. Data & methodology

4.1. Data

This study uses data and information from the financial statements of 39 commercial banks in Vietnam from 2010 to 2021. We collect all the data from audited financial statements and annual reports to ensure accuracy. We follow Duong et al. [16] to exclude joint venture banks and 100% foreign-owned banks. We also exclude Agribank because it is a policy bank with 100% capital from the state budget. In addition, the global financial crisis in 2008 had significant repercussions on economies worldwide, and Vietnam was no exception. Therefore, we follow Dao [21] and DUONG et al. [22] to start the sampling period from 2010. They contended that the Vietnamese economy has become more solid since its recovery from the crisis. By starting the research in 2010, we can ensure that the estimations are not affected by the financial crisis. Finally, we follow Duong et al. [23] to exclude observations that do not have data to calculate the required variables and winsorized our sample at the 1st and 99th percentile to eliminate outliers. Our final sample is an unbalanced panel with 373 annual observations.

4.2. Variable definitions

Core competence: In the existing research on banks, too many started from a single index and failed to comprehensively analyze motivation to implement green credit in combination with various competitive factors [1]. As a result, this study explores the impact of green credit and CEO power on commercial banks by constructing a comprehensive core competence index. We follow Luo et al. [1] to estimate the index by applying the principal component analysis (PCA) for selected factors (Table 1). The results of PCA for the core competence index are shown in Appendix A.

CEO Power: We follow Altunbaş et al. [14], Brodmann et al. [15], and Duong et al. [16] to estimate the CEO power index by applying the principal component analysis (PCA). PCA eliminates correlated features, resulting in independent components. Additionally, the unique function of PCA is to reduce the risk of overload when linearly transforming the high-dimensional variables into a single low-dimensionality index [24,25]. Specifically, we apply PCA to estimate the CEO power index from the three proxies to realize

Table 1
Index System of core competence.

	Observed Index	Definition and measure	Direct of influence
Profitability	Return on average equity	Net income divided by total equity	+
	The proportion of non-interest income	Non-interest income divided by total operating income.	+
	Cost-to-income ratio	Operating cost divided by total operating income.	–
Liquidity	Loan-to-deposit ratio	Total loans divided by total deposits	–
	Short-term asset liquidity ratio	Short-term assets divided by total assets	+
Safety	Core capital adequacy ratio	Total own capital (tier 1+ tier 2) divided by risk-weighted assets	+
	Non-performing loan ratio	Non-performing loans divided by total loans	–
	Provision coverage	Provision for loan losses divided by total loans	+
Growth	Net interest margin	Net interest income divided by total assets	+
	Asset growth rate	The difference between the total assets of the current year and the previous year over the total assets of the previous year	+
	Deposit growth rate	The difference between total deposits of the current year and the previous year over the total deposits of the previous year	+
	Loan growth rate	The difference between the total loans of the current year and the previous year over the total loans of the previous year	+
Competence	Market share of deposits	The bank's total deposits are divided by the market's total deposits	+
	Market share of loans	The bank's total loans are divided by the market's total loans.	+

Note: Table 1 highlights the index system construction and selected variables of core competence.

the research objective. The first proxy is CEO ownership since a CEO who owns a significant stake acquires a stronger position in the bank's decision-making process [9]. Moreover, the positive correlation between CEO ownership and CEO power is substantiated by recent studies showing that increasing CEO ownership decreases the likelihood of a CEO dismissal [26]. In addition, CEO ownership significantly raises the bank's performance [4]. The second proxy is CEO tenure because Finkelstein and Hambrick [27] argued that some determinants of CEO power take time to develop. Hence, CEO power tends to increase with tenure [28]. Additionally, CEOs are expected to have more power to influence the bank's decisions when they stay longer in the bank [29], and the tenure of the CEO significantly influences the bank's performance [4,9]. The final proxy is CEO gender because male CEOs empower bank performance [30]. Haider and Fang [31] suggest that female CEOs overlook risky investments more than male CEOs. Moreover, Ullah et al. [32] argue that female CEOs improve firm performance because they help reduce risk and promote more prudent and sustainable management. The results of PCA for CEO power are shown in Appendix B.

Green credit: a dummy variable that takes the value of one if the bank has green lending activities in that year and zero otherwise.

Other control variables: The control variables are represented in Appendix C.

4.3. Models construction

Fang et al. [4] and Ting et al. [9] found that CEO power (CEOP) increases a bank's lending performance and reduces its NPL ratio, which is consistent with the stewardship theory. In contrast, Onali et al. [7] argue that powerful CEOs reduce banks' performance. Therefore, we construct model (1) to examine how CEOP affects banks' core competence (CC) in Vietnam.

$$CC_{i,t} = \beta_0 + \beta_1 CEOP_{i,t-1} + \sum \beta_q control_{i,t-1} + \alpha_i + \alpha_t + \mu_{it} \quad (1)$$

Besides, Griffith et al. [6], Shen and Cannella Jr [8]. found an inverted U-shape relationship between these CEOP and CC due to the management entrenchment theory. Therefore, we follow them to add the non-linear variable (CEOP*CEOP) to model (2) to test hypothesis 3.

$$CC_{i,t} = \beta_0 + \beta_1 CEOP_{i,t-1} + \beta_2 CEOP_{i,t-1} * CEOP_{i,t-1} + \sum \beta_q control_{i,t-1} + \alpha_i + \alpha_t + \mu_{it} \quad (2)$$

Regarding green credit, Lian et al. [10] and Yin et al. [11] stated that green credit increases banks' profitability and financial performance due to the first-mover advantages and legitimacy theories. However, Del Gaudio et al. [3], Galán and Tan [5], and Zhou et al. [12] argue that green lending reduces bank efficiency. To examine the first-mover advantages theory and legitimacy theory, we construct model (3) as follows:

$$CC_{i,t} = \beta_0 + \beta_1 GC_{i,t-1} + \sum \beta_q control_{i,t-1} + \alpha_i + \alpha_t + \mu_{it} \quad (3)$$

Additionally, we follow the stakeholder theory to examine CEOP, GC, and CC interactions. We add the GC variable to model (2) to test whether the non-linear relationship between CEOP and CC persists after controlling for green credit. The model (4) is as follows:

$$CC_{i,t} = \beta_0 + \beta_1 CEOP_{i,t-1} + \beta_2 CEOP_{i,t-1} * CEOP_{i,t-1} + \beta_3 GC_{i,t-1} + \sum \beta_q control_{i,t-1} + \alpha_i + \alpha_t + \mu_{it} \quad (4)$$

In model (5), we add the interaction variable (CEOP*GC) to model (3) to test whether CEO power moderates the relationship between GC and CC. Model (5) is as follows:

$$CC_{i,t} = \beta_0 + \beta_1 CEOP_{i,t-1} + \beta_2 GC_{i,t-1} + \beta_3 CEOP_{i,t-1} * GC_{i,t-1} + \sum \beta_q control_{i,t-1} + \alpha_i + \alpha_t + \mu_{it} \quad (5)$$

Finally, we combine all variables to construct model (6) as follows:

$$CC_{i,t} = \beta_0 + \beta_1 CEOP_{i,t-1} + \beta_2 CEOP_{i,t-1} * CEOP_{i,t-1} + \beta_3 GC_{i,t-1} + \beta_4 CEOP_{i,t-1} * GC_{i,t-1} + \sum \beta_q control_{i,t-1} + \alpha_i + \alpha_t + \mu_{it} \quad (6)$$

Where "i" is cross-sections, "t" is time, and "α" is the intercept. In addition, CC represents the core competence index; CEOP denotes the CEO power index; GC stands for green credit; Control includes the loan-to-asset ratio, operating cost-to-asset ratio, and bank leverage ratio. α_i is the firm fixed effect, and α_t is the year fixed effect. μ_{it} is the residual value. All variable definitions are displayed in Appendix C.

4.4. Estimation methodology

Firstly, we implement the redundant fixed effect and Hausman tests to select the most suitable estimation methods among the fixed-effects model (FEM), Random Effects Model (REM) and Ordinary Least Square (OLS). We then perform the Durbin Watson to check for autocorrelation. In addition, we also tested for endogeneity by using the Durbin-Wu-Hausman to examine endogenous issues. Liang et al. [33], Djalilov and Piesse [34], and Tran et al. [35] have recently used the Generalized Method of Moments (GMM) to overcome endogeneity problems in corporate governance in banking. The GMM method is simpler to implement and is robust under heteroscedasticity. It has no prior assumption about cross-equation error correlation or homoskedasticity [11]. Therefore, we follow them to employ this method. This study implements the two-step System Generalized Method of Moment (Sys-GMM) since the Sys-GMM has improved the Dif-GMM [36].

We also diagnose the Fisher test (F-test), Arellano-Bond (AR), and J-statistics to ensure that the estimations are not biased. The F-

test checks the statistical significance of the estimated coefficients; the Arellano-Bond test determines the autocorrelation and the J-statistic tests for endogeneity. If the probability (*P*-value) of the F-test is less than 1%, the estimated coefficients are statistically significant. The model has no quadratic autocorrelation if the AR (2) probability is more than 10%. The model has no endogeneity issues if the *P*-value of the J-statistic is above 20%.

5. Empirical results

5.1. Descriptive statistics

Table 2 reports the sample descriptive statistics. The average value of CC is 0.009, with a standard deviation of approximately 1.671. CEOP has an average value of −0.002, consistent with Altunbaş et al. [14] and Brodmann et al. [15]. However, the CEO power of Vietnam is lower than the US. Both of their results of PCA for CEO power have a mean of 0.00 and 0.438. The average value of GB is about 0.244, indicating that the number of green banks is about 24.4% of total observations. Table 1 also reports that the mean value of the Bank BLOAN is 0.549, with a standard deviation of 0.131. In addition, this table also presents the descriptive statistics of other variables, such as the operating cost (OC) and leverage ratio (LEV) of the banks.

5.2. Pearson correlation matrix

Table 3 presents the research data sample by the correlation matrix. According to the data, the correlation coefficient between BLOAN and CEOP is about 0.2911; between BLOAN and GC, it is about 0.3568; between BLOAN and OC, it is about 0.2881; between GC and LEV, it is 0.2204, between OC and LEV, is about −0.3868. All correlation coefficients are moderate, so we examine the variance inflation factor (VIF) to ensure no multi-collinearity issue in our sample. The result is that the VIF of all variables is less than two. Hence, this study has no multi-collinearity issue [35].

5.3. How CEO power and green credit affect the bank's core competence

Table 4 shows an inverted U-shape relationship between CEO power and core competence. In addition, the results report that green credit positively affects core competence. All R-squared and adjusted R-squared range from 40% to 86.8%, implying that independent variables used in all five models explain nearly 40%–86.8% of the variation in core competence. In addition, the F-test shows that the estimated coefficients are statistically significant. Moreover, the Durbin-Watson statistics show that all five models have auto-correlation issues.

After generating FEM and REM estimations, the study follows Duong et al. [37] to perform the Durbin-Wu-Hausman test to check whether endogenous variables exist. First, the endogenous examination test model of CEOP – model (7), is as follows:

$$CEOP_{i,t} = \beta_0 + \beta_1 GC_{i,t} + \beta_2 BLOAN_{i,t} + \beta_3 OC_{i,t} + \beta_4 LEV_{i,t} + \mu_{it} \quad (7)$$

The CEOP residuals (Res-CEOP) acquired in the first stage are added to model (8) as an alternative variable of CEOP [37]. There is an endogeneity problem if the coefficient of residuals is a statistically significant variable. Similarly, we test for GC, BLOAN, OC, and LEV.

$$CC_{i,t} = \beta_0 + \beta_1 CEOP_{i,t} + \beta_2 GC_{i,t} + \beta_q control_{i,t} + \alpha_i + \alpha_t + \mu_{it} \quad (8)$$

Table 5 reports that endogenous variables exist. Since the GMM method has been recently used to overcome endogeneity issues in corporate governance in banking [33,34], it is also simpler to implement and is robust under heteroscedasticity. At the same time, it has no prior assumption about homoskedasticity or cross-equation error correlation. Therefore, we decided to use the dynamic system GMM to improve the precision and reduce the finite sample bias since it outperforms Dif-GMM.

The J-statistic determines endogeneity, and the AR test determines autocorrelation. The model has no quadratic autocorrelation if the AR (2) probability is above 20%. Suppose the *P*-value of the J-statistic is above 20%. In that case, all instrument variables are valid, and the models have no endogeneity issues.

Table 2
Descriptive statistics of variables.

	Mean	Median	99th Pct	1st Pct	Std. Dev.	Obs
CC	0.009	−0.295	4.518	−3.766	1.671	373
CEOP	−0.002	−0.400	3.317	−1.012	1.020	373
GC	0.244	0.000	1.000	0.000	0.430	373
BLOAN	0.549	0.567	0.756	0.158	0.131	373
OC	0.016	0.016	0.032	0.004	0.005	373
LEV	0.908	0.920	0.974	0.751	0.043	373

Note: Table 2 highlights the descriptive statistics. The sample consists of 39 Vietnamese commercial banks from 2010 to 2021. All variable definitions are reported in Appendix C.

Table 3
Pearson correlation matrix.

	CEOP	GC	BLOAN	OC	LEV	VIF
CEOP	1					1.1236
GC	0.0696 (0.1798)	1				1.2049
BLOAN	0.2911*** (<0.0001)	0.3568*** (<0.0001)	1			1.4050
OC	−0.0397 (0.4447)	0.0647 (0.2122)	0.2881*** (<0.0001)	1		1.3667
LEV	−0.0097 (0.8512)	0.2204*** (<0.0001)	0.0596 (0.2509)	−0.3868*** (<0.0001)	1	1.2914

Note: Table 3 reports the Pearson correlation coefficients of all variables used in the study. The sample consists of 39 Vietnamese commercial banks from 2010 to 2021. All variable definitions are reported in Appendix C. The expression of significance at 1%, 5%, and 10% is shown by ***, **, and *, respectively.

Table 4
Regression results from REM and FEM method.

Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
	FEM	REM	REM	REM	FEM	REM
CEOP	0.1483*** (0.0028)	0.2200*** (0.0002)		0.1975*** (0.0007)	0.1160** (0.0259)	0.1837*** (0.0019)
CEOP*CEOP		−0.1054*** (0.0103)		−0.0991*** (0.0143)		−0.1056*** (0.0099)
GC			0.4113*** (0.0002)	0.3688*** (0.0008)	0.3427*** (0.0024)	0.3498*** (0.0015)
CEOP*GC					0.0756 (0.4134)	0.1050 (0.2559)
BLOAN	5.6015*** (<0.0001)	5.6692*** (<0.0001)	5.1389*** (<0.0001)	4.9332*** (<0.0001)	4.8639*** (<0.0001)	4.9496*** (<0.0001)
LEV	−2.7583** (0.0292)	−2.5896** (0.0368)	−1.8934 (0.1176)	−2.4295** (0.0465)	−2.6295** (0.0352)	−2.4350** (0.0461)
OC	−32.789*** (0.0031)	−34.003*** (0.0017)	−29.980*** (0.0051)	−29.991*** (0.0051)	−29.150*** (0.0081)	−30.635*** (0.0043)
C	−0.0478 (0.9677)	−0.1938 (0.8693)	−0.8062 (0.4783)	−0.0854 (0.9412)	0.0972 (0.9337)	−0.0713 (0.9510)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Period fixed effect	Yes	No	No	No	Yes	No
Number of obs	373	373	373	373	373	373
R-squared	0.8636	0.4086	0.4065	0.4253	0.8680	0.4276
Adjusted R-squared	0.8462	0.4006	0.4000	0.4159	0.8503	0.4166
F-statistic	49.7458	50.7155	63.0082	45.1494	49.0173	38.9528
Prob (F-statistic)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)
Prob (Redundant Test)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)
Prob (Hausman Test)	0.001	0.1723	1	1	0.0078	1
Durbin-Watson stat	0.7957	0.7180	0.7088	0.7237	0.8177	0.7351
Hannan-Quinn criteria.	2.2802				2.2665	

Note: Table 4 reports the regression results of the FEM and REM methods. The sample consists of 39 Vietnamese commercial banks from 2010 to 2021. All variable definitions are reported in Appendix C. The expression of significance at 1%, 5%, and 10% is shown by ***, **, and *, respectively.

Table 5
Coefficient of residual variables.

Residual of variables	Coefficient	*P*-value
Res-CEOP	0.09249**	0.04720
Res-GC	0.30630**	0.01490
Res-BLOAN	5.52687***	<0.0001
Res-LEV	−1.177935	0.38500
Res-OC	−17.98195	0.12150

Note: Table 5 reports that the residuals of ADJCEO have a statistically significant dependent variable. This result shows that CEOP, GC, and BLOAN are endogenous variables. The symbols ***, **, and * represent the 1%, 5%, and 10% significance levels, respectively.

Table 6
Regressions results from the GMM method.

Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Lag of Dep. Var	0.5135*** (<0.0001)	0.5141*** (<0.0001)	0.5133*** (<0.0001)	0.5069*** (<0.0001)	0.4917*** (<0.0001)	0.5025*** (<0.0001)
CEOP	0.1203*** (<0.0001)	0.2356*** (0.0001)		0.2674*** (<0.0001)	0.1196*** (0.0002)	0.1788*** (0.0159)
CEOP*CEOP		−0.1067*** (0.0103)		−0.1304*** (0.0076)		−0.1833*** (0.0013)
GC			−0.0473 (0.1600)	−0.1193** (0.0125)	−0.0118 (0.8874)	−0.1598* (0.0973)
CEOP*GC					0.0124 (0.8448)	0.2019* (0.0524)
BLOAN	4.5856*** (<0.0001)	4.6084*** (<0.0001)	4.7592*** (<0.0001)	4.9781*** (<0.0001)	4.6143*** (<0.0001)	4.7601*** (<0.0001)
LEV	1.6530** (0.0266)	−1.1073 (0.1681)	1.0706 (0.1409)	−1.5350 (0.1614)	2.5843* (0.0562)	−2.3426** (0.0415)
OC	−25.473*** (<0.0001)	−26.619*** (0.0081)	−23.542*** (0.0007)	−39.580*** (0.0011)	−13.8568 (0.4339)	−36.6174** (0.0323)
Cross-section fixed (first differences)						
Turning point		1.1038		1.0252		0.4880
Number of orbs	298	298	298	298	298	298
J-statistic	31.1658	30.7240	29.8748	30.6439	28.8407	28.0137
Prob (J-statistic)	0.3577	0.2826	0.4203	0.2418	0.3687	0.3578
Prob (Arellano–Bond test for AR (1))	0.8806	0.4359	0.9439	NA	NA	0.9996
Prob (Arellano–Bond test for AR (2)	0.8737	0.3698	0.9842	0.2948	NA	0.9987

Note: Table 6 represents the estimation results from the GMM method. The sample consists of 39 Vietnamese commercial banks from 2010 to 2021. All variable definitions are reported in Appendix C. The expression of significance at 1%, 5%, and 10% is shown by ***, **, and *, respectively.

6. Discussion

Table 6 highlights exciting results related to CEO power (CEOP) influences on core competence (CC) in Vietnamese commercial banks. The results present an inverted U-shape relationship between CEO power and banks' core competence with a 99% significant level. This result means that, at first, powerful CEOs will positively affect the bank's core competence; however, when CEO power reaches a certain threshold, it will decrease its core competence. We estimate the turning point of CEO power by taking the absolute value of $\frac{\beta 1_{CEOP}}{2*(\beta 2_{CEOP^2})}$ in model (2). Accordingly, the relationship between CEO power and core competence is an inversed U-shape. The core competence will decrease when the CEO power index exceeds the optimal threshold. Griffith et al. [6] claimed that when CEO ownership reaches a certain threshold, they may accept sub-optimal returns to reduce firm-specific risk due to inadequate diversification within their portfolio. Moreover, this factor's marginal impact varies with the CEO ownership level. They also pointed out that, according to entrenchment theory, the manager is entrenched and may strive to increase personal usefulness rather than shareholder value after his ownership reaches the turning point. Shen and Cannella Jr [8] proposed that if a CEO's tenure is too short, the firm may not have recovered sufficiently from the disruption of the previous succession. In addition, they also stated that lengthy CEO tenures would be associated with solid organizational inertia, leading to difficulty when the successors wish to initiate strategic changes. The result of the study is consistent with Griffith et al. [6], Shen and Cannella Jr [8]. Moreover, this result complements the results of Fang et al. [4], Onali et al. [7], and Ting et al. [9] and supports both stewardship theory and entrenchment theory and hypothesis 3.

Regarding the influence of green credit and bank core competence, model (3) reports a negative and insignificant relationship between green credit and core competence. However, models (4) and (6) indicate that green credit reduces core competence at 95% and 99% significance levels. Accordingly, for commercial banks with green credit lending activities, their core competence will decrease by 0.1193 and 0.1598 points in model (4) and model (6), respectively. Zhou et al. [12] stated that green lending increases credit risk due to information and expertise asymmetries. In addition, Galán and Tan [5] found that green credit reduced bank profit efficiency and stated that the revenue obtained from these operations does not compensate for their associated higher costs. Lower interest rates from green lending and higher costs are derived from using more screening and monitoring resources in the short run compared to traditional loans. Moreover, these projects often require significant capital sources and long investment time, while the financial efficiency is not high. For instance, according to the State Bank of Vietnam, some solar wind power projects in Vietnam have a loan period of about 11–15 years. Therefore, the loan recovery cycle for green credit is often protracted, which raises the liquidity risk [1]. Our finding aligns with Del Gaudio et al. [3], Galán and Tan [5], and Zhou et al. [12]. In contrast, this result is inconsistent with Luo et al. [1], Lian et al. [10], Yin et al. [11], Cui et al. [20]. While these findings contradict the legitimacy and first-mover advantage theories, they support hypothesis 5.

Table 6 reports that CEO power moderates the relationship between green credit and core competence. Model (6) demonstrates that when a powerful CEO decides to implement green credit, it has a beneficial influence on the core competency of his or her bank. Specifically, model (6) reports that powerful CEOs who implement green lending can increase the core competence index by 0.2019 points. Experienced and powerful CEOs who have been highly influenced in making decisions can take advantage of the potential of

green credit due to its emergence as a new trend in Vietnam. According to the first-mover advantages theory, the key benefit of green lending in comparison to traditional lending is increased competitiveness and reputation, as the market for green loans is still developing and incentivizes banks to attract new green customers, thereby facilitating their entry and growth in this new market [11]. According to the stakeholder theory, when a CEO places sustainability at the forefront and takes a stakeholder-oriented approach, it strengthens the bank's dedication to environmental and social responsibility. Focusing on ESG develops the bank's reputation and trust and solves stakeholder conflicts [2]. Additionally, providing green loans can improve the bank's access to green credit, as financial institutions and investors tend to favor and support banks that prioritize sustainability by providing funding or incentives. This finding supports the first-mover advantages theory, stakeholder theory, and hypothesis 6.

Table 6 also reports the positive impact of bank loans on core competence. Maudos et al. [38] stated that bank loans could positively affect bank performance because they can acquire more interest income from extending credit activities. The results also show that the operating cost and leverage ratio negatively reduce banks' core competence. Naifar [39] suggested that increased operating expenses will decrease efficiency, negatively affecting bank profit. In addition, Almaqtari et al. [40] stated that higher operating expenses erode the net interest income. Goyal [41] argued that an increase in liabilities is associated with a decrease in banks' profitability because debts are more expensive than equity. Therefore, employing high proportions of them could lead to low profitability. Agoraki et al. [42] also suggest that bank profits are negatively related to their leverage.

7. Conclusion

This study examines the impacts of CEO power and green credit on the core competence of commercial banks in Vietnam. We employ the dynamic system GMM to reduce estimation bias and overcome the endogeneity issue. This study provides some remarkable results. First, this study found an inverted U-shape relationship between CEO power and banks' core competence in Vietnam. Second, commercial banks with green lending activities have lower performance. Finally, CEO power moderates the relationship between green lending policies and core competence. Our results support stewardship, entrenchment, first-mover advantage theories, and prior literature.

This study provides practical implications for managers and policymakers of commercial banks to develop sustainable banking performance in emerging markets. Regarding CEO power, for the managerial implications, our study suggests that boards of directors must carefully manage CEO power through CEO ownership and tenure. For instance, in Vietnam, the power of the CEO should not reach the threshold of 1.1038 points because if it crosses that point, the bank's core competence will start to decrease, as well as the benefits of shareholders. However, the average CEO power of banks in Vietnam is estimated at −0.002 points, much lower than the turning point. Remarkably, about 84.18% of total observations in our data are below this optimal point, and 15.82% are above it, which means that most banks in Vietnam need to provide more power for the CEO. Banks in the group of 84.18% should increase their CEO power to the optimal point to increase their core competence to enjoy the benefits due to the stewardship theory. In contrast, banks with CEO power belonging to the group of 15.82% should decrease the power of their CEO to the optimal level to achieve the highest core competence. Furthermore, according to the first-mover advantage theory, we propose that powerful CEOs in Vietnam implement green lending to reap potential benefits as leaders in this new market segment.

Local policymakers can encourage commercial banks to participate in green credit by promoting green securitization and other financial instruments to develop sustainable economic growth. Therefore, banks can increase the transparency and liquidity of their balance sheets by selling credit risk to investors, allowing them to make additional loans to new environmental projects without violating capital requirements [11]. For the information and expertise asymmetries problem, the board of directors should establish mechanisms and networks that allow large commercial banks to communicate and exchange information and expertise with other small commercial banks. It could also include collaboration on innovative banking activities, building and sharing green credit data analysis platforms, or establishing specialized green credit institutions [12].

Although this study contributes to the growing literature on corporate governance and green credit, it has the following limitations. Firstly, it has a sample of only 373 annual observations due to the barriers to data restriction, which is very small for making any statistical inference. This limitation is primarily attributed to the scarcity of comprehensive green credit data in Vietnam. Specifically, the study used the dummy variable due to the lack of access to specific outstanding balances of green lending activities. Additionally, some commercial banks in Vietnam lack sufficient data to construct the core competence and CEO power indices from 2010 to 2021. Consequently, observations with missing data were excluded from the research analysis. Secondly, the findings may be limited to emerging and developed countries since Vietnam is a frontier and transition market. Therefore, this study suggests that future studies extend the data coverage to compare CEO power and green credit impacts on banks' core competence in developed and emerging countries to generate in-depth insight.

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Ethics and statement

This study does not involve animals or humans.

Author contribution statement

Khoa Dang Duong (duongdangkhoa@tdtu.edu.vn): Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper. Phuc Huu Truong (b20i0138@student.tdtu.edu.vn) and Diep Van Nguyen (diep.nv@ou.edu.vn): Performed the experiments; Contributed reagents, materials, analysis tools or data. Ai Ngoc Nhan Le (ai.lnn@vlu.edu.vn): Analyzed and interpreted the data; Wrote the paper.

Data availability statement

Data will be made available on request.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendices.

Appendix A
The result of the Principal Component Analysis for bank core competence

Eigenvalues: (Sum = 14, Average = 1)														
Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Value	2.8792	1.9701	1.7661	1.1864	1.0449	0.9896	0.8754	0.7455	0.6787	0.5651	0.4838	0.4216	0.3784	0.0151
Difference	0.9091	0.204	0.5797	0.1415	0.0553	0.1143	0.1298	0.0669	0.1135	0.0813	0.0621	0.0432	0.3633	–
Proportion	0.2057	0.1407	0.1262	0.0847	0.0746	0.0707	0.0625	0.0533	0.0485	0.0404	0.0346	0.0301	0.027	0.0011
Cumulative Value	2.8792	4.8494	6.6155	7.8019	8.8468	9.8364	10.7118	11.4573	12.136	12.7011	13.1849	13.6065	13.9849	14
Cumulative Proportion	0.2057	0.3464	0.4725	0.5573	0.6319	0.7026	0.7651	0.8184	0.8669	0.9072	0.9418	0.9719	0.9989	1
Eigenvectors (loadings):														
Variable	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6	PC 7	PC 8	PC 9	PC 10	PC 11	PC 12	PC 13	PC 14
ROAE	0.3966	0.2074	−0.0013	0.1408	−0.0728	−0.0763	−0.2669	−0.3471	0.295	0.156	0.443	−0.3841	−0.3467	−0.0418
% Non-interest Income	−0.0706	−0.1545	0.1914	−0.071	0.6568	0.3022	−0.5634	−0.1982	−0.0028	−0.0301	0.0562	0.0715	0.2021	−0.003
Cost-to-income ratio	−0.2621	−0.2432	0.0501	−0.2646	0.1696	0.1448	0.4738	−0.2067	0.6615	−0.134	0.1229	−0.0086	−0.1095	0.0022
Loan-to-deposit ratio	0.3816	−0.0293	−0.2447	0.2793	0.1951	0.109	0.1642	0.0454	0.3017	0.3057	−0.4389	−0.2703	0.4152	0.1185
Current asset ratio	0.2758	0.0472	−0.4079	−0.4205	−0.0652	−0.0716	−0.0885	0.0068	0.1406	0.2947	0.2675	0.58	0.2161	0.0043
Core capital adequacy ratio	−0.1135	0.2133	−0.4198	0.1123	0.2785	0.1395	−0.115	0.6811	0.1861	−0.204	0.177	−0.083	−0.2534	0.0045
NPL ratio	−0.2222	−0.1816	−0.1223	0.1253	−0.2541	0.7132	0.057	−0.0089	−0.1857	0.4783	0.1803	−0.046	−0.112	0.004
Provision coverage	0.0699	0.3493	0.0623	0.005	0.554	−0.0664	0.527	−0.0939	−0.385	0.2596	0.1965	0.0387	−0.1248	−0.0034
Net interest margin	0.1413	0.3693	−0.2241	0.2723	−0.0882	0.4072	0.0993	−0.387	−0.0245	−0.5382	−0.0721	0.2971	0.0491	0.0021
Asset growth rate	−0.0967	0.0039	0.3767	0.6467	−0.0258	−0.1319	0.0283	0.1627	0.2711	0.1489	0.2684	0.4396	0.1555	0.0062
Deposit growth rate	−0.0496	0.4556	0.3242	−0.2779	−0.1816	0.2028	0.0509	0.1963	0.0603	−0.076	0.2838	−0.2935	0.5622	0.0178
Loan growth rate	−0.0193	0.4677	0.3282	−0.1981	−0.0372	0.1661	−0.142	0.0755	0.2488	0.2751	−0.5023	0.2227	−0.3734	0.0116
Market share of deposits	0.4635	−0.2374	0.2795	−0.0969	−0.0137	0.1864	0.089	0.2099	−0.0812	−0.1746	0.0936	0.0814	−0.1702	0.6877
Market share of loan	0.4829	−0.2265	0.2377	−0.0606	0.0128	0.2137	0.1284	0.2411	−0.0327	−0.1225	−0.0046	0.0591	−0.0668	−0.7147

Appendix B
The result of the Principal Component Analysis for CEO power

Eigenvalues: (Sum = 3, Average = 1)					
Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	1.0526	0.0518	0.3509	1.0526	0.3509
2	1.0008	0.0542	0.3336	2.0534	0.6845
3	0.9466	–	0.3155	3.0000	1.0000
Eigenvectors (loadings):					

(*continued on next page*)

Appendix B (*continued*)

Eigenvalues: (Sum = 3, Average = 1)					
Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
Variable	PC1		PC2		PC3
CEO Ownership	0.142007		0.972605		0.184046
CEO Tenure	0.69033		−0.230561		0.685774
CEO Gender	−0.709422		−0.029667		0.70416

Appendix C

Variables definition

Variables	Notation	Variable definition	References
Dependent variable			
CC	Core competence	Core competence index of banks	Luo et al. [1]
Independent variables			
CEOP	CEO power	CEO power index	Brodmann et al. [15], Duong et al. [16]
GB	Green Bank	Binary dummy. The year the bank has green lending activities has a value of one and zero otherwise.	
Control variables			
BLOAN	Bank loan	Total loans divided by total assets	Maudos et al. [38]
OC	Bank operating cost	Total operating expense divided by total assets	Naifar [39]
LEV	Bank leverage	Total liabilities divided by total assets	Lindemanis et al. [43]

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