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Do Political Connections and Bank Funding Diversity Increase Non-Performing Loans: New Evidence from the Bayesian Approach

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ABSTRACT

Our study aims to fill the gap in estimating the impacts of political connections and bank funding diversity on the risk-taking behaviors of Vietnamese commercial banks. By employing the Bayesian methodology, our paper can overcome the small sample issues to reduce the bias in estimation results. We construct a data sample that includes 38 commercial banks in Vietnam from 2003 to 2020. Our results suggest several findings in the Vietnamese banking sector. Firstly, our findings suggest that politically connected banks have 0.4% non-performing loans higher than unconnected peers. Secondly, we find a positive relationship between funding diversity and non-performing loans of commercial banks in Vietnam. Interestingly, our findings report that the commercial banks, especially the politically connected banks, reduced non-performing loans by 0.2% and 0.4% for a year before the recent two National Congress of the Communist Party of Vietnam, respectively. It could be due to the notion that the bank managers secure their job and political promotions by reducing non-performing loans before the National Congress of the Communist Party of Vietnam. Finally, our study argues that the commercial bank had a lower level of non-performing loans during the Covid19 pandemic because the government offered stimulus supports to the local economy. Our study has substantial implications for bank managers and authorities in emerging markets.

INTRODUCTION

Politicians can work in the private sector after being elected at the local or national levels (Gagliarducci et al., 2010). The relationship between politics and business is likely to be highly tied (Faccio, 2006). In addition, Micco et al. (2007) argue that politics captured banks are only interested in maximizing their objectives, increasing banks' risk-taking and increasing non-performing loans. From these lenders' aspect,

Hung et al. (2017) indicate depositors prefer politically connected banks, although these banks are inefficient and risky. In addition, various studies indicate the impacts of politics on the performance of the banking industry (Khwaja and Mian, 2005; Micco et al., 2007; Hussain et al., 2020; Zhao et al., 2020).

An increasing number of studies examine the risk-taking behaviors of commercial banks in Vietnam (Batten and Vo, 2016; Vuong and Nguyen, 2021; Thai et al., 2021). Vo (2018) suggests that Vietnamese firms with higher state ownership have strong political connections in a transitional economy and are exposed to higher business risks. Pursuing this argument, we investigate whether political connection affects non-performing loans in Vietnam. Our work is unique because we estimate the political connections of commercial banks by matching whether the chairman or CEO is a member of the Communist Party, which is the only ruling Party in Vietnam, based on section 4th of the Vietnamese Constitution. Our study differs from existing studies because we employ the Bayesian regression approach, which allows us to overcome the asymptotic issues, which can hinder when using frequentist methods in small-sample contexts (McNeish, 2016).

Although current studies in Vietnam focus on income, product, and market diversification on bank performance, a few papers analyze the impact of funding diversity on commercial banks' risk-taking behaviors. Vo (2020) indicates that the commercial banks that have higher funding diversity undertake more risks. Moreover, Rizwan et al. (2020); Ari et al. (2020) state that Covid19 affects the volume of NPLs of commercial banks. As a result, it would leave the research gap to compare the effects of bank funding diversity on NPLs of politically connected and nonconnected banks in Vietnam. Finally, Vietnam is among a few countries with positive economic growth during the Covid19 pandemic, so it is worth testing the risk-taking behavior of commercial banks in Vietnam before and during the pandemic.

Our empirical results document that politically connected banks have about 0.4% NPLs than unconnected banks. Hu et al. (2004) and Jasmine et al. (2020) suggest that politically connected banks receive support from the government through political lobbies. Thus, bank managers tend to engage in aggressive lending activities, increasing the NPLs (Lassoued et al., 2016; Rehman et al., 2016; Carretta et al. 2012). In addition, higher funding diversity increases the NPLs of commercial banks from 0.4% to 0.5%. Interestingly, we figure out that commercial banks tend to reduce around 1% NPLs a year before the recent two National Party Congress in Vietnam. Significantly, bank managers in politically connected banks intentionally reduce the NPLs from 0.2% to 0.4% a year before the National Party Congress compared to unconnected banks. The reduction in NPLs becomes more effective with the intensive anti-corruption campaigns before the National Party Congress. Finally, we report that the commercial banks temperately reduce NPLs during the Covid19 pandemic because of the stimulus programs from the government to support the local economy.

Our study widens empirical theory by utilizing Bayesian methodology in estimating the impact between political connections (POC) and funding diversification (BFD) with non-performing loans (NPL). Our findings suggest that political connections will increase the risk-taking behavior of banks. Hu et al. (2004) suggest that banks with higher political connections can loosen credit policy to increase NPL performance. In addition, our findings are also consistent with Lassoued et al. (2016); Hu et al. (2004); Rehman et al. (2016); Carretta et al. (2012), and Jasmine et al. (2020).

Our paper serves as a role to fill the gaps of previous papers on investigating the influence of political connections and funding diversification on non-performing loans in Vietnamese commercial banks. Moreover, our findings suggest two policy implications for a sustainable financial system. Firstly, the government and State Bank of Vietnam should supervise bank funding diversity to control the loan quality in the economy. Secondly, we suggest that the government reduces the NPLs by implementing effective anti-corruption programs through the Party Congresses.

This study is constructed as follows. Literature background and Hypothesis development are presented in Section 2. Section 3 describes data, empirical models, and research methodology. Section 4 discusses the empirical results. Section 5 is a conclusion.

1. LITERATURE BACKGROUND AND HYPOTHESIS DEVELOPMENT

1.1 Funding diversity and Bank risk-taking behaviors

Previous literature remains mixed evidence of diversification strategies on banking risks (Doumplos et al. 2016). Most studies indicate that diversification strategy increases risk-taking behavior in Vietnam. For instance, Batten and Vo (2016) investigate the impact of diversification in the context of Vietnamese commercial banks. Vuong and Nguyen (2021) also test the impact of revenue diversification and state ownership on risk-shifting in Vietnamese banks. The shortage of these papers focuses entirely on the impact of revenue diversification on banking risks, while the relationship between bank funding diversity and Vietnamese commercial banks' risk-taking behaviors remains unexplored.

The current literature also indicates mixed evidence between funding diversity and banking risks. Vo (2020) confirms that Vietnamese commercial banks with diversified funding sources tend to have higher risk-taking behaviors, presented by the Z-score indicator. Vo (2020) also suggests that stable bank funding is essential for bank operations and risk management. Acharya and Naqvi (2012) also report that stable funding motivates banks to take higher risks. When banks attract more extensive deposits, they reduce funding liquidity risk, so bank managers engage in aggressive lending activities to earn higher compensations (Acharya and Naqvi, 2012). Vazquez and Federico (2015) indicate that stable funding sources may help banks prevent financial distress. On the other hand, Wagner (2007) argues that increased bank asset liquidity belittles stability for the banking system during financial crises, not during regular periods.

H1: Funding diversity has a significant impact on banks' risk-taking behaviors

1.2 Political connection and Bank risk-taking behaviors

Government policies affect banks' performance, so commercial banks tend to foster links with government officials to enhance their business performance. Recently, the link between political connections and loan quality is still under debate in the literature. Khwaja and Mian (2005) report that firms with tightened political relations obtain preferential access to loans from politically connected banks. More politically powerful firms could threaten bank officers by job transferring, removals, promising promotions. In this way, these politically connected firms take advantage of the preferable loans while banks encounter credit risk. Besides, the boards of politically connected banks have operated in government interest due to pressure from the authorities (Jasmine et al., 2020). Agency problems grow in policy loans for political purposes, reducing bank performance (Berger et al., 2009).

On the other hand, Faccio et al. (2006) argue that creditors are willing to lend to state-owned enterprises, who are more likely to be bailed out than their private peers in the distress context. Banks with higher political connections also have timely support from the central bank, counterparties, or other politically connected banks. It is possible that these banks also have less pressure from legislative compliances. Politically connected banks can also take advantage of the connections to exchange favors to achieve purposes (Gu et al., 2008) which eventually enhance bank performance.

Non-performing loans are undesirable outputs of credit activities that can dampers bank performance and increase credit risks. Hu et al. (2004) indicate that increasing government ownership in banks facilitates political lobbies more easily, implying that government ownership represents political connections in commercial banks. In another facet, Lassoued et al. (2016) indicate that government ownership positively relates to the risk-taking behaviors of banks in both developed and emerging countries. Lassoued et al. (2016) also figure out that liquidity risk positively relates to higher state ownership in banks. In addition, tighter political connections also reduce the lending quality, leading to increasing non-performing loans. Hung et al. (2017) report that CEOs, former government officers, tend to increase the non-performing loans for commercial banks in China. Tsai et al. (2016) indicate that the acceptance loan ratios hike up despite higher credit risk for firms in the Taiwanese market during the financial crisis of 2007-2008. In addition, Carretta et al. (2012) indicate that the number of politicians on board affects negatively and significantly on banks' net interest income, loan quality, and market capitalization. Their findings imply that the presence of political directors reduces the loan quality of US banks. Rehman et al. (2016) document that the

political system positively influences non-performing loans in Pakistan. However, Hung et al. (2017) argue that Chinese banks with former government CEOs have lower credit risk. Hung et al. (2017) suggest that banks with political connections have better relationships with politically connected firms, more likely to receive government bailouts in financial distress. Jasmine et al. (2020) also report similar findings in Indonesia.

H2: Political connection has a significant impact on banks' risk-taking behaviors

1.3 The Covid19 pandemic and Bank risk-taking behaviors

The effect of the Covid19 pandemic extends beyond the health sector and has direct economic consequences. Most governments have taken the initiative to immediately soften the impact of economic and financial shocks by providing monetary and macroeconomic bailouts. In most countries, regulators have responded by relaxing regulatory requirements, deferring loan payments, and temporarily declassifying non-performing loans. Unfortunately, prolonged shutdowns, loan repayment delays, and an uncertain political position have built up the banking sector's vulnerability, and experts believe that "Holes in credit markets, emerging countries and banks could even trigger a new financial crisis." As a result, Rizwan et al. (2020) show that the bank's systemic risk increases during the Covid19 pandemic over eight markets. However, Ari et al. (2020) argue that the Covid19 pandemic was not pre-appeared by a credit boom after investigating the international banking database. Due to extensive economic integration, the Vietnamese economy is heavily affected by the Covid19 pandemic and showed considerable resilience. Fortunately, Vietnam is one of the few countries in the world with positive economic growth. Additionally, all Vietnamese firms affected by the Covid19 pandemic and meeting the conditions prescribed by the Vietnamese State Bank will be considered and supported by the commercial banks.

1.4 Other determinants of Bank risk-taking behaviors

The natural logarithm of total assets is a popular proxy for Bank size (LogSIZE). Prior studies report a negative relationship between bank size and bank risk (Lassoued et al., 2016; Le et al., 2019; Ghosh, 2015). On the contrary, larger banks have higher risks due to increased costs with scale (Vuong and Nguyen, 2020). It could be due to the positive influence of scaled economics or the positive effect of larger banks on profitability, resulting in the negative impact of bank size on risk.

Berger and DeYong (1997) and Makri et al. (2014) suggest that the capital to asset ratio (CAP) is an important driver affecting bank risk, which is widely observed in the current literature. Identically, we implement regressions to emphasize the importance of bank capital on bank risk in Vietnamese commercial banks. Pop et al. (2018) indicate that Banks with higher liquidity ratios have lower credit risk. However, Laeven et al. (2016) prove that a growing bank's scale pulls along the higher systemic risk.

Several empirical articles indicate that banks maintaining a high level of liquidity are the best-performing banks (Fungáčová and Poghosyan, 2011; Lee and Hsieh, 2013). In this case, there is a high probability of a negative link between liquidity ratio (LIQ) and bank risk. Banks can make loans to firms with riskier projects or firms with lower creditworthiness during excess bank credit. Therefore, banks tend to have more risky loans and are easily exposed to economic shocks.

Excessive credit growth pre-appears banking bankruptcy. Vithessonthi (2016) find out a positive relationship between non-performing loans and credit growth (LGR) in Japanese banks during the global financial crisis. However, a negative link between them is shown afterward. The sign of the connection between credit growth and non-performing loans depends significantly on the bank's lending strategy over each economic period. A negative effect of non-performing loans and capital ratios, including the required reserve ratio, are primarily documented (Makri et al., 2014; Ghosh, 2015) because the required reserve ratio enhances banks' liquidity and minimizes the bank's bankruptcy costs in a distress situation.

2. DATA AND METHODOLOGY

2.1 Data

Our data is obtained from various reliable databases, including Vietstock and financial reports of each commercial bank from 2003 to 2020. The data sample consists of specific characteristics of 38 Vietnamese commercial banks. We hand-collected the full name of the CEO and Chairman of each commercial bank from audited financial reports. After that, we check the published Curriculum Vitae of each CEO and Chairman to determine whether he or she is a member of the Communist Party in Vietnam. If either CEO or Chairman of a specific bank is a Party member, we categorize that bank as politically connected banks in that year. We also remove observations that do not have sufficient data to calculate the required variable. Our final sample includes 491 bank-year observations. The Covid19 is a dummy variable with 1 for the pandemic period and 0 for the remaining periods. We aim to differentiate the collective impact of bank funding diversity and political connections on NPLs of commercial banks before and during the Covid19 pandemic. The variable definitions are explicitly described in Appendix A.

Appendix A. Variable definitions

Variables	Notation	Definition
<i>Dependent variables</i>		
Non-performing loans ratio	NPLs	According to Berger and DeYoung (1997), the non-performing loans ratio is determined as the total non-performing loans divided by the total outstanding loans.
<i>Independent variables</i>		
Political Connection	POC	Following Rehman <i>et al.</i> (2016); we give POC as the dummy variable measured by: If a member of the Board of Directors is a ruling Party member, it is 1; otherwise, it is recorded as 0.
Bank size	SIZE	Following Ghosh (2015), calculate Bank size by Natural logarithm of total assets.
Bank's Liquidity	LIQ	According to Pop <i>et al.</i> (2018), the LIQ variable that measures a bank's liquidity is calculated as Total loan debt scaled by Total customer deposits.
Bank Reserve Ratio	RR	Bank Reserve Ratio is measured by the ratio of Reserve in the Central Bank to Customer deposits.
Capital to asset Ratio	CAP	The capital to asset ratio is measured with the share of Total equity in Total assets (Berger and DeYoung, 1997).
Loan Growth	LGR	According to Ozili (2015), LGR is the bank loan growth rate, defined by the below formula: $\text{LGR} = \frac{(\text{Total Bank's Loan of the current year} - \text{Total Bank's Loan of previous year})}{(\text{Total Bank's Loan of the previous year})}$
Bank Funding Diversity	BFD	Following Vo (2020), the bank funding diversity variable is calculated: $\text{BFD} = 1 - [(\text{EQU}/\text{Fund})^2 + (\text{GOV}/\text{Fund})^2 + (\text{IBD}/\text{Fund})^2 + (\text{CD}/\text{Fund})^2 + (\text{DER}/\text{Fund})^2 + (\text{LTF}/\text{Fund})^2 + (\text{OTH}/\text{Fund})^2]$

2.2 Methodology

In this study, we apply the Bayesian linear regression method due to the following reason. Prior literature relies on frequentist probability, while the P-value-based approach has been criticized as unreliable (Amrhein *et al.*, 2019). McNeish (2016) also suggests that the Bayesian linear regression method overcomes the asymptotic, a property that can hinder when employing frequentist methods in small-sample contexts. Schoot *et al.* (2021) also indicate that the Bayesian approach is more reliable than the frequentist school. Therefore, we employ Bayesian linear regression to mitigate the asymptotic issues, arise from a small data sample.

Anti-corruption campaigns have impacts on the risk-taking behavior of commercial banks. Mohamad and Jenkins (2020) report that a higher corruption level increases NPLs in commercial banks in the MENA

region. Therefore, the anti-corruption campaigns help reduce the NPLs of commercial banks. For instance, Pan and Tian (2017); Tao (2020) figure out that the anti-corruption program leads to a significant decline in loan loss provisions, implying a lower level of NPLs. Hence, we use model 1 to estimate the relationship between political connection and NPLs. The tension of the anti-corruption program is higher in a year before each Party congress, so we add two dummy variables, Y2010 and Y2015 to Model 2 to estimate the impacts of the National Party Congress on NPLs of commercial banks in Vietnam. Finally, we further measure the effect of the National Party Congress on politically connected banks against other banks by creating the interaction variables in Model 3.

The baseline these three Models is as follows:

Model 1: $NPLS_{it} = \alpha_0 + \beta_1 POC_{it} + \beta_2 CAP_{it} + \beta_3 LGR_{it} + \beta_4 LogSIZE_{it} + \beta_5 LIQ_{it} + \beta_6 RR_{it} + \beta_7 BFD_{it} + \beta_8 Covid19 + \varepsilon_{it}$ (1)

Model 2: $NPLS_{it} = \alpha_0 + \beta_1 POC_{it} + \beta_2 CAP_{it} + \beta_3 LGR_{it} + \beta_4 LogSIZE_{it} + \beta_5 LIQ_{it} + \beta_6 RR_{it} + \beta_7 BFD_{it} + \beta_8 Covid19 + \beta_9 Y2010 + \beta_{10} Y2015 + \varepsilon_{it}$ (2)

Model 3: $NPLS_{it} = \alpha_0 + \beta_1 POC_{it} + \beta_2 CAP_{it} + \beta_3 LGR_{it} + \beta_4 LogSIZE_{it} + \beta_5 LIQ_{it} + \beta_6 RR_{it} + \beta_7 BFD_{it} + \beta_8 Covid19 + \beta_9 POC_{it} * Y2010 + \beta_{10} POC_{it} * Y2015 + \varepsilon_{it}$ (3)

Accordingly, Model (1) can be rewritten according to the probabilistic model as follows:

$$\mu_{it} = \alpha_0 + \beta_1 POC_{it} + \beta_2 CAP_{it} + \beta_3 LGR_{it} + \beta_4 LogSIZE_{it} + \beta_5 LIQ_{it} + \beta_6 RR_{it} + \beta_7 BFD_{it} + \beta_8 COVID19$$

$$NPLS_i \sim N(\mu_i, \sigma)$$

NPLs is a dependent variable that obeys a normal distribution, parametrized by mean (μ_{it}) and standard deviation (σ). We assume the prior distributions for the parameters in the Bayesian approach and use the Bayesian theorem: posterior $\propto$ likelihood $\times$ prior.

In which:

Prior: $f_\alpha(\alpha)f_\beta(\beta)f_\sigma(\sigma)$

Likelihood: $\prod_{i=1}^n N(DEC_i | \mu_i, \sigma)$

Posterior: $f(\alpha, \beta, \sigma | NPLs, POC, CAP, LGR, LogSIZE, LIQ, RR, BFD, Covid19)$

We follow Lemoine (2019) to employ the typical prior calculation to estimate the Bayesian linear regression model. Meanwhile, the posterior distribution is based on Markov Chain Monte Carlo (MCMC) method combined with the Gibbs sampling algorithm. Cowles and Carlin (1996) suggest that the MCMC must converge to ensure a stable Bayesian inference condition.

3. EMPIRICAL RESULTS

3.1. Descriptive statistics

Table 1 reports the political connections of 38 commercial banks in Vietnam for the period 2003-2020. Of these, 19 banks are completely politically connected, with 50% of the sample. There are 11 banks with absolutely no political connections (29%). There are eight banks with and without political connections, depending on the sampling period.

Table 1. Descriptive statistics for political connections variable (POC)

<i>Political Connection</i>	<i>Banks</i>	<i>Percent</i>
With Connection	19	50%
Without Connection	11	29%
With and without Connection	8	21%
Total	38	100%

Table 2 shows the descriptive statistics of main variables in determining the relationship between bank funding diversity, political connection, and NPLs. In addition, Table 1 also provides detailed information about the number of observations (Obs), mean (Mean), Standard deviation (Std. Dev), minimum value (Min), and maximum value (Max) of each variable in the study. Specifically, table 2 has 491 bank-year observations. NPLs have an average value of 0.02262 with a standard deviation of 0.02384, the maximum value is 0.33135, and the minimum value is 0.00000. The state bank has issued regulations to control the bad debt ratio of the country to ensure the stable operation of the national financial system. The mean value of the POC variable is 0.63544, indicating that a strong relationship between commercial banks and the government of some commercial banks in Vietnam were established initially from state-owned financial institutions. However, the standard deviation of 0.4818 indicates high volatility. Notably, the BFD variable has a mean value of 0.55888 with a standard deviation of 0.10030, which is align with Vo (2020). In addition, Table 2 also gives notable statistical descriptions of CAP, LGR, LogSIZE, LIQ, RR, BFD variables.

Table 2. Descriptive statistics for quantitative variables

<i>Variable</i>	<i>Obs.</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
NPLs	491	0.02262	0.02384	0.00000	0.33135
POC	491	0.63544	0.48180	0.00000	1.00000
CAP	491	0.10676	0.07771	0.01405	1.00000
LGR	491	0.43499	0.95533	-0.41573	11.31726
LogSIZE	491	3.45631	0.04925	3.26158	3.55407
LIQ	491	0.93513	0.40543	0.37187	7.29587
RR	491	0.04678	0.04195	0.00101	0.55354
BFD	491	0.55888	0.10030	0.18758	0.75455

THIS TABLE HIGHLIGHTS THE DESCRIPTIVE STATISTICS OF KEY VARIABLES IN THIS STUDY. THE SAMPLE CONSISTS OF 38 COMMERCIAL BANKS IN VIETNAM FROM 2003 TO 2020.

3.2. Correlation analysis

Table 3 presents the Bayesian correlation matrix between used variables in the empirical model. Lee and Wagenmakers (2014) suggest that the correlation coefficients in the Bayesian approach are only marked with flags when the Bayes factors are higher than 10. The results show that NPLs and POC, CAP, LogSIZE, LIQ, RR, BFD are positive, while NPLs and LGR, COVID19 are negative. However, the correlation coefficients between NPLs and POC, CAP, LGR, LogSIZE, LIQ, RR, BFD, COVID19 report low Bayes factors because the maximum value is 0.596. There is only anecdotal evidence about the correlation between NPLs and the independent variables.

Table 3. Bayesian correlation matrix

	<i>NPLs</i>	<i>POC</i>	<i>CAP</i>	<i>LGR</i>	<i>LogSIZE</i>	<i>LIQ</i>	<i>RR</i>	<i>BFD</i>	<i>COVID19</i>
<i>NPLs</i>	—								
<i>POC</i>	0.098	—							
<i>CAP</i>	0.001	-0.003	—						
<i>LGR</i>	-0.089	-0.049	0.121	—					
<i>LogSIZE</i>	0.011	0.151*	0.595***	0.278***	—				
<i>LIQ</i>	0.044	-0.017	0.197***	0.103	0.266***	—			
<i>RR</i>	0.077	0.06	0.036	0.078	-0.085	0.258***	—		
<i>BFD</i>	0.014	0.009	0.294***	0.197***	0.316***	0.089	0.071	—	
<i>COVID19</i>	-0.071	-0.087	-0.084	-0.075	0.198***	-0.012	-0.024	-0.15*	—

THIS TABLE HIGHLIGHTS THE CORRELATION COEFFICIENTS OF ALL VARIABLES IN THIS STUDY. THE SAMPLE CONSISTS OF 38 COMMERCIAL BANKS IN VIETNAM FROM 2003 TO 2020. NOTE: * BF > 10, ** BF > 30, *** BF > 100

3.3 Convergence Diagnostics via Effective Sample Size

The MCMC algorithms used to simulate posterior distributions are indispensable in Bayesian analysis. A common approach in evaluating MCMC convergence is based on running and analyzing the difference between multiple chains. In this paper, we analyze the convergence through Gelman-Rubin's R_c statistics (multi-chain MCMC). Brooks and Gelman (1998) indicate that MCMC becomes non-convergence if the R_c statistic value is enormous. Brooks and Gelman (1998) also suggest that R_c statistics provide a reliable scale for better diagnosis than plots. Table 4 reports the R_c statistics of all the parameters in the models. The results showed that the R_c statistics of all the parameters are less than 1.2 for three model specifications, so MCMC has reached convergence (Brooks and Gelman, 1998).

The second technical issue of the MCMC method is that the samples will often have autocorrelation in a chain, which increases the uncertainty of the estimation of the posterior parameters, such as means and variances. For this reason, Roberts and Rosenthal (2001) suggest employing an adequate sample size (ESS) rather than an actual sample size to determine the sampling efficiency of the MCMC algorithm. Table 4 reports the lowest ESS of 28,062 and the highest ESS of 30,000 for the posterior parameters. Also, the efficiency values of all parameters are higher than 0.01, so the MCMC algorithm achieves sampling efficiency Roberts and Rosenthal (2001). Therefore, the empirical results from Table 4 indicate that the Bayesian inference is stable through the convergence diagnostics and ESS tests.

Table 4. Convergence test via effective sample size

<i>Models</i>	<i>Model 1</i>			<i>Model 2</i>			<i>Model 3</i>		
	<i>Rc</i>	<i>ESS</i>	<i>Efficiency</i>	<i>Rc</i>	<i>ESS</i>	<i>Efficiency</i>	<i>Rc</i>	<i>ESS</i>	<i>Efficiency</i>
<i>POC</i>	1.00006	30,000	1	1.00008	29,742	1	1.00000	30,000	1
<i>CAP</i>	1.00005	30,000	1	1.00000	30,000	1	1.00000	30,000	1
<i>LGR</i>	1.00001	30,000	1	1.00003	29,789	1	1.00000	30,000	1
<i>LogSIZE</i>	0.99998	29,689	1	1.00001	30,000	1	1.00000	30,000	1
<i>LIQ</i>	1.00003	30,000	1	0.99998	30,000	1	0.99130	29,740	1
<i>RR</i>	0.99998	29,072	1	1.00012	30,000	1	0.97380	29,213	1
<i>BFD</i>	1.00000	29,709	1	1.00001	30,000	1	1.00000	30,000	1
<i>COVID19</i>	1.00003	30,000.	1	1.00021	29,729	1	1.00000	30,000	1

Y2010	—	—	—	1.00020	29,965	1	—	—	—
Y2015	—	—	—	1.00014	30,000	1	—	—	—
POCxY2010	—	—	—	—	—	—	0.99440	29,831.32	0.9944
POCxY2015	—	—	—	—	—	—	1.00000	30,000.00	1.0000
Cons	0.99998	29,689.16	0.9896	1.00001	30,000.00	1.0000	1.00000	30,000.00	1.0000
Var	1.00010	29,134.67	0.9712	1.00004	28,062.96	0.9354	0.95040	28,513.31	0.9504

THIS TABLE REPORTS THE CONVERGENCE TEST VIA ADEQUATE SAMPLE SIZE. THE SAMPLE CONSISTS OF 38 COMMERCIAL BANKS IN VIETNAM FROM 2003 TO 2020.

3.4 Parameter Estimates

Table 5 presents the posterior simulation results of the models with the Bayesian linear regression method. Specifically, we compared the fraction of the accurate model parameters in the credible interval of the Bayesian 95% of the posterior distribution.

Table 5. Parameter Estimates results

Models	Model 1		Model 2		Model 3	
Variables	Mean	Posterior probability	Mean	Posterior probability	Mean	Posterior probability
POC	0.00409 [-0.0005; 0.0087]	0.96*	0.00409 [-0.0006; 0.0087]	0.96*	0.00454 [-0.0002; 0.0094]	0.97*
CAP	-0.00212 [-0.0374; 0.0332]	0.55**	-0.00212 [-0.0380; 0.0336]	0.55**	-0.00272 [-0.0385; 0.0329]	0.56**
LGR	-0.00254 [-0.0049; -0.0001]	0.98**	-0.00257 [-0.0050; -0.0002]	0.98**	-0.00254 [-0.0049; -0.0001]	0.98**
LogSIZE	0.00020 [-0.0593; 0.0607]	0.50*	0.00300 [-0.0578; 0.0643]	0.54*	0.00159 [-0.0583; 0.0624]	0.52*
LIQ	0.00231 [-0.0035; 0.0081]	0.78*	0.00217 [-0.0037; 0.0080]	0.77*	0.00225 [-0.0035; 0.0081]	0.78*
RR	0.03849 [-0.0157; 0.0934]	0.92*	0.03595 [-0.0188; 0.0905]	0.90*	0.03620 [-0.0186; 0.0907]	0.90*
BFD	0.00401 [-0.0192; 0.0276]	0.63*	0.00526 [-0.0189; 0.0292]	0.66*	0.00514 [-0.0189; 0.0287]	0.67*
COVID19	-0.00691 [-0.0166; 0.0028]	0.92**	-0.00749 [-0.0173; 0.0023]	0.93**	-0.00714 [-0.0170; 0.0026]	0.93**
Y2010	—	—	-0.00244 [-0.0111; 0.0063]	0.71**	—	—
Y2015	—	—	-0.00500 [-0.0142; 0.0042]	0.86**	—	—
POCxY2010	—	—	—	—	-0.00273 [-0.0131; 0.0077]	0.70**
POCxY2015	—	—	—	—	-0.00453 [-0.0160; 0.0069]	0.78**
Cons	0.01485 [-0.1999; 0.2254]	0.56*	0.00526 [-0.2108; 0.2200]	0.52*	0.00968 [-0.2059; 0.2220]	0.54*
Var	0.00061 [0.0005; 0.0007]	—	0.00061 [0.0005; 0.0007]	—	0.00061 [0.0005; 0.0007]	—

THIS TABLE PRESENTS THE PARAMETER ESTIMATES RESULTS OF THREE MODELS. THE SAMPLE CONSISTS OF 38 COMMERCIAL BANKS IN VIETNAM FROM 2003 TO 2020. THE DEPENDENT VARIABLE IS NON-PERFORMING LOANS (NPL). THE MAIN INDEPENDENT VARIABLES ARE POLITICAL CONNECTIONS (POC) AND BANK FUNDING DIVERSITY (BFD). OTHER CONTROL VARIABLES ARE CAPITAL TO ASSETS RATIO (CAP), CREDIT GROWTH (LGR), BANK SIZE (LOG-SIZE), LIQUIDITY RATIO (LIQ), REQUIRED RESERVE RATIO (RR). NOTES: 95% CREDIBLE INTERVALS IN BRACKETS, * POSTERIOR PROBABILITY OF MEAN > 0, ** POSTERIOR PROBABILITY OF MEAN < 0.

The posterior simulation results show that the POC variable's mean coefficient is 0.004 in all three models, and the probability of positive influence of the POC on the NPLs is above 95%. This result suggests

robust evidence that politically connected banks have 0.4% NPLs higher than unconnected competitors. This result also implies that political connections will increase the risk-taking behavior of banks. Faccio *et al.* (2006) indicate that the higher NPLs of politically connected banks could own the notation they prefer lending to state-owned enterprises, which the government guarantees in the financial distress. Hu *et al.* (2004) state that commercial banks with higher political connections also have timely support from the central bank, relaxing credit policy to achieve higher business performance. Our findings are consistent with Lassoued *et al.* (2016); Hu *et al.* (2004); Rehman *et al.* (2016); Carretta *et al.* (2012), and Jasmine *et al.* (2020). However, our results are inconsistent with Jasmine *et al.* (2020) and Hung *et al.* (2017). Therefore, we accept hypothesis 2 that political connections affect banks' risk-taking behaviors.

Table 5 also reports the positive relationship between bank funding diversity and NPLs. We figure out that the mean coefficient of BFD ranges from 0.004 to 0.005 in all three models, and the probability of positive influence of the BFD on the NPLs is above 51%. Vo (2020) indicates that commercial banks with access to diversified funding sources tend to take more risk-taking activities. Acharya and Naqvi (2012) state that bank managers conduct aggressive lending activities to earn higher compensation when banks have higher funding diversity. Therefore, we accept hypothesis 1 that funding diversity can determine banks' risk-taking behaviors. In addition, our findings align with Vo (2020); Acharya and Naqvi (2012).

We report strong evidence of a negative impact of the Covid19 pandemic on NPLs of commercial banks in Vietnam. Table 5 recommends that commercial banks reduce from 0.6% to 0.7% NPLs during the pandemic period. Ari *et al.* (2020) show that the Covid19 does not lead to the credit boom as regulators have responded by relaxing regulatory requirements and deferring loan payments. Additionally, all Vietnamese firms affected by the Covid19 pandemic and meeting the conditions prescribed by the Vietnamese State Bank will be considered and supported by the commercial banks. As a result, Vietnamese commercial banks are more likely to reduce NPLs temporarily.

The estimations in Table 5 highlight some exciting results. Our findings indicate a negative relationship between the capital to asset ratio (CAP) and NPLs. The CAP's mean coefficient is -0.002, and CAP's negative probability of effect on NPLs is above 54%. The capital to asset ratio discourages the risk-taking behavior of commercial banks. Therefore, those banks with higher CAP tend to be more sensitive in operating, which eventually decreases non-performing loans. In addition, because of risk-taking behavior, banks tend to employ sustainable strategies to minimize risk. This finding aligns with Berger and DeYoung (1997) and Makri *et al.* (2014), but it is inconsistent with Ghosh (2015).

Credit growth (LGR) has a mean coefficient of -0.0025, and the relationship between LGR and NPLs is also negative. The probability of LGR's negative effect on NPLs is above 98%, so there is robust evidence for this relationship. This result suggests that the increase in LGR can reduce the risk-taking behavior of Vietnamese commercial banks. Our finding is consistent with Ozili (2015), while it is inconsistent with Espinoza and Prasad (2010); Vithessonthi (2016).

Bank size (LogSIZE) has a positive link with NPLs. A positive probability of effect is above 50%. There is ambiguous evidence of the connection between bank size and bad debt ratio. The paper results show that the larger banks are, the higher the risk-taking behavior of banks. Larger banks can reach out for more funding sources that lead to the aggressive lending policy, eventually increasing NPLs. Vuong and Nguyen (2021) indicate that larger banks expose to higher lower loan quality due to higher agency costs and information asymmetry. Laeven *et al.* (2016) also report that a growing bank size increases higher systemic. Unfortunately, our results are inconsistent with Lassoued *et al.* (2016) and Le *et al.* (2019).

LIQ's mean coefficient is positive, so the relationship between LIQ and NPLs is direct. The probability of LIQ's effect on NPLs is above 77%, indicating strong evidence of a positive impact of LIQ on NPLs. This result is consistent with Pop *et al.* (2018) because banks with higher liquidity encourage the financial intermediaries' role, increasing NPLs. Moreover, high liquidity banks tend to participate in riskier loan activities. However, our finding is inconsistent with Fungáčová and Poghosyan (2011); Lee and Hsieh (2013).

RR's mean coefficient is positive. The effect probability of RR is above 89%, so it shows robust evidence of the positive effect of RR on NPLs. The result indicates that the more the required reserve ratio, the higher the risk-taking behavior of banks. However, the required reserve ratio represents the minimum portion of liquid assets that banks must persevere to fulfill their liabilities. Therefore, it could be due to the

notion that a higher reserve ratio serves as a provision for commercial banks to provide loans to riskier customers. Our finding is in line with Rezina (2020), while it is inconsistent with Makri et al. (2014); Ghosh (2015).

3.5 The impact of the National Congress of the Communist Party of Vietnam on NPLs in Vietnam

Empirical results from Model 2 suggest that commercial banks tend to reduce the NPLs a year before the National Congress of the Communist Party of Vietnam. Model 2 reports that the mean coefficients of Y2010 and Y2015 are negative with an impact probability of over 70%. Our result argues that commercial banks diminish about 1% of NPLs in a year before the National Congress of the Communist Party of Vietnam. Noticeably, Pan and Tian (2017) state that after discharging corrupt bureaucrats, Chinese firms with political connections experience a significant decrease in investment. Moreover, Tao (2020) reports that the anti-corruption campaign has significantly reduced bank NPLs in China. However, our result reports that Vietnamese commercial banks reduce NPLs right before the National Congress of the Communist Party of Vietnam. This incident happened because some banks knew that their politically connected officers might be expelled after the National Congress.

Finally, Model 3 reports that the mean coefficients of the interaction variables between the POC and the period before the National Congress of the Communist Party of Vietnam (POC*Y2010 and POC*Y2015) are also statistically negative. They also have a negative probability of over 69%. Our finding indicates that bank managers of politically connected banks worsen NPLs by around 0.2% to 0.4% more than unconnected banks in a year before the recent two National Congresses of the Communist Party of Vietnam. Interestingly, the magnitude of NPLs reduction is higher for the most recent National Congress, implying the higher impacts of anti-corruption campaigns on the banking sectors. Therefore, politically connected bank managers improve the loan quality to secure their political position for the coming National Congress. In short, our findings from Model 2 and Model 3 are consistent with Pan and Tian (2017); Tao (2020).

CONCLUSIONS AND POLICY IMPLICATIONS

Although Vietnam is considered a frontier market, its role in the global financial market is rising gradually (Vo and Ellis, 2018), and it is soon to become an emerging market. Therefore, an increasing number of researchers examine the banking system and risk-taking behavior of commercial banks in Vietnam (Batten and Vo, 2016; Vo, 2020). While the current literature focuses on testing the impact of income, product, market diversification, bank funding diversity, it has been explored. In this research, we extend the study of Vo (2020) by examining the impact of funding diversity and political connections on non-performing loans (NPLs) of commercial banks in Vietnam. We also apply the Bayesian Regression approach to overcome the estimation issue for a small sample size. Our data includes 38 Vietnamese banks covering the period 2003–2020.

Our primary findings suggest a positive relationship between funding diversity and NPLs. Higher funding liquidity encourages commercial bank managers to engage in aggressive lending behaviors to earn higher compensation. Consequently, the NPLs increase accordingly. Our findings align with Acharya and Naqvi (2012); Vo (2020) on risk-taking behavior in banks. We also figured out that politically connected banks have higher NPLs than unconnected banks.

Moreover, we document the impacts of the anti-corruption campaign on reducing NPLs in commercial banks in general and specifically in politically connected banks. Our results suggest that the politically connected bank managers intentionally improve the loan quality to secure their political position in the Vietnamese Communist Party Congresses. Finally, we figure out that commercial banks have lower NPLs during the Covid19 pandemic due to credit relaxing and government support for the local economy. Thus, Vietnamese commercial banks temporarily have lower NPLs during the pandemic.

The paper has two relevant policy implications for Vietnam to maintain a stable banking system. First, the government and State Bank of Vietnam should monitor the funding sources of commercial banks as

higher funding diversity encourages commercial banks to have lower loan quality. Secondly, our study is inspired by the effectiveness of anti-corruption campaigns on reducing the NPLs in commercial banks, incredibly politically more connected banks. We propose that government perform higher supervisory functions and push up anti-corruption programs to improve the efficient financial markets and promote economic growth (Vo, 2020).

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