The Presence of Market Discipline: Evidence from Commercial Banking Sector

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Abstract The study selected the model with the lowest error outcomes utilizing modest observational data from 272 banks in the Asia–Pacific area from 2015 to 2019 and a large number of characteristics using the Lasso regression approach. The study reached the following outcomes: (i) The study reveals the presence of market discipline and its sensitivity to the bank's risks, particularly when enforcing Basel III capital standards. (ii) Our research reveals signs of a deterioration in market discipline under regulatory scrutiny, notably in emerging-market banks. (iii) Finally, the findings of the study, in particular, indicate the reasons why banks fail to report bank risks in compliance with the third pillar of the Basel III framework. When the Basel III framework is followed, depositors can expect higher interest rates or more market discipline towards risky banks. Our research has implications for bank supervisors, policymakers and bank managers.

Keywords Market discipline · Bank risk · Bank regulations · Lasso regression

1 Introduction

Economists and bank executives are becoming increasingly concerned about market forces and support increased participation of private agents (Flannery 2001). Market discipline in the banking industry can be defined as a situation in which private agents, such as depositors, creditors, and stockholders, incur rising costs as a result of banks' large-scale risk management efforts. Depositors can penalize higher-risk institutions by demanding higher interest rates or withdrawing their funds, according to research by Soledad et al. (2001). Because depositors are extremely risk averse, banks will be penalized by paying higher interest rates on deposits or attracting fewer

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deposits if they take on excessive risk. Depositors are acutely aware of the bank's hazards, potentially limiting the bank's excessive risk-taking. Market discipline is the third of the three pillars of the regulatory system, according to the Basel Committee on Banking Supervision. Market discipline is defined as a market-based push for banking-related risk transparency and disclosure, as well as regulatory procedures to promote market safety and soundness. As a result, several studies in both developed and developing nations have underlined the need of market discipline in limiting banking risk (Hamalainen et al. 2005; Nier and Baumann 2006).

The economic and business environment of emerging countries is quite different from that of developed countries (Hunjra et al. 2020). This leads to differences in sensitivity to the market environment. In addition, Asia–Pacific banks are facing strong competition, which has a negative effect on their risk taking. The principle "too—big—to—fail"[1] also applies to Asia–Pacific banks, mainly as they face poor regulation and supervision (Ahmad and Albaity 2019). For these reasons, the research has selected banks with large capital and adequate risk disclosure data in the Asia–Pacific region as a sample for research and comparison between the two groups. Based on our model, we examine the existence of depositors' discipline for disclosing bank risks and the impact of the Basel III framework on depositors' sensitivity. This shows the behavior of banks in delaying disclosure of risks when completing the safety framework as proposed by Basel.

This study contributes to the literature in a number of ways. *Firstly,* the market discipline literature is dominated by studies in developed economies in the US and Europe (Demirgüç-Kunt and Huizinga 2004; Distinguin et al. 2012; Hasan et al. 2013). Evidence of market discipline in the Asia–Pacific region is limited (Afzal et al. 2021). South Asia is an exception. Besides, there are also some studies in this area, but only conducted within one country, such as (Hadad et al. 2011) in Indonesia or (Le 2020) in Vietnam. In the Asia–Pacific region, 272 banks with large capital in Tier 1 will conduct our research. The study will add an overview of market discipline for this region, while comparing emerging and developed economies in terms of market discipline sensitivity in the study area. *Secondly,* compared with previous studies, our study focuses on four types of risks that the Basel regulatory framework requires to improve information disclosure, namely credit risk, market risk, operational risk and counterparty credit risk. From there, to explain the behavior of banks in delaying disclosure of risks when implementing the Basel framework. *Thirdly,* this study is the first attempt to assess market discipline under the new capital and liquidity regulations using the Lasso regression model as suggested by (Tibshirani 1996, 2011; Hastie et al. 2009, 2015). *Finally,* we find evidence of evidence for the presence of market discipline under the economic freedom index of countries. This is an important result that complements the theoretical and experimental evidence of sensitivity between the two factors compared with previous studies.

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[1] The "too big to fail" (TBTF) theory asserts that certain corporations, particularly financial institutions, are so large and so interconnected that their failure would be disastrous to the greater economic system, and that they therefore must be supported by governments when they face potential failure.

The remainder of this paper is structured as follows: Sect. 2 provides a literature review. Section 3 discusses the methods and data used. Section 4 discusses the findings while Sect. 5 concludes.

2 Literature Review

Market discipline is a self-regulating process in which participants assess a bank's risk tolerance and take appropriate steps to prevent them from engaging in excessive risk-taking activities (Balasubramnian and Cyree 2014). Since banks operate efficiently in a "market economy", risk regulation can be determined by market participants (BIS 2008). When investors face the prospect of loss, they will be more cautious about their investments. Many empirical studies have addressed the existence and effectiveness of market discipline. Many private agents can create market discipline as depositors, creditors, and equity holders. Some of the articles focus on the discipline of depositors. Soledad et al. (2001), for example, show that depositors withdraw their deposits or demand higher deposit rates from bad banks. Their study also revealed the presence of market discipline in Argentine, Chilean and Mexican banks, including for small, insured depositors. Ghosh and Das (2005), Hasan et al. (2013) and Karas et al. (2019) used and validated the idea that depositors are central to market discipline. The study will focus on the behavior of depositors when considering market discipline.

Research on market discipline from the perspective of depositors' behavior is divided into three groups. *Firstly,* studies are interested in the number of uninsured deposits (Karas et al. 2019; Khorassani 2000). *Secondly*, studies interested in the interest rates payable to depositors create market discipline for banks (Hadad et al. 2011; Le 2020 and Afzal et al. 2021). *Finally,* the group of studies used both the consideration of factors affecting the amount of uninsured deposits and the interest paid to depositors (Jordan 2000; Soledad et al. 2001; Ghosh and Das 2003; Ioannidou and Dreu 2011 and Demirgüç-Kunt and Huizinga 2004). *Overall,* these studies have demonstrated that in the presence of market discipline, uninsured deposits penalize riskier banks by withdrawing their funds and/or demanding higher deposit interest rates. In addition, these studies also showed the effect of increasing capital and meeting capital regulations that led to a weakening of market discipline.

However, these studies have the following gaps: (i) The bank risk measures used are mainly risks calculated from financial reporting metrics and not disclosed directly by banks, such as loan loss reserves over total assets, non-performing loans over total assets, the log of loan loss reserves over capital, the log of non-performing loans over capital, and the bank's Z-score. Within the scope of the reference, there is no research examining the impact of the group of risks that Basel III requires to be disclosed in the response process, including credit risk, market risk, operational risk and counterparty credit risk. Therefore, the study will focus on these risks, thereby explaining the risk disclosure behavior of banks in the process of implementing the new regulatory framework. (ii) These studies have shown that increasing capital and implementing

capital regulation under the Basel framework weakens market discipline, but they have not shown an increase in depositors' response to riskier banks. In particular, previous studies did not address the effect of meeting liquidity regulations under the Basel III. In addition, our research also shows that high economic freedom weakens market discipline. It is explained that countries with a higher index of economic freedom will create a better economic environment and increase economic growth, reduce financial crises, financial crises, etc. banking crisis (Ahmed and Ahmad 2020), thereby weakening market discipline. This is a macro variable that has not been mentioned in previous studies on market discipline.

3 Methodology

The study will use a lasso regression model, which is a selection procedure that performs both transformation and regularization selection to improve prediction accuracy and interpretability. It combines the least square method with a constraint on the sum of the absolute values of the coefficients (Tibshirani 1996, 2011; Hastie et al. 2009, 2015). Lasso can be useful in estimating regression coefficients and performing variable selection. This method is useful when demonstrating the presence of market discipline through a selection of factors. By using Lambda penalties to select a suitable model with minimal risk, the prediction accuracy will be increased compared to previous traditional models. In addition, it is suitable for factor analysis with many endogenous factors and big data.

Applications of the models take the following form:

$$\hat{\beta}^{lasso} = \arg\min_{\beta} \sum_{i=1}^{N} (MD_i - \beta_0 - \beta_1 CR_i - \beta_2 MR_i - \beta_3 OR_i - \beta_4 CCR_i - \beta_5 RDI_i$$
$$- \beta_6 CAR_i - \beta_7 LCR_i - \beta_8 LNTA_i - \beta_9 GDP_i - \beta_{10} INF_i - \beta_{11} ECO\_FREE_i$$
$$- \beta_{12} CAR(\geq 10.5)_i - \beta_{13} LCR(\geq 100_i)^2 + \lambda \sum_{J=1}^{13} |\beta_j| \qquad (1)$$

where β_0 an intercept; β_j the corresponding coefficient and $\hat{\beta}^{lasso}$ represents the vector of fitted regression coefficients on factors. λ is a positive weighting parameter on the L1 penalty, which encourages sparsity in the resulting set of fitted regression coefficients.

MD_i the i-*th* observation of the maket discipline variable. To investigate market discipline, numerous studies have provided several indicators of market discipline from the perspective of depositors, such as based on the uninsured debt (Nier and Baumann 2006), subordinated debt (Gropp et al. 2005 and Sironi 2005), interest rate (Demirgüç-Kunt and Huizing 2004 and Hadad et al. 2011). For the first measure, interbank deposits are not sufficiently representative of depositors, on the other hand,

the interbank deposit market is not very transparent for emerging countries. As for the second measure in our sample data, only about 50% of banks issue secondary debt and mainly large banks. Therefore, the study will use the third measure, *which is calculated by dividing the total interest expense by the total deposit.*

Bank risks including Credit risk (CR), Market risk (MR), operational risk (OR) and counterparty credit risk (CCR)[2] with the i-*th* observation. According to the provisions of the 3 pillars of the Basel framework, 4 types of risks need to be fully informed. Therefore, the study will mainly focus on these types of risks to discipline from depositors and *expects a positive sign among risks to market discipline* (Hadad et al. 2011; Le 2020 and Afzal et al. 2021).

Bank-*specific variables: RDI* is a revenue diversification index.[3] In theory, the combined cash flows from non-correlated revenue sources should be more stable than the individual sources (Stiroh and Rumble 2006). In contrast, Baele et al. (2007) and Williams and Rajaguru (2013) provide evidence that diversification decreases a bank's idiosyncratic risk. Therefore, depositors may have different responses to the diversification of the Bank's revenue. *CAR* (Capital Adequacy Ratio—Tier 1) is calculated by Tier 1 Capital, net of deductions, divided by Total Risk Weighted Assets, expressed as a %. *LCR* (The Liquidity Coverage Ratio) is calculated by The value of High Quality Liquid Assets divided by the total net cash outflows over the next 30 calendar days, expressed as a %. Research of Abbas et al. (2019) suggests that high-capitalized banks tend to have better access to financing sources with lower cost and risk and better access to higher quality asset markets than low capitalized banks. As a result, depositors will reduce their deposit interest rate requirements and increase deposits in capitalized and liquid banks as a result of (Ghosh and Das 2003 and Afzal et al. 2021). In contrast, banks will be holding more capital aside, they need to be more selective when they are allocating their resources to project financing. This can ultimately lead project financing to be more difficult to obtain from banks (Ozkan and Iqbal 2015). Thus, well-capitalized banks appear to have lower profitabiity (Goddard et al. 2013). In addition to those arguments, Baker and Wurgler (2015) demonstrated that higher capital requirements are also related to higher cost of bank equity. Therefore, depositors will demand a higher interest rate for banks with higher capital (Hadad et al. 2011). From the conflicting results of previous studies, we will examine the effect of these two variables on depositors' discipline. *LNTA,* the natural logarithm of total assets, is used to control for the effect

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[2] Credit risk (CR) is "the possibility that the bank borrower or counterparty will not meet its obligations under the agreed terms". Counterparty credit risk (CCR) that one party to a financial transaction will default. Market risk (MR) is "the risk of loss in on-balance sheet and off-balance sheet positions arising from fluctuations in market prices". Operational risk (OR) is "the risk of loss due to inadequate or failed internal processes, people and systems, or from external events". BIS (2008).

[3] Following the work of Stiroh and Rumble (2006), we calculate a revenue diversification index (RDI). The RDI is estimated as: $RDI = 1 - (SHNET^2 + SHNON^2)$; where SHNET is the share of net operating revenue from net interest sources, $SHNET = NET/(NET + NON)$ and NET is net interest income and NON is non - interest income; SHNON is the share of net operating revenue from non-interest sources, where $SHNON = NON/(NET + NON)$.

of bank size. Mixed results were found in some studies as a negative sign (Flannery and Sorescu 1996) or a positive sign (Hadad et al. 2011). *Therefore, we do not have any a priori indication on this variable.*

General macroeconomic conditions including gross domestic product growth rate *(GDP),* inflation rate *(INF)* and economic freedom index *(ECO_FREE)* were also used as control variables. Since studies conducted for Asia–Pacific countries differ in the characteristics and variability of the indicators, the specific expected signs for these variables are not clear.

Furthermore, other control variables are used: *CAR(≥10.5)* and *LCR (≥100)* are dummy variables—specifying the minimum capital adequacy requirement 10.5% and liquidity coverage ratio account greater than 100%. These are the two regulations on capital and liquidity according to the Basel III framework. The study does not consider two other important regulations, NFSR and LEV, because these are two new regulations, so the data provided by banks is lacking. The study expects a negative sign for these two variables to prove that the theory of regulatory discipline can replace market discipline. This result is also corroborated by previous studies such as Hadad et al. (2011), Le (2020).

4 Empirical Results and Diagnostic Test

4.1 Data

Our sample is a balanced panel that includes the financial data of the top 272 commercial banks in four developed countries (Australia, Hong Kong, Japan and New Zealand) and ten emerging countries (China, India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand and Vietnam) in the Asia–Pacific region. A developed market is a country that is most developed in terms of its economy and capital markets. The country must have a high income, but this also includes openness to foreign ownership, ease of capital movement, and the efficiency of the market institutions. An emerging market is a market that has some characteristics of a developed market but does not fully meet its standards (MSCI—Market Classification Framework[4]). We limited our sample to large banks due to the numerous differences associated with bank size and the ability to implement Basel III regulations. Furthermore, sufficient data is only available for large capital tier 1 banks. All financial items related to bank characteristics are primarily drawn from the link: https://www.Banker

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[4] MSCI—Morgan Stanley Capital International, is an American finance company headquartered in New York City and serves as a global provider of equity, fixed income, hedge fund stock market indexes, and multi-asset portfolio analysis tools. The MSCI Market Classification Framework was developed by MSCI, which aims to reflect the views and practices of the international investment community by striking a balance between a country's economic development and the accessibility of its market while preserving index stability.

database.com and the statements of various banks in annual financial reports (2015–2019). In addition, data on disclosed bank risks is applied according to calculation methods such as: credit risk, counterparty credit risk, market risk—Standardized approach (SA), operational risk—Basic indicator approach (BIA).

Table 1 presents the descriptive statistics for the raw variables and Table 2 reports the Pearson correlation coefficient during the study period. To ensure that these correlations will not lead to multicollinearity, we proceed with the variance inflation test (VIF). The VIFs of the variables are below 10 and the mean VIF of the model regression is below 2, indicating that multicollinearity is not a serious problem.[5]

4.2 Diagnostic Test

This study divides the dataset into two parts: using 80% for training and 20% for testing. The training split is used to fit the model (i.e. estimate the parameters of the model for a fixed set of tuning parameters). The test split is used to estimate the performance of the final chosen model.

Figure 1 shows the statistical pattern of models 1, 2, 3. In Table 3, there is a clear trend of increasing error levels when increasing the lambda penalty. Therefore, the statistical model eliminates the case of the "underfitting" model. In addition, statistical models can only choose one model with the lowest error level. This eliminates the case where the statistical model is said to be "overfitting"—there are many options for building models based on the dataset (Czum 2020).[6] Thus, this result is consistent and reliable. In order to get a good fit, we will stop at a point just before where the error starts increasing. At this point, the model is said to have good skills on both training and unseen testing datasets. Table 3 displays the models that were chosen.

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[5] Gujarati (2003) indicates the VIF cut-off is 10. If the calculated VIF is more than 10, it can be an indication of multicollinearity.
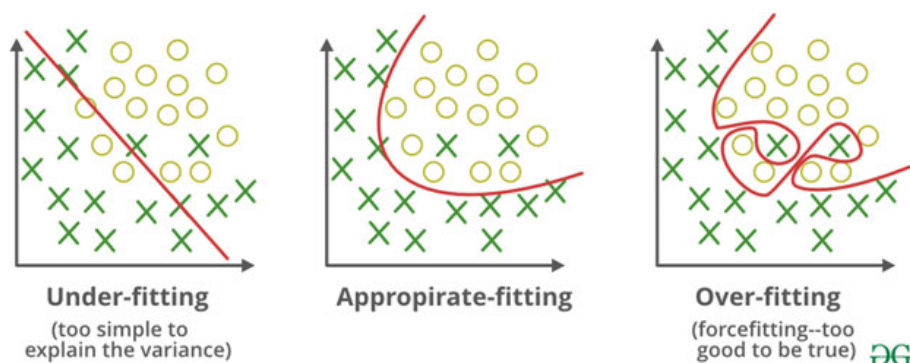
[6]

Under-fitting
(too simple to
explain the variance)

Appropirate-fitting

Over-fitting
(forcefitting--too
good to be true)

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Table 1 Descriptive statistics

Variables	Obs	Mean	Std. Dev	Min	Max
Panel A: Full sample (N = 1360 bank years)					
MD	1360	1.830	2.637	1.085	55.608
CR	1360	30.453	29.256	0.672	104.812
MR	1360	1.221	2.313	0.002	22.434
OR	1360	2.479	2.746	0.105	18.965
CCR	1360	0.126	0.571	7.605E-05	8.291
CAR	1360	12.896	4.267	6.1	75.4
LCR	1360	158.757	75.342	40	818.7
LNTA	1360	1.176	1.176	9.007	15.276
INF	1360	1.843	1.843	−0.922	8.639
GDP	1360	5.891	5.660	−21.595	30
ECO_FREE	1360	65.486	10.942	51.7	90.2
RDI	1360	0.338	0.136	−0.403	0.500
CAR($\geq$10.5)	1360	0.569	0.495	0	1
LCR($\geq$100)	1360	0.368	0.482	0	1
Panel B: Emerging and developed countries					
Emerging (N = 998 bank years)					
MD	998	2.286	2.818	1.085	55.608
CR	998	36.029	29.457	0.672	104.812
MR	998	1.464	2.586	0.002	22.434
OR	998	2.932	2.883	0.441	18.965
CCR	998	0.097	0.565	7.605E-05	8.291
CAR	998	12.581	4.563	6.1	75.4
LCR	998	159.154	77.257	40	818.7
LNTA	998	11.046	1.174	9.007	15.276
INF	998	2.544	1.848	−0.922	6.499
GDP	998	7.633	5.693	0.522	30
ECO_FREE	998	61.105	8.857	51.7	89.4
RDI	998	0.330	0.145	−0.403	0.500
CAR($\geq$10.5)	998	0.577	0.494	1	0
LCR($\geq$100)	998	0.425	0.495	1	0
Developed (N = 362 bank years)					
MD	362	1.926	2.109	0	15.116
CR	362	36.79	17.025	6.52	72.465
MR	362	1.141	1.085	0.086	5.055
OR	362	3.474	1.689	0.105	6.124

Table 1 (continued)

Variables	Obs	Mean	Std. Dev	Min	Max
CCR	362	0.706	0.927	0.002	3.493
CAR	362	14.38	2.894	10.4	23
LCR	362	153.859	66.995	96.9	607.9
LNTA	362	12.287	1.338	10.443	14.946
INF	362	1.963	1.513	−0.55	3.735
GDP	362	1.864	1.415	−1.249	3.791
ECO_FREE	362	82.833	6.473	69.6	90.2
RDI	362	0.371	0.11	0.085	0.499
CAR($\geq$10.5)	362	0.987	0.116	1	0
LCR($\geq$100)	362	0.987	0.115	1	0

Note This table presents the correlations between the variables included in this study. The dependent variable is Market discipline (MD). The bank risk variables include: Credit risk (CR), Market risk (MR), Operational risk (OR), Counterparty credit risk (CCR). The bank—specific variables include: Capital Adequacy Ratio (CAR), Liquidity Coverage Ratio (LCR), the natural logarithm of total assets (LNTA), Revenue diversification index (RDI). Control variables for general macroeconomic conditions include: Gross domestic product growth rate (GDP), Inflation rate (IMF), Economic freedom index (ECO_FREE.) The bank regulation variables are CAR($\geq$10.5), LCR($\geq$100)

Source Authors' own estimation

4.3 Empirical Result

The study examines the presence of market discipline in the Asia–Pacific region using Lasso regression. We use 3 models to test our hypotheses. After meeting the requirements for the diagnostic test and performing the selection of Lamdba fines, the study selected 3 models with the lowest error level and the regression results are reported in Table 3. In addition, Fig. 2 shows the impact of disclosed banking risks on market discipline by country group.

Presence *of market discipline, its sensitivity to risks through capital and liquidity regulations under the Basel III Framework.*

The positive and significant signals of MR and OR suggest the presence of market discipline under the influence of disclosed banking risks (Fig. 2). According to Cheng et al. (2018), operational risk increases cost inefficiencies while decreasing economic efficiency. According to Ekinci (2016), the bigger the market risk, the larger the volatility of the bank's stock returns. Depositors want a greater rate of interest than banks with larger market and operational risk, which explains why. CCR, on the other hand, has a large negative impact on depositor interest rates. When the counterparty's credit risk is significant, depositors will accept a low deposit rate. Because, according to Groups (2013), this risk indicates that banks are adjusting credit prices. Even when we employ two dummy variables to indicate capital and liquidity rules in accordance

Table 2 Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1.000													
2	0.298*	1.000												
3	0.254*	0.472*	1.000											
4	0.317*	0.733*	0.468*	1.000										
5	−0.031	0.136*	0.173*	0.097*	1.000									
6	0.011	0.012	0.149*	0.201*	0.063*	1.000								
7	0.071	−0.107*	−0.051	−0.033	−0.093*	0.213*	1.000							
8	−0.054*	0.057	−0.055*	0.026	0.274*	−0.136*	−0.206*	1.000						
9	0.201	0.346*	0.232*	0.248*	0.037	−0.094*	−0.040	−0.077*	1.000					
10	−0.008	0.277*	0.147*	0.096*	0.039	−0.244*	−0.103*	−0.090*	0.629*	1.000				
11	−0.222*	0.019	0.019	−0.040	0.189*	0.222*	−0.106*	0.126*	0.056*	−0.104*	1.000			
12	−0.033	0.129*	0.215*	0.142*	0.079*	0.082*	−0.054	0.244*	0.125*	0.110*	0.199*	1.000		
13	0.127*	0.339*	0.270*	0.393*	0.159*	0.460*	0.095*	0.097*	0.101*	−0.032*	0.292*	0.146*	1.000	
14	0.207*	0.386*	0.180*	0.377*	0.202*	−0.027	0.238*	0.309*	0.216*	0.118*	0.036	0.078*	0.258*	1.000

(continued)

Table 2 (continued)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
VIF		2.27	1.33	2.81	1.22	1.57	1.23	1.43	1.87	2.18	1.39	1.25	1.5	1.14
1/VIF		0.44	0.752	0.355	0.818	0.638	0.813	0.7	0.535	0.459	0.72	0.8	0.665	0.878
Mean VIF													**1.63**	

Note: *significant at 5% level

This table presents the correlations between the variables included in this study. The dependent variable is Market discipline (MD). The bank risk variables include: Credit risk (CR), Market risk (MR), Operational risk (OR), Counterparty credit risk (CCR). The bank—specific variables include: Capital Adequacy Ratio (CAR), Liquidity Coverage Ratio (LCR), the natural logarithm of total assets (LNTA), Revenue diversification index (RDI). Control variables for general macroeconomic conditions include: Gross domestic product growth rate (GDP), Inflation rate (IMF), Economic freedom index (ECO_FREE.) The bank regulation variables are CAR($\geq$10.5), LCR($\geq$100)

1: MD, 2:CR, 3:MR, 4:OR, 5:CCR, 6:CAR, 7: LCR, 8: LNTA, 9:INF, 10:GDP, 11:ECO_FREE, 12: RDI, 13: CAR($\geq$10.5), 14: LCR($\geq$100)

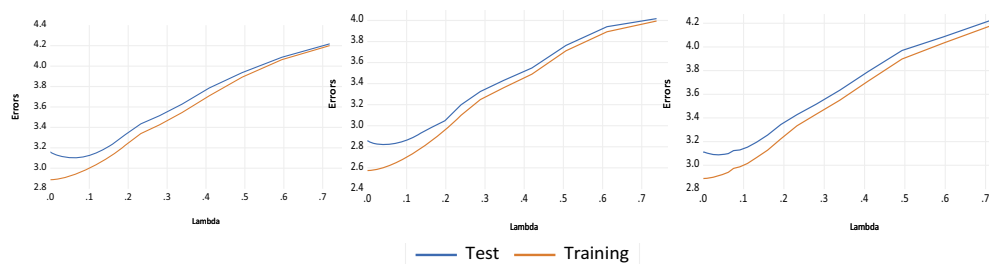*Source* Authors' own estimation

Fig. 1 Training/ Test error evolution

with Basel III, as illustrated in models 2 and 3, the outcome remains constant. The findings also revealed that, according to (Le 2020), credit risk had essentially no effect on depositor discipline.

When capital needs are taken into account, Model 1 shows how the impact of banking risks on market discipline increases. The study also discovered that the CAR ($\geq$10.5) and MD variables had the opposite effect, but that the LCR ($\geq$100) variable had no effect on MD, utilizing these two models. Depositors are more confident in a bank's safety when it fulfills the Basel 3 framework's minimum capital requirement of more than 10.5 percent. As a result, they will accept lower interest rates, weakening market discipline. This finding supports the concept that regulatory discipline can take the place of market discipline, as well as earlier research (Hadad et al. 2011; Le 2020; Afzal et al. 2021).

When it comes to capital requirements, the above statistics are similar for rising economies (model 5). Depositors are more interested in and respond strongly to the risks revealed by banks under Basel III when banks build capital to execute capital requirements. When enforcing liquidity limits, these institutions, on the other hand, clearly demonstrate market discipline. Model 6 indicates that if banks fail to achieve the Basel 3 liquidity criteria, depositors will demand higher deposit rates. This finding is in line with Abbas et al. (2019).'s study, which advocates for banks to comply with Basel III requirements.

Market discipline—the difference between emerging and developed economies.

When banking regulations are not taken into account, Models 4 and 7 illustrate the impact of factors on market discipline in emerging and developed countries, respectively. When these two models are compared, the regression results for credit risk are the opposite (Fig. 2). Depositors, in particular, expect a higher interest rate when credit risk for emerging countries is higher, according to Hadad et al. (2011). Depositors in industrialized countries, on the other hand, display credit risk-talking behavior, which is consistent with Ioannidou and Dreu's findings (2011). Because credit risk is so tightly linked to an investment's prospective return, the yields on bonds have a high correlation with their perceived credit risk, according to CFA Study Preparation research (2021).

When banks in emerging economies have smaller capital, a lower liquidity coverage ratio, and a larger revenue diversification rate, some disparities between the two sets of countries, such as market discipline, will be more obvious. The data,

Table 3 The result of lasso regression

Dependent variable	MD						
Independent variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Lambda at minimum error	0.051167	0.03548	0.06235	0.03645	0.03645	0.03645	0.09566
CR	0.000000	0.000000	0.000000	0.003859	0.003909	0.003741	−0.019599
MR	0.043550	0.049642	0.040031	0.019368	0.023217	0.019739	0.190726
OR	0.028559	0.032555	0.028571	0.000000	0.000000	0.000000	0.000541
CCR	−0.037183	−0.044407	−0.028691	0.000000	0.000000	0.000000	0.000000
CAR	0.000000	−0.001762	0.000000	−0.005590	−0.000966	−0.005334	0.007126
LCR	0.000000	−4.47E-05	0.000000	−0.000638	−0.000525	−0.000545	7.38E-06
LNTA	−0.250899	−0.262748	−0.247064	−0.370436	−0.364735	−0.370563	0.251718
INF	0.257402	0.279026	0.241537	0.362183	0.359766	0.362205	−0.071425
GDP	−0.131378	−0.141118	−0.126534	−0.170766	−0.171516	−0.171218	−0.028715
ECO_FREE	−0.057198	−0.057187	−0.056215	−0.054699	−0.053095	−0.054386	−0.018435
RDI	0.000868	0.200936	0.000000	1.360157	1.374628	1.355407	−11.72658
CAR(≥10.5)		−0.119790			−0.141985		
LCR(≤100%)			0.000000			−0.114291	
N	1360	1360	1360	998	998	998	362

Notes This table presents the correlations between the variables included in this study. The dependent
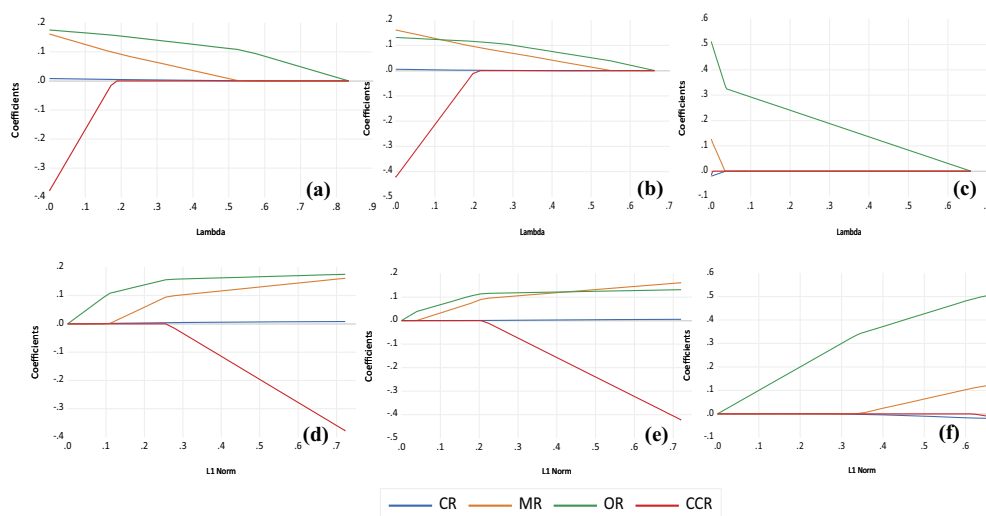
Fig. 2 Coefficient estimates for Lasso regression versus Lambda (fig a, b, c), L1 Norm (fig d, e, f)[7]

on the other hand, corroborate the "too-big-to-fail" theory in industrialized countries. Depositors will be more concerned and demand a higher interest rate from banks with higher capital, liquidity coverage ratios, bank size, and less diversified revenue, resulting in more market discipline.

Finally, the analysis reveals that countries with a low economic freedom rating have better market discipline. This is true regardless of whether or not laws within the Basel framework are considered, as well as for groups of developed and emerging countries.

5   Conclusion

We uncover evidence of market discipline using a balanced panel of 272 commercial banks since higher deposit rates are linked to bank risks such as credit risk, risk market risk, operational risk, and counterparty credit risk (these are the types of risks that Basel III requires banks to disclose). In addition, deposit rates and capital and liquidity regulations have an inverse connection, according to our findings. This is in line with high CAR and LCR signals, which lower the likelihood of a bank collapsing, resulting in a weakening of market discipline. Our research uncovers indications of a weakening of market discipline under regulatory oversight, particularly in banks from emerging nations.

The following are some of the significant results of our findings: (i) Assist regulators in developing strategies to manage banks' risk and achieve Basel III liquidity and capital requirements. Market discipline has become less effective, and banking

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[7] Fig a, Fig d (Full sample); Fig b, Fig e (emerging countries) and Fig c, Fig f (developed countries).

authorities must compensate by expanding their supervisory powers. (ii) In particular, the study's findings reveal the reasons why banks fail to disclose bank risks in accordance with the Basel III framework's third pillar. Depositors expect higher interest rates or increased market discipline towards riskier banks when the Basel III framework is followed.

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