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Credit Risk and Operational Risk on Financial Performance of Banks in South Asian Countries: A Partial Least Squared Structural Equation Model (PLS SEM) Approach

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Article info	Abstract
Received: 30 November, 2023 Accepted: 20 December, 2023 Published: 30 December, 2023 *Corresponding author:  nurnabicu@gmail.com 	The main purpose of the study is to assess the effect of credit and operational risk on the financial performance of the South Asian countries' commercial banks in the context of the structural equation model (SEM). As it is an explanatory study, the partial least-squares structural equation modeling (PLS-SEM) method was used to explore how operational risk and credit risk affect banks' profits in a South Asian country. The study used a sample of 20 commercial banks from four countries in South Asia. A five-year data set from 2018 to 2022 was used for the study. The study found that a significant positive relationship exists between credit risk and the profitability of South Asian countries' commercial banks. It is further explored an insignificant negative relationship between operational risk and profitability. Results also found an insignificant negative relationship between bank-specific variables and profitability. In addition, a significant but negative relationship between bank-specific variables and operational risk is found. Lastly, a significant positive relationship exists between bank-specific variables and credit risk. It is anticipated that the results of the study will be beneficial to the banking sector as well as the investor community. Keywords: Credit risk, operational risk, financial performance, South Asian, PLS-SEM.

Introduction

Banks, like other institutions, are established to maximize their shareholders' wealth. Wealth is determined by risk and return. Banks confront several hazards when conducting business. Profitability is influenced by how well these risks are understood and handled. If one wants a better rate of return in financial markets or many commercial endeavors, one must accept a higher level of risk. Banks are also in the risk-taking industry. Banks confront a variety of financial risks while providing various services to their clients, including market risk, credit risk, and operational risk (Young, 2001).

When compared to the other types of banking risk, credit risk is by far the most significant., (Hussain & Al-Ajmi, 2012). Credit risk is the risk of loss that can be incurred as a consequence of a debtor's inability to repay a loan or other line of credit (either the principal amount or the interest (coupon) amount, or both) (Campbell & Hamao, 1993). Credit risk management is extremely important for financial institutions like banks because it is a fundamental part of

the credit process (Musyoki & Kadubo, 2012). It maximizes bank risk and adjusted risk rate of return by maintaining credit risk exposure to shield the bank from the adverse effects of credit risk. The modeling of credit risk management has received a significant investment from banks (Musyoki & Kadubo, 2012).

On the other hand, operational risk is defined as financial loss to a firm as a result of faulty or inadequate business operations, which may be caused by external sources. The disruption of business operations, the failure of internal controls, the commission of illegal acts, or the occurrence of unanticipated external events are all examples of operational risks (Lyambiko, 2015). Two distinct types of losses can be categorized as operational risk: expected losses and unexpected losses. Even though operational risk has been around for a while, there is unequivocal evidence to suggest that it is significant and possibly growing (Lyambiko, 2015). Before this time, operational risk was overlooked and seen as a mere residual risk, that is, a sort of risk that lies outside the scope of market and credit concerns. It is impossible to overstate how important it is to

properly manage operational risks. Uncertain financial results can be the result of insufficient management of operational risk (Fadun & Oye, 2020).

The current worldwide financial crisis is proof that the way financial institutions handle risk is inadequate. The highly competitive banking industry suffers as a result, (Hosna, Manzura, & Juanjuan, 2009). Therefore, with good operational risk management, investment claims will go down, decisions will be better, customer and employee satisfaction will go up, and regulatory compliance will improve. Also, credit creation is an important part of managing operational risk. Credit risk is one of the risks that banks face, and it has a big effect on how well they do financially because a lot of their money comes from loans on which they charge interest (Gadzo, Kportorgbi, & Gatsi, 2019).

Effective risk management assists banks in identifying all of the risks to which they are exposed, even those for which they lack the necessary skills or experience. As a result, they are better equipped to put frameworks in place to decrease such risks and the related consequences if they materialize, making them less sensitive to systemic issues. Therefore, to improve the bank's financial performance, it needs to manage both credit and operational risk systematically. Becoming aware of how important it is to manage credit risk and operational risk as part of a complete strategy for risk management.

Fadun & Oye (2020) and Lyambiko (2015) indicated that operational risk affects how well a bank does financially. Hosna et al. (2009) and Hussain & Al-Ajmi (2012) indicated that credit risk affects banks' profitability as well as financial performance. The bulk of the existing research has taken a different method, but there is a lack of previous studies about the credit risk and operational risk by using a partial least squares structural equation model. Though Gadzo et al. (2019) worked with both credit risk and operational risk on financial performance, their study covers only one country named Ghana. Despite different contexts used regarding the issues in some previous studies, studies considering Bangladeshi and South Asian countries' commercial banks are limited. Therefore, the goal of this study is to find out how credit risk and operational risk affect the financial performance of banks in South Asian countries using the Partial Least Squares Structural Equation Model. This model uses control variables that are specific to each bank to confirm the link between credit risk, operational risk, and the financial performance of banks in South Asian countries.

Literature Review

Credit risk and operational risk affect the financial sector's ability to stay in business and compete, especially in terms of their financial performance. This study looks at how credit risk and operational risk affect the way banks in South Asian countries handle their money. This study tries to build a research model by looking at the problems that other studies have found.

Theoretical Postulates

In the study, information asymmetry is discussed. In 1970, Akerlof came up with a theory called the "lemon theory." Information asymmetry is one of the parts of the lemon theory. When one side of an economic transaction has more or better information than the other side, this is called "information asymmetry." When a project is being financed, there is sometimes an information gap when one party has more information than the other. Investors have a lot of trouble with it. As the person in charge of converting assets into cash, the bank needs more information about the client while the assets are being sent to it. Becoming aware of how credit risk management and operational risk management fit together to make a full plan for managing risk. Based on what the study has

talked about so far, the lemon hypothesis says that a bad credit reporting service will lead to a lack of information between the regulator and universal banks, as well as between the banks' customers and management (Akerlof, 1970). Banks have a hard time telling the difference between good and bad borrowers, which can lead to problems with selection and moral hazard. According to Bofondi & Gobbi (2003), a bad choice of borrower and a lack of information lead to more credit risk and operational risk. When credit risk and operational risk go up or down, they affect the financial performance of a bank.

Framework and development of hypothesis

Zou & Li (2014) looked at the link between managing credit risk and making money for commercial banks in Europe. Return on equity (ROE) and return on assets (ROA) were used in this study to measure profitability, and non-performing loan ratio (NPLR) and capital adequacy ratio (CAR) were used to measure credit risk. The data showed that the relationship between credit risk and commercial bank profits is a good one.

But NPLR and CAR, two credit risk management proxies, had a big impact on both ROA and ROE, while CAR had a small impact on both. Though PLS-SEM is not used by Zou & Li (2014), which uses path analysis, that's why it is not possible for the author to check credit risk against latent variables. Ali, Dhiman, & Research (2019) investigated how credit risk management affects how well India's public sector commercial banks make money. The study's results show that credit risk management indicators have a big effect on how well certain public sector banks in India perform financially. The research shows that ROA (profitability) is related positively to CAR, management quality, and the ability to make money, and negatively to AQ and liquidity.

Cheng, Nsiah, Ofori, & Ayisi (2020) looked at how credit risk, operational risk, and liquidity risk affect the company's ability to make money. The smart PLS-SEM method was used to find out how the dependent variable was affected by the independent variables. The results showed that credit risk (measured by the non-performing loan ratio, the capital adequacy ratio, and the cost per loan) is strongly linked to bank profitability (ROA, ROE, NIM). A study examined the effect of credit risk management on performance in Nigeria (Nwude, Okeke, & Issues, 2018). Results show that credit risk management had a favorable and significant influence on deposit money banks' total loans and advances, return on assets, and return on equity. There is also a favorable association between credit risk and profitability (Kolapo et al., 2012).

Ekinci & Poyraz (2019) looked at how credit risk affected the way Turkey's deposit banks performed financially. The study is based on data from other sources. The information came from the annual reports of 26 commercial banks (2005-2017). Non-performing loan ratio (NPLR) was used as credit risk, and return on assets (ROA) and return on equity (ROE) were used as bank profitability to figure out the relationship between credit risk and bank profitability. The results showed that bank profits were linked to CR in a bad way. Further, a study looked at how credit risk affected the way universal banks in Ghana did financially (Gadzo et al., 2019). The result also showed that profitability and CR are not related in a good way.

Noor & ACMA (2019) looked at how credit risk management affected Bangladesh's financial performance over 17 years by using data from 10 commercial banks (2000-2016). The information came from the bank's annual reports, and the t-test, correlation, and multiple regression analyses were used to look at it. Non-performing loan (NPL), credit adequacy ratio (CAR), and advance deposit ratio (ADR) are all measures of credit risk management (CRM). Return on assets (ROA) is a measure of how well a bank is doing financially. The empirical results show that both

NPL and ADR have a negative and moderately significant effect on ROA, but NPL's effect is bigger than ADR's. Also, the study found that CAR has a positive effect on ROA, but this effect is not statistically significant.

From the above literature review, the following hypothesis was constructed to guide the investigation.

Hypothesis 1: Credit risk positively influences the profitability of the banks in South Asian countries.

Nigerian commercial banks were used as a case study to look at how operational risk management affects financial performance. A linear multiple regression model was used to look at the data. The results showed that operational risk management and how well a bank does financially are linked in a good way (Fadun & Oye, 2020). Research was conducted by Falihi, Kasim, & Yaseen (2022) to investigate how operational risk management affected the financial performance of Iraqi commercial banks. The study used SmartPLS to process the data. The empirical results show that operational risk management is strongly linked to financial success in a good way.

In another study, Chen et al. (2009) examined how capital structure and operational risk affect the profitability of Taiwan's life insurance industry. A partial least squares structural equation model was used to do the study. In this study, leverage and portfolio concentration were used to stand in for operational risk, and profit margin and return on assets were used to stand in for profitability. The results showed that there was a strong and negative link between operational risk and profit.

A study investigated how credit risk, operational risk, and liquidity risk affect a company's ability to make money (Cheng et al., 2020). Smart PLS-SEM was used to find out what effect the independent factors had on the dependent variable. The results showed that operational risk, which includes portfolio concentration, bank leverage, lawsuits, and key director resignations, was linked to a bank's loss of money (ROA, ROE, NIM).

Muriithi et al. (2017) looked into how credit risk, operational risk, and liquidity risk affect a business's ability to make money. Smart PLS-SEM was used to find out how the dependent variable was affected by the independent factors. Operational risk, which includes portfolio concentration, bank leverage, lawsuits, and key director resignations, was found to have a negative relationship with bank profitability (ROA, ROE, NIM). Consequently, the next hypothesis was developed.

Hypothesis 2: Operational risk negatively influences the profitability of banks in South Asian countries.

A previous study focused on how credit risk and operational risk affect the financial health of universal banks in Ghana (Gadzo et al., 2019). The analysis was based on secondary data from 27 universal banks' annual reports (2007-2016). A partial least squares structural equation model was used to do the study. Four hidden factors were used to decide what happened. Some of the things that were looked at were the bank's performance, its credit risk, its operational risk, and its own characteristics. ROAE and NIM were used as stand-ins for how well a bank was doing. The NPLR and CAR were used to measure credit risk, bank leverage, and portfolio concentration were used to measure operational risk. As a stand-in for bank-specific factors, the liquidity ratio, the equity ratio, the cost to net income ratio, and the asset quality were used. The results showed that bank-specific factors had a positive and large effect on credit risk, operational risk, and the financial performance of the bank.

Recently, a research was conducted by Cheng et al., (2020) to find out how credit risk, operational risk, and liquidity risk affect how much money a bank makes. From 2012 to 2018, banks that were

listed on the Johannesburg Stock Exchange (JSE) were used in the study. Smart PLS-SEM was used to find out what effect the dependent variable had on the other factors. The relationship between bank-specific risk (asset quality, firm size, and equity ratio) and credit risk, operational risk, liquidity risk, and profitability was found to be strong and positive. The third, fourth, and fifth hypotheses were established against this backdrop.

Hypothesis 3: Bank specific variables positively influence the profitability of banks in South Asian countries.

Hypothesis 4: Bank specific variables positively influence the operational risk of banks in South Asian countries.

Hypothesis 5: Bank specific variables positively influence the credit risk of banks in South Asian countries.

Variable indicators employed in the research

Credit risk is the chance that a lender will lose money because a borrower won't pay back a loan or meet other obligations. The Basel Accord ties the amount of minimum regulatory capital that banks need to how much risk they are exposed to. This means that there is a link between how much risk a bank is exposed to and how much minimum capital it needs, (Zou & Li, 2014). Credit risk is the chance of losing money if a borrower doesn't pay back a loan or meet other obligations. The Basel Accord ties the amount of minimum regulatory capital a bank needs to the amount of risk it faces. This suggests that there is a link between the amount of risk a bank faces and the amount of minimum capital it needs. In light of this, Brewer III et al., (2006), considered the non-performing loan ratio (NPLR) to be an important economic measure of credit risk. According to (Boudriga et al., (2009), the capital adequacy ratio (CAR) seems to reduce the number of bad loans, which suggests that a higher CAR means less credit risk. Lastly, the capital adequacy ratio (CAR) and the non-performing loan ratio (NPLR) were chosen as credit risk indicators because of how they work and how often they have been used in past studies. The capital adequacy ratio is a way to figure out how much a bank has in capital compared to how much credit risk it has. Basel rules made it possible because it is a key part of managing credit risk.

Operational risk is the risk of direct and indirect loss caused by inefficient internal processes, people, and systems as well as outside events (OR). According to the Basel II agreement, the operational risk management systems and practices of financial institutions can use the basic indicator approach, the standardized approach, or an alternative standardized approach that is available to entities that can show that using this measure leads to a better and improved operational risk charge. Based on these assumptions of Chen et al., (2009), Gadzo et al., (2019), Cheng et al., (2020), used bank leverage (BL) and portfolio concentration as a measure of operational risk. The argument is that a company's well-planned activities will lead to a rise in reserves, which will show up on the high side of shareholders' equity in the end. They looked at the effect of regulatory oversight on operational risk and found a positive link between portfolio concentration and regulatory oversight (Chen et al., 2009). Profitability is a way to figure out how well a bank is doing. Banks make money when they make or create more money than they spend.

The study looked at two ways to measure profitability: net interest margin (NIM) and return on equity (ROE). Net interest margin is the difference between what the bank pays savers and what it gets from lending money. Because of this, NIM focuses on the normal lending and borrowing activities of the bank, (Chen et al., 2009). Net interest margin is another name for the difference between how much interest banks make from loans and how much they pay out

in interest to depositors. This is measured against the average amount of assets that bring in interest. The net interest margin (NIM) shows how much money a bank makes from its main business, based on its average earning assets. Higher NIM makes banks more likely to give out more loans, which raises the levels of credit and operational risk management. Some studies that have used NIM as a way to measure how profitable something is are (Cheng et al., (2020); Gadzo et al., (2019); Noman et al., (2015); Chen et al., (2009)). Return on equity is the second profitability metric used in this analysis (ROE). Total equity is the capital given by the bank's shareholders, whereas net income is the net revenue after taxes. This metric is useful for determining managerial efficiency and a bank's financial success. It demonstrates how capable management uses shareholders' equity to achieve net profit. Net interest margin is calculated through net profit divided by total equity (Masood & Ashraf, 2012). Gatsi et al., (2016), went on to say that return on equity is the most important indicator of a company's financial health and growth potential. NIM is the rate of return on equity, or how much each cedi invested in the bank earns back as a percentage.

Literature has shown that bank-specific factors such as liquidity ratio (LR), equity ratio (ER) and cost to net income ratio (CTIR) are beneficial as controlling variables when conducting study on credit risk and operational risk together. The cost-to-income ratio is linked to operational risk and may have a mixed effect on profitability, according to (Zou & Li, 2014). According to Zou & Li, (2014), businesses with higher operational expense ratios may spend a lot more of their revenue. This shows that there is a connection between a business's costs and its income and its ability to make money. On the other hand, firms with a high operational expense ratio may not have a lot of retained earnings, which means that profitability may depend on how the business is run. Masood & Ashraf (2012), said that liquidity, equity to asset ratio, loan loss ratio, cost of income ratio, deposits structure, assets structure, and spending item are statistically important factors that can be used as controlling variables in bank research. Chen et al., (2009), looked at the relationship between performance and internal bank characteristics using a number of bank ratios, such as money source management, equity to asset ratio, loan loss ratio, and cost of income ratio. They found that these ratios had a positive effect on the profitability of banks. The study chooses the bank observed variables for each latent variable based on what has already been found. But because the banking sector is always changing, the market conditions are changing for sure. This study adds the characteristics of the bank as a latent variable into the model as a control variable to avoid getting wrong results from the research model.

Methodology

Population of the research

Research population is the entire group of attention which a scholar desires to study. In this study South Asian countries all commercial banks are the research population.

Sample size

Sample size is the proportion of the research population that are taking part in the study. The study used the sample size of 20 commercial banks from four countries in South Asia. The country name and the banks selected from the country are given below:

Table 1. Country and Bank name

Country name	Bank name
Bangladesh	1. Brac Bank Ltd.
	2. Dutch Bangla Bank Ltd.
	3. Janata Bank Ltd.
	4. Prime Bank Ltd.

	5. Sonali Bank Ltd.
India	1. HDFC Bank Ltd.
	2. Bank of Panjab Ltd.
	3. Axis Bank Ltd.
	4. Bank of India Ltd.
	5. Bank of Maharastra Ltd.
Pakistan	1. Allied Bank Ltd
	2. Habib Bank Ltd.
	3. MCB Bank Ltd.
	4. JS Bank Ltd.
	5. Soneri Bank Ltd.
Sri Lanka	1. Ceylon Bank PLC.
	2. Union Bank PLC.
	3. Hatton National Bank PLC.
	4. DFCC Bank PLC.
	5. Nations Trust Bank PLC.

Source: study data

Sampling method

Purposive sampling method is applied in this study. This sampling method, which is also called "judgment sampling," relies on the researcher's judgement to find and choose the people, situations, or events that will give the most useful information to meet the goals of the study. The study tried to considered all the commercial banks of the four South Asian countries. However, it is used the data of 20 commercial banks of the mentioned four countries purposively.

Data collection

This study is based on secondary data. For empirical analysis, information is taken from the annual reports of 20 banks in four South Asian countries. The data for this study were collected over a five-year span, from 2016 to 2020.

Variables of the study

Latent variables are used to figure out what the data mean for this empirical study. Four hidden factors were used in this study. The credit risk, the operational risk, the profitability, and the moderating variables are the latent variables. Two variables are used to measure credit risk: the non-performing loan ratio (NPLR) and the capital adequacy ratio (CAR). Two variables are also used to measure operational risk: bank leverage (BL) and portfolio concentration (PC). Two variables are used to measure profitability: net interest margin (NIM) and return on equity (ROE). Three variables are used to measure the moderating variable: the liquidity ratio (LR), the equity ratio (ER), and the cost to net income ratio (CTIR). Table 2 shows the formulas for the latent variables and their observed variables.

Table 2. Variables description

Latent Variables	Observed variables	Formula
Credit Risk	Non-performing loan ratio	Non-performing loan/Total loan
	Capital adequacy ratio	Bank capital and reserve/Total asset
Operational Risk	Bank leverage	The reserve/Shareholder equity
	Portfolio concentration	Investment of ki/Total investment (ki = Common stock, bond, mortgage loan, real estate, preferred stock)

Profitability	Net interest margin	The profit before tax/Total revenue
	Return on equity	The net income/Total equity
Moderating Variables	Liquidity ratio	Liquid fund/Total interest-bearing liabilities
	Equity ratio	Total equity/Total asset
	Cost to net income ratio	Non-interest operating expenses/Operating income

Model of theory

Three endogenous latent variables and one exogenous latent variable are added to the theoretical model. There are three endogenous latent variables. They are operational risk, credit risk, and profitability. As stand-ins for operational risk, bank leverage (BL) and portfolio concentration (PC) are used. Credit risk is measured by the capital adequacy ratio (CAR) and the non-performing loan ratio (NPLR). Return on equity (ROE) and net income margin (NIM) are two ways to measure profitability. Bank-specific variables are proxied by the cost-to-net-income ratio (CTIR), the equity ratio (ER), and the liquidity ratio (LR).

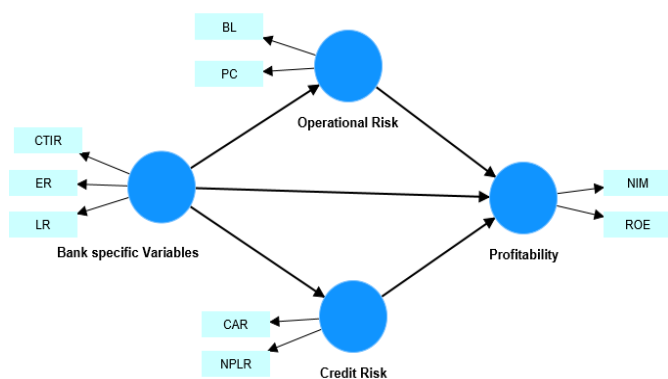


Figure 1. Theoretical model of the study

Research design and approach

For this study, a research design called "explanatory study" was used. In this kind of study, the researcher has to think about "cause and effect." The main goal of the researcher is to find the causes. The explanation study is best for this issue because the goal of the research is to find out how credit risk and operational risk affect the profits of banks in South Asian countries.

Table 3. Result of Reliability and Validity of latent construct

Latent variables	Indicators	Loadings	Indicator reliability	(STDEV)	T- Stats	P-Values	Composite reliability	(AVE)
Profitability	ROE	0.335	0.112	0.245	2.523	0.000	0.837	0.540
	NIM	0.984	0.968	0.137	1.057	0.000		
Credit Risk	CAR	0.833	0.694	0.091	1.583	0.000	0.744	0.639
	NPLR	0.764	0.584	0.068	1.671	0.000		
Operational Risk	BL	0.844	0.712	0.043	0.682	0.000	0.725	0.627
	PC	-0.736	0.542	0.138	0.105	0.095		
Bank Specific Variables	ER	-0.263	0.069	0.214	0.129	0.045	0.683	0.457
	LR	0.822	0.676	0.012	1.774	0.000		
	CTIR	0.791	0.626	0.137	0.298	0.000		

Source: Study area

Method for data analysis

SEMs make it possible to include many predictors and criteria variables, to create latent (unobservable) variables, to model measurement errors for observed variables, and to test mediation and moderation links in a single model, (Bentler & Huang, 2014). When doing predictive analysis on very complicated data, PLS-SEM technology becomes very helpful. Composites, which are exact linear combinations of the indicators given to the latent variables, are used to figure out what the latent variables are, according to (Nitzl, 2016).

In this situation, the partial least-squares structural equation modeling (PLS-SEM) method is used to study how operational risk and credit risk affect banks' profits in a South Asian country. Profitability, operational risk, and credit risk are often hidden and can't be found right away because ratios can't be used to evaluate profitability directly unless multiple ratios are used. On the other hand, there are many different ways to measure credit risk and operational risk. This idea says that profit, credit risk, and operational risk are all examples of latent variables. The Smart-PLS program is used in the study to apply PLS-SEM because it can handle nonlinear interactions well.

Result and Discussion

This chapter shows the internal consistency reliability measurement firstly, later on presents the convergent validity, discriminant validity, correlation matrix, result of the PLS-SEM measurement model, and finally the finding of the study.

Descriptive statistics

The Stochastic Multiple Regression Imputation algorithm initially performs partial least squared structural equation model missing data imputation. The latent variables are interchangeable and closely associated reflected measurement scales. All variable indicator loadings are employed for scale purification in the main measurement of the partial least squared structural equation model. Any loading value less than 0.5 should be removed from the model. This indicates that the indicator is distinct from the other variables and must be removed. Table 3, shows that the values of the factors (NIM, CAR, NPLR, BL, PC, CTIR, LR) loadings are above 0.5. But the value of ROE and ER are less than 0.5 but latent variable's composite reliability and AVE shows the validity. That's why the factors did not remove from this model.

Internal consistency reliability measurement

In general, "Cronbach's alpha" evaluates internal consistency reliability, however it is a conservative assessment in the partial least squared structural equation model. To avoid the conservative

measurement, the composite reliability in Table 3 is adopted in this investigation. In exploratory research, the best range for composite reliability values is 0.60-0.70, while in more advanced research, the range is 0.70-0.90.

Table 3 represents the composite reliability value of all the latent variables (profitability, credit risk, operational risk and bank specific variables) which values are gradually 0.837, 0.744, 0.725 and 0.683. The result indicates that all the latent variables are reliable because all are near 0.07.

Furthermore, Table 3 also displays the indicator reliability, which is defined as the squares of the factor's loading. The results of the indicator reliability showed that the highest indicator reliability values were above the minimum level of 0.4 and close to the level of 0.7 that would be best. Only, ROE and ER indicator reliability's values are less than 0.4 because there factoring values are also low.

Convergent validity

According to Fornell & Larcker (1981), $AVE > 0.5$ or $AVE = 0.5$ demonstrates the convergent validity. Table 3, shows that the value of AVE of all the latent variables without bank specific variables are above 0.5. But the value of AVE of bank specific variables is 0.457 which also validates convergent validity because it is near 0.5.

Table 4. Correlation among latent variables and AVE roots

	Bank Specific Variables	Credit Risk	Operational Risk	Profitability
Bank Specific Variables	0.876			
Credit Risk	0.792	0.799		
Operational Risk	-0.311	-0.207	0.792	
Profitability	0.228	0.463	-0.079	0.735

Source: Study calculation

Discriminant validity

According to Henseler et al., (2015), analyzing discriminant validity has become a requirement that is widely recognized for having reached a sufficient level of acceptance for understanding the relationship between latent variables. The Fornell-Larcker criteria and the examination of cross-loadings are the primary methods that are utilized in variance-based structural equation modeling for the purpose of testing the validity of the discriminant function. Table

Table 5. Correlation matrix

	BL	PC	NPLR	CAR	NIM	ROE	LR	ER	CTIR
BL	1.000								
PC	-.259**	1.000							
NPLR	-.035	.118	1.000						
CAR	-.251*	.099	.280**	1.000					
NIM	-.098	.083	.226*	.527**	1.000				
ROE	.160	-.095	-.092	.084	.162	1.000			
LR	-.165	.239*	.411**	.601**	.388**	-.061	1.000		
ER	-.217*	-.265**	-.397**	.017	.064	.225*	-.054	1.000	
CTIR	-.356**	.048	.623**	.412**	.054	-.130	.327**	-.159	1.000

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Source: Study calculation

4 illustrates the Fornell-Larcker criterion, which states that the square root of AVE needs to be greater than the correlation of the construct with every other construct in the structural model. This requirement can be found in the Fornell-Larcker criterion. The

relationships between latent variables and the square root of AVE are presented in Table 4. It is possible to demonstrate that the AVEs of each latent variable are greater than the correlation of the latent variables, which demonstrates that the latent variables have valid discriminant properties.

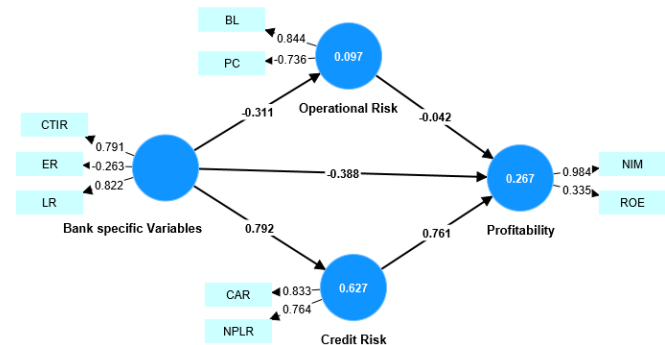


Figure 2. Result of linear bootstrapping path coefficient

Source: study calculation

Correlation matrix

To determine the degree of correlation between variables and if regressors are multi-collinear, the correlation matrix is used. It is also advised that study investigate if the dependent and independent variables have a positive or negative connection. Table 5, shows the result of correlation matrix. Here dependent variable is profitability which is proxy by return on equity (ROE) and net interest margin (NIM). On the other hand, two independent variables are used in this study. One is operational risk which is proxy by bank leverage (BL) and portfolio concentration (PC). And credit risk is another independent variable which is proxy by non-performing loan (NPLR) and capital adequacy ratio (CAR).

The results indicate that ROE has positive and insignificant relationship with BL while negative insignificant relationship with PC. In case of credit risk, ROE has negative insignificant relationship with NPLR while positive significant relationship with CAR. On the other hand, NIM has negative and insignificant relationship with BL while positive insignificant relationship with PC. But NIM has positive significant relationship with credit risk variables. The result also shows that the extents of among the regressors are minimal, and no multi-collinearity exists.

The result of the PLS-SEM measurement model

R2 is seen in Figure 2. The model-wise dependent latent variable R2 revealed that combined credit risk and operational risk explain

26.7% of South Asian bank profitability.

It shows that the independent factors (operational risk and credit risk) have a 26.7% of influence on the dependent variable (profitability). Bank-specific variables, on the other hand, explain

9.7% of operational risk and 62.7% of credit risk. This suggests that bank-specific factors might change operational risk by 9.7% while credit risk by 62.7%. As a result, the bank-specific variables chosen describe credit risk far better than operational risk.

Table 6. Structural path significant in bootstrapping

	Original sample (O)	Sample mean (M)	Standard deviation	T-Statistics	P-Values
Bank Specific Variables -> Operational Risk	-0.311	-0.335	0.078	3.983	0.000
Bank Specific Variables -> Credit Risk	0.792	0.781	0.084	9.431	0.000
Bank Specific Variables -> Profitability	-0.388	-0.39	0.205	1.895	0.058
Credit Risk -> Profitability	0.761	0.738	0.248	3.066	0.002
Operational Risk -> Profitability	-0.042	-0.038	0.122	0.349	0.727

Source: Study calculation

Discussion of results

This section discusses the findings in Figure 2 and Table 6. Credit risk shows a statistically significant positive association with bank profitability in South Asian countries, according to the structural path significant in bootstrapping in Figure 2 and Table 6.

The positive link is statistically significant, as evidenced by the coefficient of 0.761, p-value of 0.002 ($p < 0.05$), and t-value of 3.066 ($t > 1.96$). This suggests that banks in South Asian countries that are exposed to high credit risk perform better financial performance. In this study, credit risk is proxy by capital adequacy ratio (CAR) and non-performing loan ratio (NPLR). This study now explains the two outcomes. Firstly, the capital adequacy ratio (CAR) is a measure of a bank's available capital, expressed as a percentage of its risk-weighted credit exposures. The goal is to ensure that banks have adequate capital on hand to absorb a specific level of loss before going bankrupt. A higher capital adequacy ratio suggests safety. Because banks with larger levels of equity capital are regarded to be safer, and this advantage may be converted into higher profits. The higher a bank's capital ratio, the more lucrative it will be. Therefore, it can say that banks in South Asian countries with higher capital adequacy ratio will lead to boost up the bank's financial performance. It also added that, a greater capital adequacy ratio leads to fewer credit risks since it reduces the number of problem loans. (Boudriga et al., 2009). From this backdrop, it can say that there is a relationship between capital adequacy ratio and non-performing loan ratio. Therefore, higher capital adequacy ratio helps to manage the losses resulting from non-performing loan and thus, improve financial performance. It should be added that a higher NPLR leads to information asymmetry which is one of the parts of lemon theory.

The primary factors that lead to credit risk are poor management, ineffective loan policy, fluctuating interest rates, low capital and liquidity rates, inadequate credit appraisal, inappropriate lending procedures, inadequate lending underwriting, government interference, and ineffective central bank supervision, (Kolapo et al., 2012). A positive association between credit risk and financial

performance indicates that banks in South Asian country are taking appropriate efforts to address the issues raised. When the findings of this study are compared to the empirical literature, they are similar with the findings of Zou & Li, (2014); Nwude et al., (2018); Cheng et al., (2020), Ali et al., (2019); Kolapo et al., (2012) whose articles indicated a positive relationship between credit risk and profitability. On the other hand, this research contradicts the findings of (Ekinci & Poyraz, 2019), (Noor & ACMA, 2019), (Gadzo et al., 2019) whose studies indicated a negative relationship between credit risk and profitability.

According to the discussion above, the first hypothesis, "Credit risk positively influences profitability of banks in South Asian country" is accepted since credit risk has a strong positive influence of banks in South Asian countries. Further, Figure 2 and Table 6 shows that Operational risk, as measured by bank leverage and portfolio concentration, shows a statistically insignificant negative connection with South Asian bank profitability. The negative association is statistically insignificant, as evidenced by the coefficient of -0.042, p-value of 0.727 ($p > 0.05$), and t-value of 0.349 ($t < 1.96$). This suggests that South Asian banks exposed to high operational risk have poor financial performance.

When looking at this finding from the perspective of the hidden variables of operational risk, it is possible to draw the conclusion that a high bank leverage results from losses brought on by an inadequate system. This imposes a greater cost on the financial institutions, specifically in the form of increased interest payments. Bank inflows are decreased when debt obligations are repaid in full. When there is a decrease in bank inflows, financial performance also decreases.

Portfolio concentration is another proxy for the latent variable operational risk. Inefficiencies in procedures, along with information asymmetry, result in poor portfolio selection from the standpoint of portfolio concentration. Furthermore, when communication between bank management and shareholders is distorted, the outcome is an undesirable selection of leverage policies. According to (Samuel, Samuel, & Finance, 2018), a recurring recurrence of this phenomena results in a highly leveraged bank and, eventually, loss of the bank's net interest revenue.

The outcome is similar with the outcomes of Chen et al., (2009), Cheng et al., (2020), and Muriithi et al., (2017) whose results also showed the negative association between operational risk and financial performance. On the other hand, Fadun & Oye, (2020) and Falihi et al., (2022) studies showed a positive relationship between operational risk and financial performance which is not similar with this study.

From this above backdrop, the study's second hypothesis which stated that "operational risk negatively influences the profitability of the South Asian banks" is accepted. Because this study shows a negative (-0.042) relationship between operational risk and profitability with p-value of 0.727 ($p > 0.05$) and t-value of 0.349 ($t < 1.96$) which also indicate insignificant relationship with operational risk and profitability.

Again, according to Figure 2 and Table 6, bank specific variables such as liquidity ratio, equity ratio, and cost to net income ratio have a statistically insignificant negative (-0.388) association with profitability, with a p-value of 0.058 ($P > 0.05$) and t-value of 1.89 ($t < 1.96$). This result reveals that when bank-specific factors are high, profitability will be low. Now this study explains the three outcomes. The findings show that banks with higher liquidity ratio have possibility of experiencing lower profitability. Because a high liquidity ratio means less investment and more money at hand. This affects the profitability negatively. The equity ratio is another proxy for bank specific variables. The equity ratio measures the proportion of a company's total assets that were created through

the sale of equity shares as opposed to through the incurrence of debt. The higher the ratio result, the more equity is used to pay for its assets. When the more equity is used, it tends to be more expensive than debt. While banks expense is more, it affects the profitability negatively. Cost to net income ratio is last proxy for bank specific variables. Cost to net income ratio presents the banks costs as a proportion of income. So, the higher cost to net income ratio experiences lower profitability.

When compared to the empirical literature, the findings of this study are not inconsistent with (Gadzo et al., 2019) and (Cheng et al., 2020). Because they showed a statistically significant positive relationship between bank specific variables and profitability.

From this backdrop, the third hypothesis which stated that "Bank specific variables positively influence the operational risk of banks in South Asian countries" is rejected on the grounds of bank specific variables have statistically insignificant negative influence on financial performance of banks in South Asian countries. The results also show that bank specific variables have a statistically significant but negative (-0.311) relationship with p-value of 0.000 ($p < 0.05$) and t-value of 3.983 ($t > 1.96$) with operational risk. It indicates that when bank specific variables are increased the banks operational risk will be decreased.

Now the results explain the three outcomes of liquidity ratio, equity ratio and cost to net income ratio which are the proxy of bank specific variables. Firstly, liquidity ratio is used to measure the banks capacity to pay off its short-term financial obligations with its current assets. Higher liquidity ratio means more money at hand. It helps banks to maintain day-to-day activity properly. And by this way, it decreases operational risk. Next, the equity ratio indicates whether a bank uses its equity or debt for financing its assets. When the ratio is high it indicates that banks use more equity than debt to financing its assets. So, higher the ratio is, less the operational risk will be. Lastly, the ratio of cost to net income illustrates the relationship between income and the resources expended to generate that income. As a general rule, the cost-to-income ratio of a bank can be used to determine how efficiently the bank operates.

Comparing the findings with the empirical literature, the results are contradictory with the findings of Cheng et al., (2020). They demonstrated a statistically significant positive association between bank-specific factors and operational risk. As a result of this discussion, it was discovered that bank-specific variables have a relationship with operational risk that is not only statistically significant but also negative. Therefore, the fourth hypothesis, which stated that "Bank specific variables positively influence the operational risk of banks in South Asian countries", is rejected due to the insignificant negative relationship between bank specific variables and operational risk.

Again, the study found that bank specific variables such as LR, CIR, and ER have a statistically significant and positive (0.792) association with credit risk, with a p-value of 0.000 ($p < 0.05$) and t-value of 9.431 ($t > 1.96$). It indicates that if bank-specific variables rise, credit risk rises as well. Now, the three variables LR, ER and CTIR can be explained. According to the three outcomes (LR, ER, and CTIR), a highly liquid bank with a high equity ratio and a high cost to net income ratio will enhance credit risk. When the result was compared to the empirical literature, they are compatible with the findings of (Gadzo et al., 2019) and (Cheng et al., 2020). They demonstrated a statistically significant positive association between bank-specific factors and credit risk.

In addition, the result based on the findings is that there is positive correlation and statistically significant relationship between bank-specific variables and credit risk. As a result, the fifth hypothesis, which stated that "Bank-specific variables positively influence the credit risk of banks in South Asian countries", is accepted on the

grounds of the significant positive relationship between bank-specific variables and credit risk.

Conclusions

In this study, a partial least squared structural equation model is utilized to investigate the impact of credit risk and operational risk on financial performance of banks located in South Asian countries. According to the findings of the study, the level of risk associated with bank credit has a significant and positive impact on the profitability of banks in South Asian countries. This leads to the acceptance of the first hypothesis, which stated that "Credit risk positively influences the profitability of banks in South Asian countries." According to this result, a rise in the level of credit risk is associated with an increase in the profitability of banks. As a consequence of this finding, the results of a number of empirical investigations that suggest that the financial success of a bank is connected to credit risk provide support for this finding. The research also revealed that the operational risk of South Asian banks has a negative association with the financial performance of the banks. The second hypothesis, which stated that "Operational risk has a negative influence on the profitability of banks in South Asian countries", is validated as a consequence of this finding as well. It indicates that the amount of profit generated will be lower if the operational risk is high. According to the findings of this study, the relationship between bank-specific variables and profitability is insignificantly negative. Therefore, it concludes that the third hypothesis, which stated that "Bank specific variable positively influences the profitability of banks in South Asian countries," is incorrect and must be rejected. In addition, this study found significant negative correlation between bank-specific variables and operational risk. In light of the foregoing, the fourth hypothesis, which stated that "Bank specific variables positively influences the operational risk of banks in South Asian countries," must also be rejected. In conclusion, this research demonstrates that there is a statistically significant positive association between bank-specific variables and credit risk. As a result, the fifth hypothesis, which stated that "Bank specific variables positively influences the credit risk of banks in South Asian countries," is supported by the findings of this research. It is anticipated that the results of the study will be beneficial to the banking sector as well as the investor community.

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