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Unveiling Risk Determinants in Islamic and Conventional Banks: Empirical Evidence from Pakistan

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Abstract

This study aims to compare the determinants of the four main risks (credit, liquidity, operational, and regulatory risks) that Islamic and conventional banks face by focusing specifically on Pakistans regulatory and institutional settings. The study collected unbalanced panel data for the period 2005-2022 and employed the Generalized Method of Moments (GMM-IV) approach to estimate outputs. For the robustness check, the samples were pooled for both groups and the results are re-estimated. The study found that there exist significant differences in the risk determinants of both types of banks. Similarly, there was found a positive and significant association of non-performing loans (NPL) with lag terms for conventional banks (CBs) and an insignificant association for Islamic Banks (IBs). Regarding firm performance, the study found that it does not explain the credit risk for IBs, but reported improved results for CBs. Similarly, the study found significant differences in terms of efficiency for both banks. Additionally, it was determined that derivative contracts increase liquidity and operational risk for CBs, while no such significant association exists for IBs.The findings provide valuable insights for Pakistans regulatory and standard-setting institutions when developing governing, risk management, and overall operational policies and frameworks for Islamic and conventional banks. The inherent differences in the overall functioning of these banks make their anatomy of risk significantly different. As such, the governing regulations, for example, the Prudential Regulations issued by the State Bank of Pakistan (SBP), need to account for these differences. Although the current literature examines the differences between Islamic and conventional banks from different perspectives, a thorough and holistic comparison is missing. The current study aims to address this gap.

***Keywords*:** credit risk, conventional banks (CBs), firm performance, governing regulations, Islamic Banks (IBs), liquidity risk, non-performing loans (NPL), operational risk, regulatory risk

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Introduction

Depository institutions play a vital role in promoting economic growth and financial stability around the globe (Accornero et al., 2018). The Global Financial Crisis (GFC) of 2007-8 brought to light the shortcomings of risk management departments, underscoring the necessity of risk management and risk disclosures (RDs) in the banking industry (Barakat & Hussainey, 2013; Khalid & Amjad, 2012). Heflin et al. (2021) documented that managers can use RDs to reduce information asymmetry because it signals the quality and prospects of banks, reducing the cost of capital. This is because banks are exposed to different types of risks as compared to the non-financial sector and other businesses. Hence, they are concerned with effective risk management and publish detailed disclosures about the various types of risks they encounter (Farooqi & OBrien, 2019). Primarily acting as middlemen, banks continuously struggle to improve their financial performance by extending credit, yet remain highly susceptible to credit risk (Khan et al., 2023). According to Accornero et al. (2018), the banking sector fails to meet its obligations due to extensive credit risk usage. As such, the extensive use of credit risk may result in the collapse of the whole financial system. The authors also highlighted that credit risk is expected to materialize when investors cannot meet their promise to future cash flows. Similarly, Ofori-Abebrese et al. (2016) documented that when internal variables are improperly managed, it results in moral hazards and unfavourable choices, which are the root of instability in the financial and banking sectors.

Risk management has proved to be an enigma in management literature for several years. As risk is an inevitable reality when operating in the real world, scholars have strived to theorize and examine its impact on the performance of firms using different rationales (Huan & Parbonetti, 2019; Naili & Lahrichi, 2022). Due to the overall subjectivity and judgment involved, literature cannot provide consensus over the most effective techniques to control, manage, or mitigate risk exposures. It can be claimed that no industry or firm is exempt from managing exposures, whether operational, market, financial, or strategic.

The concept of Islamic banking has spread lately around the globe. The structure and mechanism of Islamic banks (IBs) are characteristically

different from conventional banks (CBs) (Khawaja et al., 2023; Siddiqui et al., 2022). Their unique and innovative financing and intermediation enables financial institutions to evolve from traditional financing roles. However, this evolution comes with a cost; one of these is the additional risk exposure due to *Shariah* compliance. As such, this should make the risk and risk management approaches of IBs substantially different from their conventional counterparts.

Although the current literature examines these differences between IBs and CBs from different perspectives, a thorough and holistic comparison which considers the changes in the risk and its management approaches from a broader perspective is missing. As such, the current study aims to address this gap identified in the literature by comparing the four main risks that IBs and CBs face, while focusing specifically on Pakistans regulatory and institutional settings. To answer the question why Pakistan , the study highlights the countrys unique institutional setting. Firstly, it is an emerging market that, as per the notions of Fan et al. (2011), is characterized by weak markets and institutions. As such, it is important to consider the risk management of financial institutions when operating in such weak markets and institutional frameworks. For example, using derivatives might not be as effective in managing risks for these institutions as they are in developed markets. Secondly, Pakistan also provides a unique governance setting for financial institutions, where an additional set of rules (or *Shariah* principles) are imposed for IBs. This distinctive feature of the Pakistani economy provides an interesting setting to compare the practices of IBs and CBs.

For this study, data was collected from 25 banks (both conventional and Islamic) operating in Pakistan. After performing various estimations, it was found that non-performing loans (NPLs) showed a positive and significant association with their lagged value in CBs, while they showed an insignificant association in IBs. Similarly, firm performance (EPS) showed that it helps to reduce credit risk for IBs but showed no such association for CBs. Further, liquidity risk (DTA) showed a negative association with the capital adequacy ratio (CAR) of IBs and a positive association with the CAR of CBs. The current study significantly contributes to the existing literature on risk exposure in both banking groups and validates the earlier findings of Grassa et al. (2020), Grassa et al. (2021), and Hasan et al. (2022) in the context of Pakistan. Considering the above findings, the study

provides significant guidelines for banking groups, policymakers, and regulatory bodies.

Literature Review

Several studies found that IBs face similar risks to CBs because CBs accept deposits and advance loans from customers (Bitar et al., 2017). Risk management has significantly improved with the recent developments in the financial industry (Kunz & Heitz, 2021). Similarly, banks continuously attempt to manage risk and maintain stability. Oyewo (2022) suggested that banks must project potential future events to identify and manage risks in the financial sector, rather than to wait until the risk materializes.

Fundamental Differences in Islamic and Conventional Banking

Aside from the development in the banking industry due to the advancements in technology, there is another one major area that has substantially changed the overall mechanics of the industry. This is the development and progress in Islamic banking and finance.

The philosophical foundation and theoretical support for the Islamic banking and finance industry are mainly derived from *'Maqasid-al-Shariah'* (Objectives of the *Shariah*), covered under the boarder scope of *'maslaha'* (or greater public good), as highlighted in the work of Mas'ud (1975). This theoretical framework argues that entities functioning in an Islamic economy must work in a manner to remove *'zulm'* (or injustice) from the society as a whole. As such, this framework aims to prohibit numerous tools that can cause injustice in an economy Usmani (2005). Building on this theoretical framework, IBs carry numerous definitions in the literature but are popularly seen as banking institutions that adhere to the *Shariah*[1] principles (Rahahleh et al., 2019). Hence, additional restrictions are imposed on IBs through *Shariah* principles irrelevant to CBs. A major example is the prohibition of dealing in interest-based securities. Due to the extra sets of governing and regulatory principles for them, their overall operating framework is substantially different from CBs. Consequently, many scholars (Hussain et al., 2024; Rahahleh et al., 2019; Siddiqui et al., 2022) have argued that IBs have to adhere to an extra set of governing principles which exposes them to an extra compliance risk,

[1]It can be seen as the law and jurisprudence that includes Fiqh (law derived explicitly from religious Scriptures) and other regional or local regulations devised by leaders based on cultures and customs (Esposito & Delong-Bas, 2018).

compared with CBs. However, apart from this extra risk, the overall risk management framework of IBs and CBs remains quite similar.

Contrary to this viewpoint, considering the objectives of the *Shariah*[2], *Shariah*-compliance among IBs should arguably have a much wider impact on their procedures and policies. As such, *Shariah*-compliance should have more tangible implications for their numerous fundamental operational areas, including risk management. The implications have been examined thoroughly in the literature from different perspectives, including (1) performance (Bilgin et al., 2021a; Chaffai & Hassan, 2019; Gull & Khan, 2023; Fakhri & Darmawan, 2021; Salem et al., 2021; Zainuldin & Lui, 2020), (2) stability (Albaity et al., 2019; Bilgin et al., 2021b; Hassan et al., 2019; Paltrinieri et al., 2021; Safiullah, 2021; Widarjono, 2020), and (3) stakeholder management (Grassa et al., 2021; Julia & Kassim, 2020; Purwanto et al., 2020). Scholars have also compared the risk management processes of IBs and CBs. However, such comparisons have been made mainly from specific perspectives. For example, (1) credit risk management (İncekara & Çetinkaya, 2019a; Saiful & Ayu, 2019), (2) liquidity risk management (Ghenimi et al., 2021; İncekara & Çetinkaya, 2019b), (3) stakeholder risk management (Butt et al., 2022), and (4) non-compliance risk management (Basiruddin & Ahmed, 2020; Bhatti, 2019).

Additionally, literature explicates two main uses for derivatives when used by banks. Firstly, it is used to manage risk by controlling the volatility of earnings. Secondly, it is used for speculative purposes to improve earnings (Huan & Parbonetti, 2019). When used for the latter purpose, the use of derivatives contributes to an increase in the volatility of earnings (Vuillemey, 2019). However, literature shows that the banks actively use derivatives as a risk management technique (Hankins, 2011; Huan & Parbonetti, 2019; Keffala, 2021; Sharifi et al., 2019; Vuillemey, 2019). It is important to note that IBs cannot deal in traditional derivative instruments, as those are considered *Shariah* non-compliant. As such, the derivatives that IBs deal in are *Shariah*-complaint arrangements that differ from what CBs deal in (Rizvi et al., 2014). This implicates that risk management practices of IBs and CBs would differ, as they are the means to control their performance and earnings volatility.

[2]Also referred to as *Maqasid-al-Shariah*.

Overall Risk in Banks

Focusing on risk and its management practices in banks, firstly, it is important to define risk. In its simplest form, risk comprises the chance that the actual results may differ from the expectations. Naturally, risk can rise both due to outside (macroeconomic and market) factors and inside (bank-specific) factors. Risk and its management remain quite subjective and diverse. However, the financial reporting framework of jurisdictions helps banks to quantify and report their risks to interested stakeholders. Focusing more specifically on Pakistan, the State Bank of Pakistan[3] (SBP) has defined the prudential regulations for all the banks operating in Pakistan (SBP, 2023a) through the Banking Companies Ordinance (The Pakistan Code, 1962). Similarly, the Securities and Exchange Commission of Pakistan (SECP) has defined the financial reporting framework through the Companies Act (Government of Pakistan, 2007).

Furthermore, focused research on banking risks in Pakistan shows divergence in its findings. For example, Hassan (2021) performed a review of literature assessing the difference between IBs and CBs regarding the impact of liquidity risk on the overall banking risk. The review showed that there still exists a gap in this area as literature fails to provide conclusive decisions regarding the impact of liquidity risk on banking risk for IBs and CBs. Similarly, Butt et al. (2022) showed that reputational risk does not explain the financial performance of IBs in Pakistan. Although, for CBs, it mediates the relationship between financial risk and financial performance. Additionally, Butt et al. (2022) also showed that credit risk is more severe for CBs in the Pakistani market, as compared to IBs. Nonetheless, these studies examined individual risks but failed to capture its impact in a holistic manner when comparing the two separate banking systems (Islamic and conventional). On the other hand, literature does show a consensus that the impact of risk on these two banking systems is significantly different (Butt et al., 2022; Hassan, 2021).

According to the applicable financial reporting framework, the banks operating in Pakistan, in addition to their capital adequacy, disclose their risks in three main categories[4]. Among these three, market risk can be seen as the risk mainly arising from external factors, while the remaining two

[3]The Central Bank of Pakistan

[4](1) Credit risk, (2) Market risk, and (3) Liquidity

(including capital adequacy) risks are more relevant to internal factors. Operational risk is also included with these three risks as an additional risk arising from internal factors.

Credit Risk

Naili and Lahrichi (2022) performed a thorough literature review related to the banks credit risk. The authors highlight ed two main types of factors in the literature to explain credit risk behaviour. These two factor types included macroeconomic (systematic) factors and bank-specific (idiosyncratic) factors. Similarly, Butt et al. (2022) and Chamberlain et al. (2020) provided empirical evidence that credit risks are more pronounced for CBs than IBs. Chamberlain et al. (2020) further showed that capitalization, liquidity, and cost efficiency all contribute towards the lower credit risk of IBs. Additionally, the literature mainly conflates banks credit risk with non-performing loans (NPLs) (Cheng & Qu, 2020; Us, 2017).

Based on the existing literature, it is hypothesized that

H1: Credit risk and its determinants differ significantly between IBs and CBs.

Liquidity Risk

Similar to credit risk, literature thoroughly evaluates the banks liquidity risk determinants; unlike credit risk, there is no single popular measure dominating the research. For example, Ghenimi et al. (2021) measured liquidity risk as the reciprocal of liquid assets to total assets ratio, whereas İncekara and Çetinkaya (2019b) and Mohammad et al. (2020) used the ratio of financing gap to total assets instead. Similarly, another common measure used for liquidity risk in the literature is a variant of the former (liquid assets to total assets), where the ratio of advances to deposits is taken instead (Cheng & Qu, 2020). Hassan (2021) showed that the current literature lacks agreement regarding the impact and determinants of liquidity risk for IBs and CBs. However, despite the competing views, there is a consensus that both types of banks bear different liquidity risks due to fundamental differences. Additionally, as witnessed in the case of credit risk, the literature divides total determinants of liquidity risk into the two same classes of factors (macroeconomic and bank-specific factors). Therefore, based on the existing literature, it is hypothesized that

H2: Liquidity risk and its determinants differ significantly between IBs and CBs.

Operational Risk

The basic definition and modelling of operational risk for banks in recent literature mainly stems from Basel II, as explained by Abdullah et al. (2011). However, Hankins (2011) took a rather interesting approach when measuring operational risk for banks, where operational risk is manifested as the deviations in the operational income of the bank during the past four years (using quarterly data). Similarly, Huan and Parbonetti (2019) measured operational risk through systematic risk and deviations in the daily stock returns of the firm. Further, Neifar et al. (2020) and Elamer et al. (2020) both identified the *Shariah* Supervisory Board (SSB) as the key feature of IBs that differentiates the relationship between operational risk and bank performance, providing empirical evidence that operational risk disclosures for IBs and CBs are significantly different from one another. Literature also defines operational risk as 'residual' risk – after accounting for risks including credit risk, liquidity risk, and others. Therefore, based on the existing literature, the current study hypothesizes the following:

H3: Operational risk and its determinants differ significantly between IBs and CBs.

Regulatory (or Compliance) Risk

Regulatory or compliance risk has a wide definition in the literature and as such, it has been measured quite differently. For example, Handayani et al. (2020) and Mutamimah and Saputri (2023) specifically viewed this risk as a risk arising due to the governing framework of the firms (corporate governance and *Shariah* governance). On the other hand, Smaoui et al. (2020) viewed it as compliance with regulatory capital requirements. Further, the work of Hoque and Liu (2021) highlighted that the banking sector is a highly regulated sector and the regulations are a combination of jurisdiction-specific as well as global rules (for example Basel regulations). As such, this risk is also examined in the literature using two different sets of determinants (macroeconomic and bank-specific factors). Therefore, based on the existing literature, the current study hypothesizes the following:

H4: Operational risk and its determinants differ significantly between IBs and CBs.

Methodology

Research Approach and Sample Details

This study employs a non-contrived research approach by collecting secondary data for the period 2005-2022 from the published financial statements of both types of banks (IBs and CBs) operating in Pakistan. It utilizes unbalanced panel data for the banks (SBP licensed) selected in the sample, (details of the sample construction are in the table below). SBP categorizes banks into five[5] main categories (SBP, 2023b). Among these five categories, foreign and specialized banks were removed from the sample, as they would not enable a fair representation of the population (institutional differences associated with foreign banks and differences like operations associated with specialized banks).

Table 1

Details of Sample Construction and Number of Observations

Bank Category	Number	Observations
Public Sector Commercial Banks	5	
Specialized Banks	4	
Local Private Banks	15	
Islamic Banks	5	
Foreign Banks	4	
Total Banks Regulated by SBP	33	
Less: Banks removed from the sample		
Specialized Banks	4	
Foreign Banks	4	
Banks Included in the Study	25	
Number of full-fledged Islamic banks (IBs)	5	70
Number of Islamic windows (Ratnasari et al., 2021) (operated by CBs)	19	191
Total IBs and Windows	24	261
Total CBs	20	258
Total	25	519

Note. This table details the breakup of the sample construction.

[5](1) Public Sector Commercial Banks, (2) Specialized Banks, (3) Local Private Banks, (4) Islamic Banks, and (5) Foreign Banks.

Since only five full-fledged IBs operate in Pakistan, the Islamic windows of CBs have been included as well in the IBs sample. This is based on two main assumptions. The first is that the prohibitions imposed by the *Shariah* upon both the IBs and the Islamic windows of CBs are the same, so their risks and approaches to managing those risks should be similar as well. The second assumption is that the inclusion of Islamic windows in the Islamic sample would increase the total number of observations (total observations available for the IBs are only 70, as four out of five IBs obtained licenses after 2005). Hence, it would improve the quality of empirical testing performed in the current study. The study compares the overall risk exposure and management of IBs and CBs by measuring the risk as reported by banks in their financial statements[6].

The details of all the variables were gathered form the financial statements of banks (other than the macroeconomic variables, data for those were gathered from the World Bank Databank). This includes the data for Islamic windows as well, since all such banks have an additional note in their financial statements that shows only the results of Islamic windows. To calculate the variables for CBs in such cases, the study simply subtracted the total bank figures presented with the Islamic windows' results disclosed in the notes.

Additionally, the current study excludes market risk from the reported risks, as it mainly relates to market (external) factors. Presumably, evaluating risk from an external perspective separately from evaluating risk from internal factors would enable more comprehensive comparisons and insights. As such, this study only focuses on risks mainly from the internal factors (capital adequacy, seen as regulatory risk), credit risk, operational or business risk, and liquidity risk.

Variables Selection and Measurement

The variables selected in the study and their measurements are explained in Table 2. The variables are classified into three main categories. The first category includes dependent variables (regulatory, credit, operational, and liquidity risks). The second category includes firm-specific explanatory variables. The final and third category is of the macroeconomic variables. The determinants of these four risks have been identified from the literature, while references for including the selected variables are

[6]Under the section headed risk management in the notes to the financial statements.

provided in Table 2. Aside from macroeconomic variables (Koju et al., 2020; Smaoui et al., 2020), the study includes firm size, performance, and derivative use in the models (Boukhatem & Djelassi, 2020; Butt et al., 2021; Huan & Parbonetti, 2019). Finally, where literature shows the dependency of one risk factor over another, those risks are included in the models as well. For example, literature shows that CAR of banks has an impact on NPLs. Therefore, although CAR represents regulatory risk in the current study (Smaoui et al., 2020), it is included as an explanatory variable for credit risk as well (refer to equation 1).

Table 2
Variables of the Study

No.	Name	Proxy	Symbol	Measurement and explanation	Reference
1	Regulator risk	Capital adequacy	CAR	(Tier 1 + Tier 2 Capital) / Risk Weighted Assets	Smaoui et al. (2020)
2	Credit Risk	Non-performing loans	NPL	Non-performing loans to total net financing outstanding	Naili and Lahrichi (2022)
3	Operational or business risk	Variations in the operating income	OR	The standard deviation for the last five years of the total operating income of the bank	Cheng and Qu (2020)
4	Liquidity risk	Funding gap	ATD	Advances to deposits	Boukhatem and Djelassi (2020)
5	Risk management	Derivative use	DTA	Total gross market value of derivative contracts divided by total bank assets.	Huan and Parbonetti (2019)
6	Size	Total assets	LN_SIZ	Natural log of total assets	Boukhatem and Djelassi (2020)
7	Performance	Earnings per share	EPS	Net income available to ordinary shareholders divided by weighted average number of ordinary shares	Oahn et al. (2023)
8	Efficiency	Cost-to-income ratio	CTI	Total overheads divided by total operating income	Butt et al. (2021)
9	Board remuneration	Board remuneration	LN_BDR	Natural log of the total remuneration paid to the board	Mondello and Smaoui (2021)

No.	Name	Proxy	Symbol	Measurement and explanation	Reference
10	Liquidity gap	Liquidity gap	LN_LG	Natural log of (total assets less total liabilities)	Smaoui et al. (2020)
11	Macroeconomic factors	Growth in GDP	GDP	Year-on-year growth in GDP	Koju et al. (2020)
12		Inflation	INF	Average annual inflation rate	Smaoui et al. (2020)

This table shows the definition and measurement of the variables of the study and their symbols.

Empirical Models, Testing Approach, and Robustness Check

Based on the argument set forth by Naili and Lahrichi (2022) and Siddiqui et al. (2023), this study uses the Generalized Method of Movement (GMM) approach to estimate the empirical models expressed below. The main reason for using the GMM approach is to cater to the endogeneity problem apparent in the following models (equations 1 to 4).

Equation 1 – Credit Risk

$$NPL_{it} = \beta_0 + \beta_1 DTA_{it} + \beta_2 CAR_{it} + \beta_3 EPS_{it} + \beta_4 CTI_{it} + \beta_5 LN\_SIZ_{it} + \beta_5 LN\_BDR_{it} + \beta_6 DP_{it} + \beta_7 INF_{it} + \mu_{it}$$

Equation 2 – Liquidity Risk

$$ATD_{it} = \alpha_o + \alpha_1 DTA_{it} + \alpha_2 EPS_{it} + \alpha_3 CAR_{it} + \alpha_4 NPL_{it} + \alpha_5 LN\_SIZ_{it} + \alpha_6 LN\_L_{it} + \alpha_7 DP_{it} + \alpha_8 INF_{it} + \epsilon_{it}$$

Equation 3 – Operational or Business Risk

$$OR_{it} = \gamma_o + \gamma_1 DTA_{it} + \gamma_2 CAR_{it} + \gamma_3 ATD_{it} + \gamma_4 NPL_{it} + \gamma_5 EPS_{it} + \gamma_6 LN\_SIZ_{it} + \gamma_7 DP_{it} + \gamma_8 INF_{it} + \varepsilon_{it}$$

Equation 4 – Regulatory or Compliance Risk

$$CAR_{it} = \delta_o + \delta_1 DTA_{it} + \delta_2 ATD_{it} + \delta_3 NPL_{it} + \delta_4 EPS_{it} + \delta_5 LN\_SIZ_{it} + \delta_6 DP_{it} + \delta_7 INF_{it} + \eta_{it}$$

where i represents bank, t represents year, α, β, γ, and δ show the coefficients, and μ, ϵ, ε, and η are the respective error terms in the equations.

Furthermore, as a robustness check, the equations mentioned above were estimated a third time by pooling together the Islamic and conventional data. Finally, the structural stability of the parameters was

tested using the F-statistics for Islamic and conventional estimation results as well as the pooled estimation results using their residual sum of squares (RSS). The pooled estimation was treated as restricted and individual estimations for Islamic and conventional samples (our baseline estimations) as unrestricted estimations. An adapted F-test was used to test the hypothesis of whether the coefficients are the same in various groups or not. The F-test used is mathematically expressed as follows:

Equation 5 – Adapted F-test for Robustness Check

$$F = \frac{(RSS_R - (RSS_I + RSS_C))/k}{(RSS_I + RSS_C)/(N_I + N_C - 2k)}$$

where RSS_R is the RSS obtained from the restricted (or pooled) estimation. RSS_I and RSS_C are the RSS obtained from the baseline regressions for Islamic and conventional banks, k represents the number of restrictions equal to the number of respective coefficients in the models, and N_I and N_C are the number of observations for Islamic and conventional estimations.

Results and Discussion

Table 3 shows the summary statistics of the variables. The mean value of NPL is reported as 0.1205 for CBs, while it is reported as 0.0749 for IBs. Similarly, ATD has a mean value of 0.5372 for CBs and 0.7409 for IBs. OR has a mean value of 0.1017 for CBs and 0.1404 for IBs. CAR has a mean value of 0.1493 for CBs and 0.1425 for IBs. DTA has a mean value of 0.1458 for CBs, while it has a mean value of 0.1319 for IBs. EPS has a mean value of 6.2733 for CBs and 0.1319 for IBs. CTI has a mean value of 0.2979 for CBs and 0.3905 for IBs. The skewness and kurtosis of the variables is used to check their normality. Additionally, the natural log of the variables is taken to improve their normality, where needed.

Table 4 shows the correlation matrix of the study. ATD and OR have a negative correlation with NPL. Similarly, CAR has a significant negative correlation with NPL. At the same time, DTA has a positive and significant correlation with NPL. Meanwhile, EPS, CTI, BDR, and LG negatively correlate with NPL. As none of the figures shown in Table 4 are above +80% or below -80%, the problem of multicollinearity does not exist, as explained by Siddiqui et al. (2024).

Table 3

Descriptive Statistics

	Obs.		Min		Max		Mean		SD		Skew.		Ex_Kurt.	
	IB	CB	IB	CB	IB	CB	IB	CB	IB	CB	IB	CB	IB	CB
NPL	261	258	0.000	0.000	5.096	1.695	0.075	0.120	0.410	0.165	-0.619	-4.606	-1.165	35.586
ATD	261	258	0.000	0.189	28.902	1.024	0.741	0.537	1.983	0.142	-5.027	-0.655	31.247	1.095
OR	261	258	0.014	0.016	7.203	0.500	0.140	0.102	0.549	0.055	1.515	-0.343	9.886	0.246
CAR	261	258	-0.796	-0.796	0.620	0.570	0.142	0.149	0.103	0.119	-4.822	-2.860	41.831	24.746
DTA	261	258	0.000	0.000	28.902	1.008	0.132	0.146	0.139	0.180	1.990	2.026	5.018	4.412
EPS	261	258	-8.000	-19.040	31.000	31.000	3.050	6.273	7.262	8.184	1.145	0.688	0.509	0.420
CTI	261	258	0.010	0.100	2.463	1.275	0.390	0.298	0.249	0.148	3.172	3.179	19.563	15.204
LN_SIZ	261	258	13.328	16.618	21.670	22.359	17.592	19.787	1.491	1.239	-0.249	-0.457	-0.067	-0.342
LN_BDR	261	258	9.051	8.722	13.111	12.940	11.321	11.237	0.791	0.809	-0.344	-0.285	0.130	-0.070
LN_LG	261	258	-9.210	-9.210	18.563	19.494	14.980	16.730	2.003	3.834	-6.749	-5.965	80.538	38.403
GDP	19	18	-1.274	-1.274	7.547	6.519	4.263	4.081	2.120	2.028	-1.004	-0.940	0.554	0.481
INF	19	18	2.529	2.529	20.286	20.286	9.501	9.616	4.643	4.744	0.797	0.759	0.270	0.143

Table 4

Correlation Matrix

	NPL	ATD	OR	CAR	DTA	EPS	CTI	SIZ	BDR	LG	GDP	INF
ATD	-0.06											
OR	-0.02	0.01										
CAR	***	0.01	0.02									
DTA	0.09**	-0.01	0.01	0.12***								
EPS	-0.06	0.03	0.06	0.20***	-0.09**							
CTI	0.00	-0.01	0.01	-0.01	-0.06	0.08*						
SIZ	0.03	-0.19***	-0.01	0.01	0.03	0.32***	-0.15***					
BDR	-0.01	-0.09**	0.01	-0.08*	0.22***	0.46***	0.04	0.38***				
LG	-0.22***	-0.07	-0.00	0.4***5	0.08*	0.25***	-0.08*	0.54***	0.18***			
GDP	0.01	-0.05	0.03	-0.05	0.00	0.04	-0.02	0.07	0.11**	0.09**		
INF	0.00	0.11**	0.15***	-0.04	-0.04	0.05	0.03	0.02	-0.01	-0.01	-0.23***	

Note. (***) denotes significance at 1%, (**) denotes significance at 5%, and (*) denotes significance at 10%.

Table 5

Estimation Outputs

	Credit risk		Liquidity risk		Operational risk		Regulatory risk	
	Islamic ⅄	Conventional ⅄	Islamic ⅄	Conventional ⅄	Islamic ✖	Conventional ⅄	Islamic ⅄	Conventional ⅄
NPL(-1)	0.2219	0.911***						
ATD (-1)			0.4164***	0.4041***				
OR(-1)					1.0244***	0.3371***		
CAR(-1)							0.8347***	0.8028***
DTA	-0.3089***	-0.0244***	0.0321	0.1005***	0.2342	0.0607***	-0.0124***	-0.0253***
CAR	-0.3332***	-0.3317***	0.0487	-0.3502***	0.4765*	-0.0028		
EPS	-0.0041**	-0.0001	0.0086***	0.0002	-0.0047*	0.0011***	0.0005***	0.0001
CTI	-0.2192***	0.1342***						
SIZ	-0.0325***	0.0130***	-0.0592***	-0.0378***	0.0595***	0.0116***	0.0009***	-0.0026
BDR	0.0565***	-0.0115***						
NPL			-0.1377**	-0.3819***	-0.1039	0.0101	-0.0049**	-0.1907***
LG			0.0730***	0.0017***				
ATD					0.0204***	0.0068	0.0001	-0.0358***
GDP	-0.0028***	-0.0032***	0.0145***	0.0053***	0.0037	-0.0034***	-0.0023***	-0.0029***
INF	-0.0075***	0.0011***	-0.0083***	0.0031***	0.0062***	0.0053***	-0.0006***	-0.0001
J-Statistic	73.4295	133.1287	137.6307	148.4732	12.2918	135.2542	132.3769	139.2425
p-VALUE	0.9964	0.5294	0.9964	0.5294	0.4225	0.4777	0.5956	0.4069
RSS	16.3910	0.2387	55.1217	1.1778	26.0201	0.1823	0.2563	0.2588

Note. Estimation results for Equations 1 to 4. Estimation technique = GMM-IV. The constant term is added to the instrument list, and orthogonal deviations are used for cross-section effects. Instrument variable list also includes the dynamic dependent variable in the second difference to control for the endogeneity problem. (***) denotes significance at 1%, (**) at 5%, and (*) at 10%. Estimations with (⅄) have White (diagonal) GMM weights used, and estimations with (✖) have White period (AB n-step) GMM weights used (depending on J-Statistic value and instrumental rank). White period (cross-section clusters) are used as the coefficient covariance method for all estimations to enable robust coefficient covariances.

The estimation results for the four equations are presented in Table 5. Starting with equation 1, the results of Islamic and conventional banks differ. For example, NPL does not show a significant association with its lagged term included in the model to control for the problem of endogeneity for IBs; however, for CBs, NPL shows a strong positive association. Similarly, firm performance (represented by EPS) does not help explain credit risk for CBs; however, in the case of IBs, the results show that improving firm performance reduces the credit risk. Another inconsistency between the results of IBs and CBs relates to the efficiency of the banks (represented by CTI). The results show that for IBs, improvement in bank efficiency reduces credit risk. On the contrary, for CBs, improvement in bank efficiency increases their credit risk. Similarly, bank size (represented by SIZ) also shows the same results. For IBs, an increase in the bank size reduces credit risk. On the contrary, the bank size of CBs shows a positive association with credit risk. This difference between how bank size impacts credit risk in IBs and CBs can be explained by the different lending practices of these banks. To be more specific, Siddiqui et al. (2022) highlighted that IBs are engaged in asset-backed financing, while adopting the profit-sharing model. The findings show that this lending approach limits their credit risk, that is, as the bank size increases, it lowers the credit risk arising from NPLs.

Moving to equation 2, the estimation results for IBs and CBs show significant differences. For example, derivative contracts increase the banks liquidity risk in case of CBs, but IBs show no such significant association. Capital adequacy (represented by CAR) also measures differently for IBs and CBs, where IBs show no association of CAR with liquidity risk. Whereas, CBs show that improving CAR reduces their liquidity risk, consistent with the theoretical understanding and prior literature. The reason for this discrepancy is better understood by considering the notions set forth by Belouafi (1993). Under the restrictions imposed by the *Shariah*, IBs use equity-based financing. These financing arrangements inherently confine the speculative risks that these banks are exposed to. Therefore, this reduces their reliance on CAR to manage their liquidity exposure, as shown by the findings of the study. However, this is not true for CBs which show CAR as an effective tool to manage their liquidity exposure.

Keeping in view the results obtained for equation 3, the use of derivative contracts shows a positive association with operational risk in case of CBs.

However, for IBs, it shows no such association. Moreover, the CAR of CBs also shows no association with operational risk, although it shows a positive relationship between these two variables for IBs. The results show that improving capital adequacy increases the operational risk for IBs. Firm performance, or EPS, also shows interesting results for IBs and CBs. For IBs, it shows a weak negative association with operational risk. However, for CBs, it shows a strong and positive association with operational risk. Jedidia and Hamza (2024) explained these contrasting findings between IBs and CBs. As *Shariah* discourages speculative activities, IBs arguably follow relatively more conserved operational practices as compared with their conventional counterparts. As such, IBs demonstrate a weaker association between performance and operational risk. Furthermore, the results show that improving firm performance increases operational risk for IBs but reduces it for CBs. ATD (representative of liquidity risk, as it shows the deposit structure of the bank) was also used as an explanatory variable for operational risk. It shows an association only in the case of IBs, showing that an increase in liquidity risk increases the operational risk of IBs as well. However, no such association is demonstrated for CBs which contradicts prior literature.

Finally, considering the estimation results for equation 4, significant differences exist in how explanatory variables impact regulatory or compliance risk for banks. However, before interpreting the results, it is important to note that CAR has been used to represent regulatory risk for the banks. Therefore, as CAR improves, the regulatory risk is reduced. Understanding this association of CAR and regulatory risk is important for interpreting the results. Focusing on firm performance, EPS shows a positive association with CAR for IBs but no association with CBs. For IBs, this means that improving firm performance causes an increase in CAR, indicating a reduction in regulatory risk. Bank size also shows the same results. For IBs, bank size shows a positive association with CAR, demonstrating that an increase in the bank size of IBs causes a reduction in regulatory risk. However, the bank size of CBs shows no such association. Similarly, liquidity risk (represented by ATD) shows a negative association with CAR and a positive association with regulatory risk for CBs. It shows no such association in the case of IBs. For CBs, increasing the liquidity risk also increases the regulatory risk by reducing the CAR.

Overall, the baseline findings support earlier literature. For example, Ahmed and Khan (2007) documented that IBs make sure that all their business practices and offerings comply with the *Shariah* laws. Due to their non-compliance with the *Shariah* rules, they cannot complete numerous transactions, which presents a fiduciary risk. Similarly, Radzi and Lonik (2016) argued that in comparison to CBs, IBs face more operational risk due to their unique characteristics. Due to this fact, they may find it difficult to obtain money from the markets quickly, which suggests that they face significantly higher liquidity risks than their conventional counterparts. Similarly, Grassa et al. (2020) found that owing to the greater risks encountered as compared to CBs, IBs are more inclined to prioritize sound management practices, including risk management, and disclose more information about potential hazards to gain stakeholders confidence. Consequently, profitable firms disclose more information, emphasizing their efficiency in maximizing shareholder wealth over other firms (Grassa et al., 2021). Referring to the efficiency of both types of banks, in general, IBs tend to perform well and their score remains relatively high for technical efficiency and managing investor funds in legitimate profit-sharing accounts, significantly improving their financial performance (Lahrech et al., 2014). In a similar vein, serval previous studies indicated that companies with greater success have a greater propensity to demonstrate their ability to control risk and produce quality performance (Elshandidy et al., 2013; Hasan et al., 2022; Linsley & Shrives, 2006).

Overall, three out of four risks tested in this study (credit, liquidity, and regulatory) showed different determinants for IBs and CBs. These findings support the theoretical foundations of IBs, suggesting that their nature significantly changes due to *Shariah*-compliance, at least in terms of the risks they encounter. However, whether these changes help them to remove social and distributive injustice from the society remains to be examined. For instance, Alhammadi et al. (2022) argued that performance measures of IBs cannot be used to assess if their performance is consistent with the Objectives of *Shariah*. Therefore, although the study findings advocate that risk determinants for IBs and CBs are overall different, nonetheless, whether the conventional risk measures help monitor if IBs are truly achieving their broader objective in the economies remains to be verified. Nonetheless, the findings of the current study do provide awareness and association of the determinants of risk for IBs. This can be used to further explore the usefulness of these conventional risk measures as key

performance indicators of IBs, considering their overall role in an Islamic economy.

Robustness Check

The robustness of the baseline results was tested by pooling the observations for IBs and CBs and re-estimating the results for restricted regression, which are subsequently tested using equation 5. The results of the F-test are presented in tables 6 through 9. The tables also state whether the coefficients are the same across the equations. The findings of the baseline regression are corroborated in the robustness check for all risks, except for the operational risk, which shows that the coefficients for equation 3 (operational risk) are the same in all groups (Table 9).

Table 6

Robustness Check – Equation 1 (Credit Risk)

	Credit risk		
	Islamic ⅄	Conventional ⅄	Combined ⅄
NPL(-1)	0.2219	0.9118***	0.6735***
DTA	-0.3089***	-0.0244***	-0.1499***
CAR	-0.3332***	-0.3317***	-0.3112**
EPS	-0.0041**	-0.0001	-0.0008*
CTI	-0.2192***	0.1342***	-0.0004
SIZ	-0.0325***	0.0130***	-0.0034
BDR	0.0565***	-0.0115***	0.0092**
GDP	-0.0028***	-0.0032***	-0.0022***
INF	-0.0075***	0.0011***	-0.0014***
Observations	219	220	439
RSS (Islamic + Conventional)			16.6298
RSS (Restricted)			22.9467
k (coefficients)			9
N(unrestricted) - 2K			421
F-Statistic			12.877321***
p-Value			0.0000

Note. (***) denotes significance at 1%, (**) denotes significance at 5%, and (*) denotes significance at 10%. Additionally, estimations with (⅄) have White (diagonal) GMM weights used. White period (cross-section clusters) are used as the coefficient covariance method for all estimations to enable robust coefficient covariances.

Table 7
Robustness Check – Equation 2 (Liquidity Risk)

	Liquidity risk		
	Islamic ⅄	Conventional ⅄	Combined ⅄
ATD (-1)	0.4164***	0.4041***	0.5076***
DTA	0.0321	0.1005***	0.1329***
CAR	0.0487	-0.3502***	-0.2366*
EPS	0.0086***	0.0002	-0.0003
SIZ	-0.0592***	-0.0378***	0.0166***
NPL	-0.1377**	-0.3819***	-0.2941*
LG	0.0730***	0.0017***	0.0041
GDP	0.0145***	0.0053***	0.0085***
INF	-0.0083***	0.0031***	-0.0029***
Observations	219	220	439
RSS (Islamic + Conventional)			56.2995
RSS (Restricted)			65.2262
k (coefficients)			9
N(unrestricted) - 2K			421
F-Statistic			6.40191***
p-Value			0.0000

Note. (***) denotes significance at 1%, (**) denotes significance at 5%, and (*) denotes significance at 10%. Additionally, estimations with (⅄) have White (diagonal) GMM weights used. White period (cross-section clusters) are used as the coefficient covariance method for all estimations to enable robust coefficient covariances.

Table 8
Robustness Check – Equation 3 (Operational Risk)

	Operational risk		
	Islamic ⅄	Conventional ⅄	Combined ⅄
OR(-1)	1.0244***	0.3371***	1.0893***
DTA	0.2342	0.0607***	0.1495***
CAR	0.4765*	-0.0028	0.2025***
EPS	-0.0047*	0.0011***	-0.0023
SIZ	0.0595***	0.0116***	0.0536***
NPL	-0.1039	0.0101	0.1348*
ATD	0.0204***	0.0068	0.0197***
GDP	0.0037	-0.0034***	0.0057***
INF	0.0062***	0.0053***	0.0057***

	Operational risk		
	Islamic ✖	Conventional ⅄	Combined ✖
Observations	219	220	439
		26.2023	
RSS (Restricted)			26.2073
k (coefficients)			9
N(unrestricted) - 2K			421
F-Statistic			0.0089
p-Value			1.0000

Note. (***) denotes significance at 1%, (**) denotes significance at 5%, and (*) denotes significance at 10%. Additionally, estimations with (⅄) have White (diagonal) GMM weights used, and estimations with (✖) have White period (AB n-step) GMM weights used (depending on J-Statistic value and instrumental rank). White period (cross-section clusters) are used as the coefficient covariance method for all estimations to enable robust coefficient covariances.

Table 9

Robustness Check – Equation 4 (Regulatory Risk)

	Regulatory risk		
	Islamic ⅄	Conventional ⅄	Combined ✖
CAR(-1)	0.8347***	0.8028***	0.88866***
DTA	-0.0124***	-0.0253***	-0.02981***
EPS	0.0005***	0.0001	-7.6E-05
SIZ	0.0009***	-0.0026	0.00242***
NPL	-0.0049**	-0.1907***	-0.05932***
ATD	0.0001	-0.0358***	0.00255
GDP	-0.0023***	-0.0029***	-0.00293***
INF	-0.0006***	-0.0001	-0.00038**
Observations	219	220	439
		0.5151	
RSS (Restricted)			0.5999
k (coefficients)			8
N(unrestricted) - 2K			423
F-Statistic			7.473694***
p-Value			0.0000

Note. (***) denotes significance at 1%, (**) denotes significance at 5%, and (*) denotes significance at 10%. Additionally, estimations with (⅄) have

White (diagonal) GMM weights used, and estimations with (✖) have White period (AB n-step) GMM weights used (depending on J-Statistic value and instrumental rank). White period (cross-section clusters) are used as the coefficient covariance method for all estimations to enable robust coefficient covariances.

Conclusion

The current study examined the impact of risk exposure on Islamic and conventional banks of Pakistan. After performing the estimations, it was found that the results of Islamic and conventional banks differ. For example, NPL does not show a significant association with its lagged term. Similarly, firm performance does not explain credit risk for CBs. Whereas, in the case of IBs, it shows that improving firm performance reduces credit risk. Similarly, where the results of IBs and CBs relate to the efficiency of the banks, it shows that for IBs any improvement in efficiency reduces credit risk. Whereas, for CBs, any improvement in the banks' efficiency increases their credit risks. Further, in terms of bank size, a positive association was found for CBs. Whereas, in the case of IBs, the study found a negative association. Similarly, for derivative contracts, the study found a positive association with operational risk for CBs and no association for IBs.

Implications

The findings have significant theoretical and policy implications. Starting with theoretical contribution, the current study links the finance theory (in terms of risk and return) with the Islamic economic theory. Regarding policy implications, the findings provide valuable insights for Pakistans regulatory and standard-setting institutions when developing governing regulations, risk management, and overall operational policies and frameworks for IBs and CBs. The inherent differences in the overall functioning of IBs and CBs make their anatomy of risk significantly different. As such, the governing regulations, for example, the Prudential Regulations (SBP, 2023a) issued by the SBP, need to account for these differences. The findings also provide insights to the governing bodies of the banks regarding the most efficient ways to approach different types of risks. Risk is a subjective and a complex area. Understanding different exposures to the banks and their determinants is important when considering risk management from a broader lens. The findings provide such insights to management to consider the factors that can help improve

banks management of different types of risk s, depending on whether they are conventional or Islamic.

Limitations

Finally, the limitations of the current study can be seen as avenues for future research. Firstly, the study focuses only on Pakistan. Future studies can examine the risk determinants for CBs and IBs at the global level to consider if the current findings also hold internationally. Secondly, the study focuses only on determinants, while future studies can focus on management techniques to determine whether IBs and CBs manage their risk exposure differently or not. Finally, although this study introduces derivatives when performing estimations, the derivatives area remains underexplored in Pakistan, overall. Future studies can explore this area to see how the financial sector uses derivatives, whether derivatives reduce bank exposure, as well as the preferences between different derivative instruments among the banks.

Conflict of Interest

The authors of the manuscript have no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

Data Availability Statement

The data associated with this study will be provided by the corresponding author upon request.

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References

Abdullah, M., Shahimi, S., & Ismail, A. G. (2011). Operational risk in Islamic banks: Examination of issues. *Qualitative Research in Financial Markets*, *3*(2), 131–151. https://doi.org/10.1108/17554171111155366

Accornero, M., Cascarino, G., Felici, R., Parlapiano, F., & Sorrentino, A. M. (2018). Credit risk in banks' exposures to non-financial firms. *European Financial Management*, *24*(5), 775–791. https://doi.org/10.1111/eufm.12138

Ahmed, H. & Khan, T. (2007). Risk management in Islamic banking. In M. K. Hassan & M. K. Lewis (Eds.), *Hand book of Islamic banking* (pp. 144–158). Edward Elgar Publishing.

Albaity, M., Mallek, R. S., & Noman, A. H. M. (2019). Competition and bank stability in the MENA region: The moderating effect of Islamic versus conventional banks. *Emerging Markets Review*, *38*, 310–325. https://doi.org/10.1016/j.ememar.2019.01.003

Alhammadi, S., Alotaibi, K. O., & Hakam, D. F. (2022). Analysing Islamic banking ethical performance from Maqāṣid al-Sharī ‘ah perspective: Evidence from Indonesia. *Journal of Sustainable Finance & Investment*, *12*(4), 1171–1193. https://doi.org/10.1080/20430795.2020.1848179

Barakat, A., & Hussainey, K. (2013). Bank governance, regulation, supervision, and risk reporting: Evidence from operational risk disclosures in European banks. *International Review of Financial Analysis*, *30*, 254–273. https://doi.org/10.1016/j.irfa.2013.07.002

Basiruddin, R., & Ahmed, H. (2020). Corporate governance and Shariah non-compliant risk in Islamic banks: Southeast Asian evidence. *Corporate Governance*, *20*(2), 240–262. https://doi.org/10.1108/CG-05-2019-0138

Belouafi, A. (1993). *Asset and liability management of an interest free Islamic bank* [Doctoral dissertation, University of Sheffield]. White Rose eTheses Online. https://etheses.whiterose.ac.uk/id/eprint/4221/

Bhatti, M. (2019). Managing Shariah noncompliance risk via Islamic dispute resolution. *Journal of Risk and Financial Management*, *13*(1), Article e2. https://doi.org/10.3390/jrfm13010002

Bilgin, M. H., Danisman, G. O., Demir, E., & Tarazi, A. (2021a). Bank credit in uncertain times: Islamic vs. conventional banks. *Finance Research Letters*, *39*, Article e101563. https://doi.org/10.1016/j.frl.2020.101563

Bilgin, M. H., Danisman, G. O., Demir, E., & Tarazi, A. (2021b). Economic uncertainty and bank stability: Conventional vs. Islamic banking. *Journal of Financial Stability*, *56*, Article e100911. https://doi.org/10.1016/j.jfs.2021.100911

Bitar, M., Naceur, M. S. B., Ayadi, R., & Walker, T. (2017). *Basel compliance and financial stability: Evidence from Islamic banks* (Working Paper No.17/161). International Monetary Fund. https://www.imf.org/en/Publications/WP/Issues/2017/07/18/Basel-Compliance-and-Financial-Stability-Evidence-from-Islamic-Banks-45040

Boukhatem, J., & Djelassi, M. (2020). Liquidity risk in the Saudi banking system: Is there any Islamic banking specificity? *The Quarterly Review of Economics and Finance*, *77*, 206–219. https://doi.org/10.1016/j.qref.2020.05.002

Butt, A. A., Rizavi, S., Nazir, M. S., & Majid, A. (2021). Corporate derivatives use and firm value: Evidence from Pakistan stock exchange. *International Journal of Management*, *12*(3), 1197–1203. https://doi.org/10.34218/IJM.12.3.2021.113

Butt, M. A., Ayub, H., Latif, B., Asif, F., Shabbir, M. S., & Raja, A. A. (2022). Financial risks and performance of conventional and Islamic banks: Do reputational risk matters? *Journal of Islamic Accounting and Business Research*, *13*(4), 581–595. https://doi.org/10.1108/JIABR-10-2020-0336

Chaffai, M., & Hassan, M. K. (2019). Technology Gap and Managerial Efficiency: A Comparison between Islamic and Conventional Banks in MENA. *Journal of Productivity Analysis*, *51*(1), 39–53. https://doi.org/10.1007/s11123-019-00544-x

Chamberlain, T., Hidayat, S., & Khokhar, A.R. (2020), Credit risk in Islamic banking: Evidence from the GCC. *Journal of Islamic Accounting and Business Research*, *11*(5), 1055–1081. https://doi.org/10.1108/JIABR-09-2017-0133

Cheng, M., & Qu, Y. (2020). Does bank FinTech reduce credit risk? Evidence from China. *Pacific Basin Finance Journal*, *63*, Article e101398. https://doi.org/10.1016/j.pacfin.2020.101398

Elamer, A. A., Ntim, C. G., Abdou, H. A., & Pyke, C. (2020). Sharia supervisory boards, governance structures and operational risk disclosures: Evidence from Islamic banks in MENA countries. *Global Finance Journal*, *43*, Article e100488. https://doi.org/10.1016/j.gfj.2019.100488

Elshandidy, T., Fraser, I., & Hussainey, K. (2013). Aggregated, voluntary, and mandatory risk disclosure incentives: Evidence from UK FTSE all-share companies. *International Review of Financial Analysis*, *30*, 320–333. https://doi.org/10.1016/j.irfa.2013.07.010

Esposito, J. L., & Delong-Bas, N. J. (2018). *Shariah - what everyone needs to know*. Oxford University Press.

Fakhri, U. N., & Darmawan, A. (2021). Comparison of Islamic and conventional banking financial performance during the Covid-19 Period. *International Journal of Islamic Economics and Finance*, *4*(SI), 19–40. https://doi.org/10.18196/ijief.v4i0.10080

Fan, J. P. H., Wei, K. C. J., & Xu, X. (2011). Corporate finance and governance in emerging markets: A selective review and an agenda for future research. *Journal of Corporate Finance*, *17*(2), 207–214. https://doi.org/10.1016/j.jcorpfin.2010.12.001

Farooqi, M. F., & O'Brien, J. (2019). A comparison of the impact of the Basel standards upon Islamic and conventional bank risks in the Gulf state region. *Journal of Islamic Accounting and Business Research*, *10*(2), 216–235. https://doi.org/10.1108/JIABR-10-2016-0125

Ghenimi, A., Chaibi, H., & Omri, M. A. B. (2021). Liquidity risk determinants: Islamic vs conventional banks. *International Journal of Law and Management*, *63*(1), 65–95. https://doi.org/10.1108/IJLMA-03-2018-0060

Government of Pakistan. (2007). *Draft companies regulations*. https://www.secp.gov.pk/document/sro-423-i2017-draft-companies-incorporation-regulations-2017/?wpdmdl=28551

Grassa, R., Moumen, N., & Hussainey, K. (2020). Is bank creditworthiness associated with risk disclosure behavior? Evidence from Islamic and conventional banks in emerging countries. *Pacific-Basin Finance Journal*, *61*, Article e101327. https://doi.org/10.1016/j.pacfin.2020.101327

Grassa, R., Moumen, N., & Hussainey, K. (2021). What drives risk disclosure in Islamic and conventional banks? An international comparison. *International Journal of Finance and Economics*, *26*(4), 6338–6361. https://doi.org/10.1002/ijfe.2122

Gull, M., & Khan, A. U. (2023). Impact of the Islamic modes of finance on the profitability of Islamic banking sector in Pakistan. *Islamic Banking & Finance Review*, *10*(1), 1–23. https://doi.org/10.32350/ibfr.101.01

Handayani, B. D., Rohman, A., Chariri, A., & Pamungkas, I. D. (2020). Corporate financial performance on corporate governance mechanism and corporate value: Evidence from Indonesia. *Montenegrin Journal of Economics*, *16*(3), 161–171. https://doi.org/10.14254/1800-5845/2020.16-3.13

Hankins, K. W. (2011). How do financial firms manage risk? Unraveling the interaction of financial and operational hedging. *Management Science*, *57*(12), 2197–2212. https://doi.org/10.1287/mnsc.1090.1068

Hasan, B. M., Rabbani, R. M., Sarker, T., Akter, T., & Hasan, S. M. (2022). Role of risk disclosure on creditworthiness and driving forces of risk disclosure of banks: Islamic vs conventional banks. *International Journal of Islamic and Middle Eastern Finance and Management*, *16*(5), 892–909. https://doi.org/10.1108/IMEFM-01-2022-0008

Hassan, M. K., Khan, A., & Paltrinieri, A. (2019). Liquidity risk, credit risk and stability in Islamic and conventional banks. *Research in International Business and Finance*, *48*, 17–31. https://doi.org/10.1016/j.ribaf.2018.10.006

Hassan, S. G. (2021). The Funding Liquidity Risk and Bank Risk: A Review on the Islamic and Conventional Banks in Pakistan. *Hamdard Islamicus*, *43*(1), 83–101. https://doi.org/10.57144/hi.v43i1.38

Heflin, F., Shaw, K. W., & Wild, J. J. (2011). Credit ratings and disclosure channels. *Research in Accounting Regulation*, *23*(1), 20–33. https://doi.org/10.1016/j.racreg.2011.03.004

Hoque, H., & Liu, H. (2023). Impact of bank regulation on risk of Islamic and conventional banks. *International Journal of Finance & Economics*, *28*(1), 1025–1062. https://doi.org/10.1002/ijfe.2462

Huan, X., & Parbonetti, A. (2019). Financial derivatives and bank risk: Evidence from eighteen developed markets. *Accounting and Business Research*, *49*(7), 847–874. https://doi.org/10.1080/00014788.2019.1618695

Hussain, K., Sheikh, R., Qayyum, A., & Abbasi, S. N. (2024). Macroeconomic conditions as determinants of profitability and risk: A comparison of Islamic and conventional banks in Pakistan. *Islamic Banking & Finance Review*, *11*(1), 1–21. https://doi.org/10.32350/ibfr.111.01

İncekara, A., & Çetinkaya, H. (2019a). Credit Risk Management: A Panel Data Analysis on the Islamic Banks in Turkey. *Procedia Computer Science, 158*, 947–954. https://doi.org/10.1016/j.procs.2019.09.135

İncekara, A., & Çetinkaya, H. (2019b). Liquidity risk management: A comparative analysis of panel data between Islamic and conventional banking in Turkey. *Procedia Computer Science*, *158*, 955–963. https://doi.org/10.1016/j.procs.2019.09.136

Jedidia, K. B., & Hamza, H. (2024). Does PLS in Islamic banking limit excessive money creation? *Journal of Islamic Accounting and Business Research*, *15*(3), 422–442. https://doi.org/10.1108/JIABR-02-2022-0047

Julia, T., & Kassim, S. (2020). Exploring green banking performance of Islamic banks vs conventional banks in Bangladesh based on Maqasid Shariah framework. *Journal of Islamic Marketing*, *11*(3), 729–744. https://doi.org/10.1108/JIMA-10-2017-0105

Keffala, M. R. (2021). How using derivative instruments and purposes affects performance of Islamic banks? Evidence from CAMELS approach. *Global Finance Journal*, *50*, Article e100520. https://doi.org/10.1016/j.gfj.2020.100520

Khalid, S., & Amjad, S. (2012). Risk management practices in Islamic banks of Pakistan. *The Journal of Risk Finance*, *13*(2), 148–159. https://doi.org/10.1108/15265941211203198

Khan, N., Ramzan, M., Kousar, T., & Shafiq, M. S. (2023). Impact of bank-specific factors on credit risk: Evidence from Islamic and conventional banks of Pakistan. *Pakistan Journal of Humanities and Social Sciences*, *11*(1), 580–592. https://doi.org/10.52131/pjhss.2023.1101.0375

Khawaja, R., Nawaz, U., & Aman, D. (2023). *Evaluating the impact of bank distress on the financial performance of commercial vs Islamic banks in Pakistan*. Social Science Research Network. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4382721

Koju, L., Koju, R., & Wang, S. (2020), Macroeconomic determinants of credit risks: Evidence from high-income countries. *European Journal of Management and Business Economics*, *29*(1), 41–53. https://doi.org/10.1108/EJMBE-02-2018-0032

Kunz, J., & Heitz, M. (2021). Banks risk and management control systems: A systematic literature review. *Journal of Management Control*, *32*, 439–493. https://doi.org/10.1007/s00187-021-00325-4

Lahrech, N., Lahrech, A., & Boulaksil, Y. (2014). Transparency and performance in Islamic banking: Implications on profit distribution. *International Journal of Islamic and Middle Eastern Finance and Management*, *7*(1), 61–88. https://doi.org/10.1108/IMEFM-06-2012-0047

Linsley, P. M., & Shrives, P. J. (2006). Risk reporting: A study of risk disclosures in the annual reports of UK companies. *The British Accounting Review*, *38*(4), 387–404. https://doi.org/10.1016/j.bar.2006.05.002

Masud, M. K. (1975). Recent studies of shā ṭibīs al -muwāfaqāt. *Islamic Studies*, *14*(1), 65–75.

Mohammad, S., Asutay, M., Dixon, R., & Platonova, E. (2020). Liquidity risk exposure and its determinants in the banking sector: A comparative analysis between Islamic, conventional and hybrid banks. *Journal of International Financial Markets, Institutions and Money*, *66*, Article e101196. https://doi.org/10.1016/j.intfin.2020.101196

Mondello, G., & Smaoui, N. B. A. (2021). *Agency theory and bank governance: A study of the effectiveness of CEOs remuneration for risk taking*. HAL-SHS. https://shs.hal.science/halshs-03502607/document

Mutamimah, M., & Saputri, P. L. (2023). Corporate governance and financing risk in Islamic banks in Indonesia. *Journal of Islamic Accounting and Business Research*, *14*(3), 436–450. https://doi.org/10.1108/JIABR-09-2021-0268

Naili, M., & Lahrichi, Y. (2022). The determinants of banks' credit risk: Review of the literature and future research agenda. *International Journal of Finance and Economics*, *27*(1), 334–360. https://doi.org/10.1002/ijfe.2156

Neifar, S., Salhi, B., & Jarboui, A. (2020). The moderating role of Shariah supervisory board on the relationship between board effectiveness, operational risk transparency and bank performance. *International Journal of Ethics and Systems*, *36*(3), 325–349. https://doi.org/10.1108/IJOES-09-2019-0155

Oahn, T. T. K., Nguyen, D. V., Le, H. V., & Duong, K. D. (2023). How capital structure and bank liquidity affect bank performance: Evidence from the Bayesian approach. *Cogent Economics & Finance*, *11*(2), Article e2260243. https://doi.org/10.1080/23322039.2023.2260243

Ofori-Abebrese, G., Pickson, R. B., & Opare, E. (2016). The effect of bank specific factors on loan performance of HFC bank in Ghana. *International Journal of Economics and Finance*, *8*(7), 185–192. http://dx.doi.org/10.5539/ijef.v8n7p185

Oyewo, B. (2022). Enterprise risk management and sustainability of banks performance. *Journal of Accounting in Emerging Economies*, *12*(2), 318–344. https://doi.org/10.1108/JAEE-10-2020-0278

Paltrinieri, A., Dreassi, A., Rossi, S., & Khan, A. (2021). Risk-adjusted profitability and stability of Islamic and conventional banks: Does revenue diversification matter? *Global Finance Journal*, *50*, Article e100517. https://doi.org/10.1016/j.gfj.2020.100517

Purwanto, P., Bustaram, I., Subhan, S., & Risal, Z. (2020). The effect of good corporate governance on financial performance in conventional and Islamic banks: An empirical study in Indonesia. *International Journal of Economics and Financial Issues*, *10*(3), 1–6. https://doi.org/10.32479/ijefi.9139

Radzi, R. M. & Lonik, K. A. T. (2016). Islamic banks' risks: Its rating methodology and shariah assessment solutions. *Journal of Islamic Banking and Finance*, *4*(2), 48–60.

Rahahleh, N. A., Ishaq Bhatti, M., & Najuna Misman, F. (2019). Developments in risk management in Islamic finance: A review. *Journal of Risk and Financial Management*, *12*(1), Article e37. https://doi.org/10.3390/jrfm12010037

Ratnasari, N. G., Hati, S. R. H., & Chalid, D. A. (2021). Full-fledged vs Islamic bank windows: Which one do Muslim consumers know better

and prefer more? *IQTISHADIA*, *14*(2), 301–311. https://doi.org/10.21043/iqtishadia.v14i2.9967

Rizvi, S. A. R., Arshad, S., & Lahsasna, A. (2014). Derivatives in Islamic finance: The need and mechanisms available. *International Journal of Financial Services Management*, *7*(3/4), 177–195. https://doi.org/10.1504/IJFSM.2014.065572

Safiullah, M. (2021). Financial stability efficiency of Islamic and conventional banks. *Pacific Basin Finance Journal*, *68*, Article e101587. https://doi.org/10.1016/j.pacfin.2021.101587

Saiful, S., & Ayu, D. P. (2019). Risks management and bank performance: The empirical evidences from Indonesian conventional and Islamic banks. *International Journal of Economics and Financial Issues*, *9*(4), 90–94. https://doi.org/10.32479/ijefi.8078

Salem, R., Usman, M., & Ezeani, E. (2021). Loan loss provisions and audit quality: Evidence from MENA Islamic and conventional banks. *Quarterly Review of Economics and Finance*, *79*, 345–359. https://doi.org/10.1016/j.qref.2020.07.002

Sharifi, S., Haldar, A., & Rao, S. V. D. N. (2019). The relationship between credit risk management and non-performing assets of commercial banks in India. *Managerial Finance*, *45*(3), 399–412. https://doi.org/10.1108/MF-06-2018-0259

Siddiqui, O., Khaleequzzaman, M., & Afzal. M. S. (2022). Accounting for Ijarah–Reviewing the need for exclusive accounting standards. *Journal of Islamic Business and Management*, *12*(2), 198–217.

Siddiqui, O., Khan, N., & Sohail, M. K. (2024). The three ESG pillars, firm value and financial performance: A comparison of developed and emerging markets. *NICE Research Journal*, *17*(2), 1–14. https://doi.org/10.51239/nrjss.v17i2.446

Siddiqui, O., Sohail, M. K., & Niazi, B. (2023). Setting CEO remuneration in Pakistan: Comparing theory and practice. *Journal of Innovative Research in Management Sciences*, *4*(1), 18–34. https://doi.org/10.62270/jirms.v4i1.41

Smaoui, H., Salah, I. B., & Diallo, B. (2020). The determinants of capital ratios in Islamic banking. *Quarterly Review of Economics and Finance*, *77*, 186–194. https://doi.org/10.1016/j.qref.2019.11.002

State Bank of Pakistan. (2023a). *Prudential regulations.* https://www.sbp.org.pk/publications/prudential/index.htm

State Bank of Pakistan. (2023b). *SBP regulated institutes*. https://www.sbp.org.pk/f_links/f-links.asp

The Pakistan Code. (1962). *The banking companies ordinance*. https://pakistancode.gov.pk/english/UY2FqaJw1-apaUY2Fqa-cJ%2BV-sg-jjjjjjjjjjj

Us, V. (2017). Dynamics of non-performing loans in the Turkish banking sector by an ownership breakdown: The impact of the global crisis. *Finance Research Letters*, *20*, 109–117. https://doi.org/10.1016/j.frl.2016.09.016

Usmani, T. M. (2005). *An introduction to Islamic finance*. Idara Isha'at-E-Diniyat (P) Ltd.

Vuillemey, G. (2019). Bank interest rate risk management. *Management Science*, *65*(12), 5933–5956. https://doi.org/10.1287/mnsc.2018.3125

Widarjono, A. (2020). Stability of Islamic banks in Indonesia: Autoregressive Distributed lag approach. *Jurnal Keuangan Dan Perbankan*, *24*(1), 40–52. https://doi.org/10.26905/jkdp.v24i1.3932.

Zainuldin, M. H., & Lui, T. K. (2020). Earnings management in financial institutions: A comparative study of Islamic banks and conventional banks in emerging markets. *Pacific Basin Finance Journal*, *62*, Article e101044. https://doi.org/10.1016/j.pacfin.2018.07.005