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UNLEASHING INSIGHTS: EXPLORING THE NEXUS BETWEEN FUNDING LIQUIDITY RISK AND BANK RISK TAKING IN PAKISTANI BANKS THROUGH THE GENERALIZED METHOD OF MOMENTS (GMM) TECHNIQUE

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Abstract

This study examines the effects of funding liquidity risk FLR and liquidity risk LR on bank risk taking BRT in Pakistan in Pakistan before and after financial crises through an application of system GMM model. The study focuses on the funding liquidity risk and BRT behavior in developing economies (Pakistan). Bank deposits indirectly fund banks which mitigates liquidity risk, less attention has been paid to the context of the Pakistani banking system.The study selects the banking sector of Pakistan. Data was collected from banks listed in state banks of Pakistan from the period of 2007 to 2017. The study applied System GMM model to the data analyzes. The outcomes show that the increasing in bank's taking of risk when decreasing FLR and increasing LR. Our result also showed that BRT is decreased by increasing FLR and decreasing LR. The chances of Bank de-fault are increased by lower Funding of Liquidity and increases in LR without financial crises respectively. The results revealed there is negative effect of Bank Activity on BRT this means that banks are less influence by crises due to their activities and banks have many opportunities to mitigate their risky activity to less risky activity.To generalize and enhance the information for the banker, policymakers as

well as practitioners. Previously unidentified factors of risk, specifically their influences on BRT contribute to the view in support the more liquidity securities hold than in the past.

Keywords **:** *Funding liquidity, liquidity risk, Risk-taking, Pakistan, System GMM.*

Introduction

To Build strong business relations with the customer and to profitably and securely for business transactions, the banks must control as arbitrators their supply and demand of the liquidity., If the firms face difficulties in handling this demand and supply then it can lead to explicit asymmetrical disclosure i.e. the reputation of the bank is affected due to maintaining the high interest rate risk and highest bank reserves (Anees, Iftikhar, & Rizvi, 2023). In adverse economic conditions in the country, liquidity problems emerge in the banks because of the unpredictable withdrawal of funds by the customer. The universal financial crunch (2007-2008) likewise emerged when the banks were unsuccessful in giving liquidity to the customer. Several business opportunities are lost due to liquidity problems with banks. The country's institutions and environment are influencing bank behavior and its related risk (Tahir, Lai, Jan, & Shah, 2023). Due to the liquidity problems in 2008, Pakistani banks also face a complexity in lending to the private sector. Many business opportunities have been lost due to liquidity problems (Ayub, Alhabshi, Othman, & Research, 2023).

Bank also plays an important role in payment settlement, and delivery of goods and services, they help to develop industries, due to various functions executed by the banks which depicts them to liquidity problems – the problem that banks possibly will not satisfy commitments (Boamah, Opoku, & Boakye-Dankwa, 2023). The liquidity problem is the root cause of excessive risk-taking of banks in crises. There is a negative effect of crises on the BRT behavior of different countries (El Mahdy, 2023). The formal and casual financial institutions, which are different in every country, manipulate the domestic and exterior working situation of banks, increasing the cross-country discrepancy in BRT behavior. BRT is reduced due to the enhanced governance structure (Harsono, 2024). The risk-taking behavior of banks is affected by liquidity risk which is the driving risk factor of bank risk. Banks take risks when the probability of loss increases due to the bank's inability to fulfill the obligation of required funds then extra costs occur and liquidity risk increases. FL plays a very significant role in transferring funds to economic parts that have a chance but are deficient in funds from surplus economic parts. Banks arrange funds from depositors, and must guarantee them that they will provide their funds reverse

according to the contract (Golubeva, Duljic, & Keminen, 2019).

The ability of bank to pay its liabilities on time when become due is known as funding liquidity (Widarjono, Wijayanti, & Suharto, 2022). Funding liquidity also gives reasonable consideration to more perception regarding the probable association between Funding Liquidity and BRT (Vuong, Phan, Nguyen, Nguyen, & Duong, 2023). To meet day-to-day business activities and unsure cash prerequisites in the future, financial institutions will have to manage their funds to mitigate the risk. Liquidity risk arises due to systematic asset or liquidity shock & and idiosyncratic or institution-specific shock. Systematic shock such as a recession. (The Enormous Depression), Oil Price Shocks of the middle of 1970, in the US in 1987 stock market, and in Japan in late 1980 the real state crashes. Idiosyncratic or intuitional shock arises due to fraud, accounting irregularities, legal settlement, and poor risk management. The Pakistani Banking system is facing both liquidity shock as well as institution-specific shock (V. V. Acharya, Anshuman, & Viswanathan, 2024).

Like other Asian country's banking systems like Sri Lanka, Bangladesh and India, the Pakistani banking sector play a significant role in the growth and development of economy, by funding to public and private sectors. State Bank of Pakistan (SBP) is responsible and makes policy to regulate all sectors of banks and "Development Financial Institutions (DFIs)" in Pakistan, (SBP, 1962). SBP became an independent body for banking management in the year 1997 through amendments in banking laws. According to the said ordinance by section 40 (A), it is the responsibility of the SBP to supervise, develop rules and regulations, and make sure all compliances of bank and routine with the defined criteria. Action can be taken by the State Bank of Pakistan against any non-compliance issue of the banking companies (V. V. Acharya, Chauhan, Rajan, & Steffen, 2023).

The structure of Pakistani banks contains 34 banks, DFIs, and non-banking finance companies that are excluded by the SBP. Structurally, the Pakistani banking sector is divided into four categories i.e.; Specialized banks (4), foreign banks (4), Public sector commercial banks (5), and Domestic Private Banks (21) (SBP, 2017).

Problem Statement

Many studies have been done on the behavior of risk-taking by banks in several countries in the world and it is found from previous research that banks are taking excess risk due to problems of liquidity. However, there is a gap in the literature remains. Many studies have been conducted on the activities of banks' lending, which is, the balance sheet of banks, specifically the asset part gives very diminutive consideration to another part of the balance sheet (Binsaddig, Ali, Ali, & Alkawi, 2023; Mubarik, Akhtar, Hassan, & Jalil, 2023; Pham, Dao, & Nguyen, 2021). Bank risk tanking. Behavior affects the profitability and performance of banks. However, most of the studies focus on the Funding liquidity risk and BRT behavior in

developed economies (Sabahat, 2017). Bank deposits indirectly fund banks which mitigates liquidity risk have lack of attention on the context of the Pakistani banking system.

There are different views about BRT behavior of banks. LR are measured by asset size on the balance sheet and by liability size on the balance sheet in some studies (SBP, 2023). There is little empirical measurement of the banking system of developing countries like Pakistan because most research focuses on developed or advanced economies (Huynh, 2023). A bank's liquidity profile is typically evaluated by the ratio of liquid assets to total assets, the loan-to-deposit ratio, and the maturity profile of its assets and liabilities. As a result, the purpose of this study is to fill this gap.

Moreover, banks' Liquidity is important for the smooth transaction of the economy because, without banks' liquidity, the wheel of the economy rotates hard. Due to the significance of banks and their liquidity, it has been revealed these facts by the current financial turmoil of 2007-08 that if banks do not perform well, the economies do not do well (Nasution, Yafiz, & Anggraini, 2023). The reputation and performance of a bank are influenced by LR. If the fund is not provided to their accountholder on time well then, the confidence of accountholders might be lost to its banks (Mahmood, Ali, Riaz, Riaz, & Azad, 2023). "The Basel Committee on Banking Supervision (BCBS) has presented Basel III reforms after the global financial crises". The main function of Basel III is to minimize the influence of BRT behavior on the economy. As a major aspect of Basel III usage in Pakistan, the State Bank of Pakistan expects to execute previously mentioned norms and checking apparatuses from 2017 comprehensively by the BCBS courses of events. The major function of BASEL III strengthen the regulation, supervision, and risk management of banks (Shonhadji & Irwandi, 2023).

Research Objectives

The purposes is to analyze the impact of FLR and LR on BRT behavior of banks in Pakistan before and after financial crises through an application of system GMM model.

Research Questions

Several questions were raised due to the risk-taking behavior of banks in Pakistan's economies that corroborate for formulating a valuable strategy.

1) *Is BRT affected by Funding Liquidity Risk?*
2) *Is BRT affected by Liquidity risk?*
3) *Is BRT affected by bank activity?*

Significance of the study

The study would be valuable and helpful for the Bank's Manager to make policies & and regulations for managing funds and investments and making the right decision at the right time, due to which bank takes less risk. The results of this research will be helpful & and add to the body of existing knowledge for academics and researchers for control purposes.

Many folds contribute to this research. Firstly, the study imparts to present literature on BRT & and liquidity risk management (Galletta & Mazzù, 2019; Gazali, Zeeshan, Aziz, & Khan, 2023; Githaiga, 2023). Secondly, the paper will inspect, by considering Pakistan's economies, the potential association with LR, FLR, and BRT of the bank, using data from Pakistani Banks. The inspiration driving exploring bank liquidity of Pakistani banks is that they are pushed toward monetary change and are estimated to become leaders of other Asian countries like Bangladesh, Sri Lanka, Iran, and India economy in the future. The enhancing financial system of advancement in the nation will request private divisions to get their venture financed through banks in the coming years. The China-Pakistan Economic Corridor is the imperative and joint wander of Pakistan and China. This is a well-established actuality that the worldview of energy has been moving towards the East from the West. Due to China Pakistan Economic Corridor (CPEC) Pakistani banks are almost certainly moving to have their probable recommendation in the advancement extended which should create a further flow of returns for them later on. Thirdly, this exploration will offer strategy creators to facilitate considerations regarding the significance of holding an adequate measure of liquidity and how it enhances the solidness of the money-related framework.

Limitations

There are some limitations in which the researcher has to complete their entire research in a particular period but it also provides the opportunity for the researcher to further research on these particular variables. As it is academic research and we have a very limited period to conduct this study, therefore it is only limited to a Sample of 30 banks that are listed in Pakistan.

Organization of the study

As shown in the following image, the Left side of the paper is as follows. Segment 2 contains the literature survey. The procedure is discussed in Chapter 3. In segment 5, the limitations of the investigation are discussed, together with a description of the outcomes, their exchange, and their conclusion.

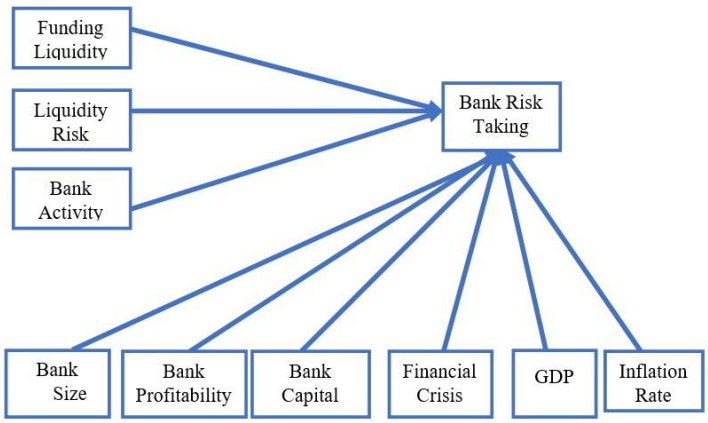
Literature Review/Theoretical Background

LR and FLR both have an indirect and significant effect on those banks who work on the behavior of risk-taking as highlighted by previous literature. Brenner and Allen, 1985 showed based on option pricing theory that those financial intermediaries who have to face funding situations have imperatives edges of arbitrage. Those treasury securities that have a cross-section are identified and measured in the

funding liquidity value. For verification of explanations, we create a relationship with the whole economy, banking sector, and in-formal market while having funding edges. Risk has been transformed by banks to get risky loans by providing no risky deposit, as stated by Transformation Risk (V. V. Acharya et al., 2024). V. Acharya and Naqvi (2012) showed that based on seed crises theory, banks with large deposits have lower liquidity to funding risk, so bank managers are incentivized to increase or decrease disposal rates to increase loans to reinforce their compensation.

Bank having a large amount of deposits might lower disposal as normal as a result of managers' compensation which could be slightly supported by the quantity of loans that are used as a benchmark for managerial activity or as an alternative future risk created might not take into account for bank manager compensation. The bank solely performs the expensive audit to research the manager's call concerning disposition if the funding liquidity shortage intimate with or by the bank is adequately massive. The adhesive deposit makes the manager unconfident that the bank won't face a funding financial condition brusquely and their disposition practices won't be asked by anyone. Banks could face a capital inadequacy from sufferers regarding destructive lending which can cause failure. Al-Harbi (2017) stated that classical principle agent theory enhanced the risk-disinclined manager needs a higher compensation level add riskier monetary firm as they face bigger un-dependableness in their affluence, therefore, to attain the upper reward levels need a manager to figure in riskier banks, that they give additional freedom to see aggressive disposal methods once liquidity is in lots of abundance. Banks hurt the economics and stability of the system while having risk-bearing behavior. Moreover, this study can support by previously used theoretical framework within the literature.

Conceptual Framework



Empirical Background/Funding Liquidity Risk

How BRT is influenced by the Funding Liquidity Risk, very diminutive consideration has been specified in experimental studies in the banking literature. Initially, there is an inspection that connects bank risk with the Funding of liquidity. (Berger & Bouwman, 2009) explore the determinants of liquidity creation, calculated by German saving. Their studies establish that 51% of liquidity creation was increased by German saving banks over the 1997-2006 period. Multivariate dynamic panel regression framework is used to discover the macroeconomic and bank-specific determinants of liquidity creation and found that macroeconomic factors, especially the liquidity-related strategy pointers had a solid negative impact on liquidity creation, and bank-particular factors like bank budgetary execution and size did not influence liquidity creation.Brunnermeier and Pedersen (2009) highlighted the association between Market Liquidity and FL. They hypothetically recommend that financial organizations lose more constraints making a subsidizing issue and instigating the establishment to decrease its position, the preceding that move the cost against the financial organization. It creates additional losses. Hence, expands market risk with quicker a higher edge, which additionally fixes the organization's subsidizing requirement. Baradwaj, Shao, and Dewally (2016) tested the association between a liquidity creation which is bank core function and institutional characteristics and a, data is to be collected from banks of 102 countries in which 75 are included in lower and middle class and 75 included in higher income countries, classified by the World Bank. Panel regressions were used for analysis. The results showed institutions and creation of liquidity has a positive relation. The risk-taking by banks and ratios of capital are inversely associated with liquidity creation. Huynh (2023) investigated the connection between the market LR and FLR, utilizing information from the Japanese floating (JF) – rate security market from July 2002 to October 2010, and the model of regime-shifting used for the analysis of the data. Their finding demonstrated that the upsurge of FLR increments that of the market LR. Additionally, there is no association between market LR and FLR during financial crises. FL becomes tangled with market LR only in the crisis supervision. Further prominently, it is the dollar financing liquidity, and not the yen subsidizing liquidity, that enhanced market LR in the JF Market. Funding liquidity level fluctuates for banks after a while, and there is apprehension that a high liquidity level cannot lead to economic crises.

Dahir, Mahat, and Ali (2018) investigated that BRT is influenced by funding liquidity risk, data was collected from BRICS countries from the sample of 57 operating banks from 2006 to 2015 period, for data analysis using the GMM estimation technique. Their result indicated that the BRT is influenced by FLR. BRT is negatively correlated with funding of liquidity risk. Moreover, banks take more risk when the liquidity of funding decreases, indeed throughout the Economic Financial Crisis, banks with inferior funding liquidity risk take on less risk. The result also shows that BRT is negatively influenced by liquidity risk has and a significant negative impact on, recommended that lower subsidizing liquidity risk outcome in higher BRT.

Umar, Sun, Shahzad, and Rao (2018) investigated the association between Bank regulatory capital and liquidity creation, using data from the period 2003-2014 from all publicly listed banks of BIRCS countries, two stages of least square regression have been used to analyze the association among banks liquidity creation and bank regulatory capital. Their result showed that bank diminishes their regulatory capital when they have a more noteworthy contribution to liquidity creation. Their result indicated that liquidity creation in BRICS Countries has a negative association with the bank regulatory capital. Their findings also show that there was a trade-off between decreased BRT and liquidity creation. Consequently, the policymaker should prepare policies to beat a steadiness between the two. Thus, both the hypothetical and empirical suggest that funding liquidity risk is straightforwardly identified with the behavior of BRT:

Hypothesis 1: There is an opposite connection between Funding Liquidity Risk and the risk-taking of banks.

2.3.2 Liquidity Risk

Ahamed (2021) examined the association between the profitability of a bank and the risk of liquidity, using data from 2004 to 2009 Pakistani bank, multiple regression was used to analyze the influence of liquidity risk on bank profitability. Their result showed that negative connection between profitability and liquidity risk of banks. Bank profitability was significantly affected by liquidity risk. He also found that liquidity risk also increased by two factors (liquidity gap and non-performing asset).

Park and Kim (2023) represented a modal to explain the association between credits of bank structure and risk-taking banks through the liquidity crisis period. Disturbed quarterly bank-level panel data is to be taken by Korean Banks from 2004 to 2008 period to estimate the subsequent bank-specific fixed effect model. They

observed that negative impact on credit structure during the liquidity crisis. Furthermore, their results showed that during liquidity crises bank risk may increase when banks depend on subsidizing from huge moneylenders, for example, budgetary foundations, organizations, and real credit providers. Meilan, Hall, and Turner, 2014 a new innovative quantitative model used for estimating the liquidity risk of UK banks. The exposure-based cash-flow-at-risk (CFaR) is the name of the model, used data for the period 1997–2010. The outcome demonstrated that the UK Banking sector suffered from variable funding pressure. At the end of 2011, the UK Banking sector will be slightly moved toward illiquid, negative forecasted by the average CFaR model. Furthermore, their model also helped to improve the management of liquidity and also helped to measure the liquidity risk tolerance of banks.

Kim (2018) studied the relationship between competition and banks' liquidity risk-taking, using data from 10,979 banks in 25 "Organization for Economic Co-operation and Development (OECD)" countries from 2000 to 2014, dynamic panel GMM estimator used to control for the dynamic relationship between competition and bank liquidity risk. They found that competition is positively related to liquidity risk. Banks with greater market power have more liquidity risk, implying that decreased competition leads to financial vulnerability signifying that competition is important to financial stability. In other words, competition is desirable for the financial stability of large banks but, in contrast, it is harmful to the financial stability of small banks during times of financial instability.

A further research, Abdel Megeid (2017) analyzed and compared the effectiveness of the management of liquidity risk in Egyptian conventional banks and Islamic Banks. To discover, which of the banks were performing better than others? Data was collected from the period 2004 to 2011 of banks financial statements of six conventional and 2 Islamic banks in Egypt, using liquidity ratio to examine the financial statement for the period of 2004 to 2011. The study established that due to better management of liquidity risk, conventional banks looked better than Islamic Banks in Egypt. The management of liquidity risk introduced huge contrasts between Islamic Banks and Conventional Banks could be unsurprising more money accessibility to conventional banks than to Islamic Banks.

Elbadry (2016) examined the influence of economic steadiness on risk management in Saudi banks. Data was collected from the financial statements of 12 Saudi banks from the period 2011 to 2014. To test the significant effect of the economic steadiness indicator on various types of liquidity risk in Saudi banks, different OLS models were used. Their results indicated that the adequacy ratio on credit risk had an inverse and significant effect on capital. Also, there was a direct and significant effect of leverage ratio on credit risk. Furthermore, outcomes indicated that liquidity risk is significant and inversely influenced by bank size, loans to deposits,

and leverage ratio. It had been accepted that there was not any informal or existing association between liquidity risk and funding liquidity risk; however, the risk-taking behavior of banks was equally affected by both risks. Hence, both the hypothetical and empirical suggest that liquidity risk is easily identified with the behavior of BRT and our second assumption is steady with (Dahir et al., 2018) prediction:

Hypothesis 2: There is an opposite connection between liquidity risk and the risk-taking behavior of banks.

Model Specification

In banking literature Static and Dynamic Panel Models have been used formerly; due to the nature of data, we will use the system GMM model to analyze, how BRT is affected by funding liquidity risk, liquidity risk, and bank activity in Pakistan. As per our study, lagged BRT is held by the Dynamic Panel Models in the equation of regression, since factors, such as liquidity risk, funding liquidity risk, and BRT, are in succession interrelated over occasion. The model is written as follows:

$$Risk_{it} = \alpha_0 + \delta Risk_{it-1} + \beta_1 FLR_{it} + \beta_2 LQR_{it} + \beta_3 BAC_{it} + \emptyset X_{it} + \varepsilon_{it} \quad (1)$$

Where banks and year are denoted by "I" and "t" correspondingly, BRT, Lagged BRT, Funding Liquidity Risk, Liquidity Risk, and Bank Activities are denoted by "$Risk_{it}$", "$Risk_{it-1}$", "FLR_{it}", "LQR_{it}" and "BAC_{it}" respectively. "δ, 1 β, 2 β, 3 β. are the slope coefficients and composite error term denoted by "ε". The exploration judge consecutive reliance in BRT with a figuring of the lagged depended on the variable "(lagged BRT)" with processes of Z-score which can be clarified by progressing modification of controls almost liquidity necessities. Hence, the probable symbol "δ" in measure of BRT of is to be encouraging. Probable signs of β1; β2 and β3 are to be encouraging. Control variables integrated by Eq. (4). We can arrange the model as follows:

$$Risk_{it} = \alpha_0 + \delta Risk_{it-1} + \beta_1 FLR_{it} + \beta_2 LQR_{it} + \beta_3 BAC_{it} + \emptyset X_{it} + \eta_{it} + V_{it} \quad (2)$$

Wherever the vector of control variables is mentioned by X_{it}, recognizable bank precise effect and heterogeneity of country is captured by this variable, the bank-specific effects are recognized by ηi that position for the heterogeneity of individual banks. Idiosyncratic shocks as independent are mentioned by V_{it} and FC is mentioned for the identically dispersed worldwide economic crisis, 1 is equal for the Dummy variable at period 2008 and 0 or else. Either bank-associated or country-associated control variables included: ratio net income to total assets is denoted by NTA, LSZ is mentioned for natural logarithm of bank assets and ETA is used equity to total assets ratio rate of real gross domestic product growth is mentioned by GDP and an

inflation rate is recognized by INF. To tackle the indigeneity problem, we perform GMM estimations. because this method is more efficient than two-stage least squares (2SLS), where there is heterogeneity of unidentified form (Sadiq, Noor, & Amir, 2023).

The reliability of GMM estimators depended on two measurement tests, for over-identifying limitations namely the Hansen / Sargan test and in the error term a serial. A correlation test is used. Firstly, the Hansen test of the over-identification limitations is used to distinguish on the off chance that the model is very much determined or on the other hand not by breaking down the general legitimacy of instruments which ought not to be corresponded with the error term. Hansen's test would be suggested in the inverse answer of the null hypothesis that instability is not related to the instruments. Furthermore, in the trial of serial connection, the invalid assumption. This expresses there is no first-arranged serial relationship [AR (1)] ought to be excess. Though invalid speculation which expresses that there is no second-arrange serial connection [AR (2)] in the unsettling influences ought not to be repetitive. In our research, the outcomes for comparison purposes two-step first difference GMM approach are motionless testimony) (Sarwar & Alim, 2023).

Measurement of Variable/Dependent variable

In this study BRT is used as the dependent variable. which will be measured by Z-Score. or which are equitable towards the aggregate on return of assets and capital of whole assets is distributed between the standard deviation of assets return. For the adjustment of losses, it will consume the bank's income and equity. In previous literature where The Z-score is going to be used to measure the gap to evaluate and evasion the liquidation by bank (Dahir et al., 2017).

$$Z - Score_{it} = \frac{(ROA_{it} + ETA_{it})}{\delta(ROA)_{it}} \qquad (3)$$

Return on assets in the bank "i" and year "t" is calculated by "ROA_{it}", and a ratio of the bank's equity to total assets is estimated by "ETA_{it}" and the bank's variability of return on assets in the bank "i" over a year "t" is estimated by" δROA_{it}" and this study espouse to approximation "$\delta(ROA)_{it}$" by three – repeated - year systematic window in its place of the complete era. The Z-score is increased by -1 to provide the higher values of the Z-score to the upper likelihood of the default by banks.

Independent variables/Funding Liquidity Risk

It is adequate for total deposits which should be divided by total assets. The study hypothesizes a positive association between funding liquidity and BRT. In distinction, BRT and funding liquidity risk are negative (Huynh, 2023).

Liquidity risk

Core deposits divided by loans calculated by it. Core deposits consist. of operation deposits and completely insured. time deposits, but. non-brokered time

deposits are expelled., the connection between BRT and liquidity risk is opposite (Mahmood et al., 2023).

The bank activity

It is captured by total loans divided by total assets. The market activities and involvement of the bank in it are evaluated by this proxy. The supposed sign for the association between BRT and bank activity is the opposite. The arrangement of activities, as in (Nasution et al., 2023) In the US Banking system all the general practices are often driven under the arrangement of bank activities. which recognizes that heterogeneousness in banks' activities all over the countries might build the US-based classification theme which is not appropriate to all or any other countries. (It is captured by total loans divided by total assets. This proxy evaluates the market activities and involvement of banks in it (Javid, Chandia, Zaman, & Akhter, 2023).

Control variables /Bank size

Bank Size is estimated by the Natural Logarithm of the bank's total assets. The behavior of BRT and the composition of the bank's assets can be influenced by bank size. Investment opportunities and risk diversification are associated with bank size as glowing economies of level. The bank size is probably a positive or negative sign. There are two contrasting contentions about the connection between size and liquidity. The "too huge to fall flat" question expresses that huge banks grip fewer liquid resources since they rely upon the moneylender of past options, and they have contact with capital markets in addition they can show and look at borrowers (Harsono, 2024).

Bank profitability

Income divided by total assets (NTA) used as proxied. For steady stable revenue, it permits the banks to own their remuneration. bank profit is positive as a predictive sign, in past studies bank profit sign has been adopted (Slimane, Benilles, & Krimi, 2023).

Bank Capital

Total Equity divided by Total Assets (ETA), calculated by this. There are positive relationships between BRT and the capital of banks which have been integrated by previous studies. Bank units are essential to take away or associate more capital higher than least needed capital and restrict the money vulnerability (Tahir et al., 2023).

The Financial Crisis

Utilized as a dummy. variable. For an Economics Crises, 1 is utilized which banks knowledgeable in the year 2008 and 0 generally. A negative association was forecasted between the economic crisis of the year 2008 and BRT in earlier research

(Nasution et al., 2023).

The Real GDP Growth Rate

It is calculated by the expansion rate in yearly gross domestic product. The probable positive association between real gross domestic product rate and BRT. Fascinatingly, the stability of the banking sector in the country, and the gross domestic product act as a vital responsibility inside. However, the demand for credit corresponds to the financial situation of a rustic. In times of associated in attention economic turmoil, banks' credit provides a decrease in volume and straight to a poor recital of monetary establishments. Moreover, the bank's money performance is affected considerably by business cycles; thus, this study uses a true gross domestic product rate to regulate the results of fluctuation (Pham et al., 2021).

The Inflation Rate

It is measured by the yearly rate of inflation. The negative association predicted among degree rate of inflation and BRT in previous research (Nasution et al., 2023).

Methodology

The basic purpose of these studies is to examine the effect of the behavior of banks taking and liquidity risk of funding in the context of Banks in Pakistani Banks before and after financial crises an application of system GMM model. Descriptive research tools will be used such as mean and average to know the population of data through quantitative analysis of secondary data. Usually, the deductive strategy will be associated with a quantitative research approach. In this research quantitative approach will be used for analysis of data from annual reports of listed banks in Pakistan. A deductive approach will be used to analyze the effect of the behavior of risk-taking banks and the liquidity risk of funding.

According to El Mahdy (2023), when allowing for the rationality of research function then there will be two different methods for research: the first one is the deductive study (theory testing) and the other one is the inductive study (theory building). This study applies both approaches. Those approaches which have been begin with theory are generally known as a testing approach of theory, and on that point, what is known about the selected area, and the theoretical examination relating to that region, the researcher deduces hypotheses that are related to empirical analysis. The hypothesis is the rendition of theory into operational terms. In other words, deductive reasoning is shifting from the general to the specific and then the function of collecting data is to test the virtue of theory which has been driven by the hypothesis. In divergence, those researches in which theory is extracted from observations by using inductive reasoning and research commenced from that observation, this process is termed as theory building Induction.

A secondary research study will be used. Data will be obtained from the annual financial statement of the listed bank in the State Bank of Pakistan. Those

financial reports will be selecting that complete the research requirement means that they should have at least ten years of data from the Pakistan Stock Exchange and State Bank of Pakistan data source. They must complete research variables requirements such as Bank Activity Ratio, Liquidity Risk, and Funding Liquidity Risk.

This study will use financial statements for the annual data of banks which are accessible in the State Bank of Pakistan database and Pakistan to carry out the univariate and empirical investigation of the research over the duration from 2007 to 2017. The comprehensive facts about banking information will be gathered from the main source of The State Bank of Pakistan. The original data will be collected from the State Bank of Pakistan database consisting of 34 banks in Pakistan those banks that are not publicly traded and those banks that have uncompleted and missing information or that banks that have less than three years of history are excluded from the data. Which constructs 340 observations from an unbalanced panel data out of 34 banks in Pakistan. To conduct this study, a secondary source will be used to collect data from published financial statements and annual reports listed by the Bank of Pakistan. No other sources will be used.

These datasets are used frequently for secondary analysis. The data have been gathered for a period of ten years from 2007 - 2017 around 34 banks in Pakistan. The intelligibility of records stated that the selection of 34 banks had common total assets of the Pakistani Banking System. Panel data is the nature of the data; an amalgamation of cross-sectional data and time series. The researchers have transformed these time series (2007-2017) and cross-section (34 banks) into panel data that will provide 340 observations which surpass the degrees of freedom problems.

Sample characteristics

There are four categories of banks which are divided by the State Bank of Pakistan as follows: Domestic Private Banks (21), Public sector commercial banks (5), Foreign Banks (4) and Specialized Banks (4).

Statistical Technique

The economic and financial data has been examined by the GMM statistical tool which firstly innovated by (Hansen, 1982). Since then it has been widely applied to analyze financial and economic data. GMM has been implemented in panel data, cross-sectional, and time series. We will use the system GMM model to test the relationship between BRT, bank activity, funding liquidity risk, liquidity risk, and for a sample of 34 banks that are listed in the State Bank of Pakistan.

In our study, we are investigating the relationship between funding liquidity risk and BRT. The study will hypothesize the relationship between funding liquidity

and BRT is negative, we will also hypothesize the relationship between liquidity risk and BRT is negative. We proposed the result that BRT will increase by increases in funding liquidity and increase in liquidity risks. In contrast, BRT will decrease with lesser funding liquidity and liquidity risks.

Data Analysis/Regression Analysis

Table 1: Descriptive Statistics

Variable		*Minimum*	*Maximum*	*Mean*	*Std. Devo*
ZSCit	*00*	*-2.6534*	*17.983*	*3.857894*	*3.4305315*
Funding liquid	*00*	*0.05*	*0.8871*	*0.548575*	*0.215771*
Liquidity risk	*00*	*0.0776*	*8.83*	*1.308526*	*1.0193467*
Bank activity	*00*	*0.0138*	*1.2089*	*0.552457*	*0.2168157*
Bank size	*00*	*14.4468*	*21.7106*	*18.62844*	*1.6949159*
Income to T asset	*00*	*-0.0925*	*0.2834*	*0.016864*	*0.0348476*
Equity to T assets	*00*	*-0.0394*	*0.711*	*0.140202*	*0.1305178*
RGDP growth rate	*00*	*0.36*	*5.79*	*4.0792*	*0.8683275*
Inflation rate	*00*	*0.0286*	*0.196*	*0.09393*	*0.0481628*
Valid N (listwise)	*00*				

We use panel regression for the analysis of descriptive statistics of BRT and Independent Variables. Table 1 displays the variables of this study in column 1 with descriptive statistics. Table 1 shows the descriptive statistics of all variables in our research. The result discloses the BRT ranges from -2.65 to a high 17.98, standard deviation average score of 3.806. The explanatory variables include Funding-Liquidity-Risk, Liquidity-Risk, Bank-Activity Ratio and Control-variable Bank Size, net income to total assets, Equity-to-Total Asset, GDP, and Inflation Rate. Liquidity-Risk contains the highest mean value of 130% whereas 54.8% is the lowest mean value of Funding Liquidity Risk and 55.2% is the mean value of Bank Activity. The Funding Liquidity Risk ranges from low 50% to high 88.7%, and Liquidity Risk from low 77.6% to high 88.3%. The highest mean value of Liquidity Risk indicates that the Bank's Credit Risk and Interest Rate Risk rise due to loan applications. Bank faces liquidity shortages. The correlation between Liquidity-Risk, Funding-Liquidity-Risk,

bank activity, and control variables on Bank-Risk-Taking of the sample of banks listed in Pakistan is shown in Table 2.

Table 2: Correlation Matrix

	ZSCit	FLRit	LQRit	BACit	LSZit	ETAit	NTAit	GDPit	INFit
ZSCit	1.0000								
FLRit	-0.2719	1.0000							
LQRit	0.1654	0.0280	1.0000						
BACit	-0.2264	0.1734	-0.6555	1.0000					
LSZit	-0.3539	0.2787	0.1375	-0.0205	1.0000				
ETAit	0.5478	-0.3319	-0.0284	-0.0724	-0.6083	1.0000			
NTAit	0.1612	0.0196	0.2427	0.0488	0.2323	0.0947	1.0000		
GDPit	0.0663	-0.0804	0.1213	-0.1089	0.1627	-0.1001	0.0551	1.0000	
INFit	-0.0821	0.0612	-0.2290	0.1819	-0.2178	0.1091	-0.09	-0.7720	1.0000

Table 2 shows the correlation results among the main variables of the study. The association between most of the variables is statistically significant and to our expectations. The correlation coefficient of Funding-Liquidity-Risk and Liquidity-Risk are -0.2913 and 0.1654 -respectively. The relationship between the Funding-Liquidity Risk and Bank-Risk-Taking is negative- which means that if the Bank-Risk-Taking increases and Funding-Liquidity-Risk decreases. The association between Liquidity Risk and Bank-Risk-Taking is relatively negative which means that Liquidity-Risk decreases the Bank-Risk Taking increase. However, the association of the Bank-Activity with the BRT is highly negatively significant (-.2264). Control variables indicate that they are related to other variables; the relationship of total assets to net income and equity to assets is positively highly correlated with BRT. In this case, bank capital demonstrates the utmost association with most of the variables.

Table 3: Correlation Matrix

ariab.	Inverce Chi –Squ		Inverse Normal		Inverse Logit t		M Inv- Chi squar	
SCit	197.261	.000	-1.577	.016	-5.691	.000	12.530	.000
LRit	192.869	.000	-6.282	.000	-8.157	.000	12.129	.000
QRit	131.261	.000	-3.820	.000	-4.308	.000	6.505	.000
	100.200		-		-		3.670	

ACit		*.001*	*1.861*	*.031*	*2.354*	*.010*		*.000*
SZit	*141.578*	*.000*	*3.487*	*.968*	*4.920*	*.000*	*7.447*	*0.000*
TAit	*137.322*	*.000*	*4.134*	*.000*	*5.147*	*.000*	*7.059*	*.000*
TAit	*197.164*	*.000*	*2.011*	*.022*	*6.396*	*.000*	*12.521*	*.000*
DPit	*122.363*	*.000*	*-4.657*	*.000*	*-5.331*	*.000*	*5.693*	*.000*
NFit	*121.015*	*.000*	*-4.044*	*.000*	*-7.100*	*.000*	*8.144*	*.000*

Most of the variables in Table 3 qualify for the stationary test, as indicated by the null hypothesis states that all panel restrains unit roots are redundant on the basis Fisher test.

Table 4: GMM Test

Dependent Variable: -Z-score

	M 1 (without financial crisis)		*M 2 (with financial crisis)*	
	Difference GMM	*System GMM*	*Difference GMM*	*System GMM*
Riskit1	*0.343***	*0.405***	*0.344***	*0.415***
	-0.02	*-0.02*	*-0.02*	*-0.02*
FLRit	*0.956***	*-0.833***	*0.956***	*-0.833***
	-0.15	*-0.11*	*-0.15*	*-0.11*
LQRit	*-0.199***	*0.139***	*-0.199***	*0.139***
	-0.02	*-0.03*	*-0.02*	*-0.03*
BACit	*1.435***	*-0.815***	*-1.435***	*-0.815***
	-0.18	*-0.19*	*-0.18*	*-0.19*
ETAit	*-0.830***	*0.874***	*-0.830***	*0.874***
	-0.11	*-0.13*	*-0.11*	*-0.14*
LSZit	*0.202***	*-0.0512***	*0.202***	*-0.0512***
	-0.03	*-0.01*	*-0.03*	*-0.01*
NTAit	*2.093***	*3.229***	*2.093***	*3.229***
	-0.45	*-1.25*	*-0.45*	*-1.26*
GDPit	*-0.78*	*0.31*	*-0.78*	*0.31*
	-0.47	*-0.55*	*-0.47*	*-0.55*
INFit	*0.775***	*(0.03) **	*0.775***	*-0.03*
	-0.13	*-0.24*	*-0.13*	*-0.24*
Constant		*1.380***	*-*	*1.380***

		-0.18	*-*	*-0.179*
Observations	*270*	*300*	*270*	*300*
Number of A	*30*	*30*	*30*	*30*
No. of instt.	*41*	*78*	*41*	*78*
No. of groups	*30*	*30*	*30*	*30*
AR(1):p-value	*0.03*	*0.03*	*0.03*	*0.031*
AR(2):p-value	*0.39*	*0.32*	*0.39*	*0.317*
Hanse test: p-V	*0.6*	*0.76*	*0.54*	*0.723*

*Notes: *** p<0.01, ** p<0.05, p<0.1*

The main empirical result in Table 4 shows the relationship among BRT, funding liquidity risk, and liquidity risk from the period 2008 to 2017 using the GMM estimation technique. There are two models that we are using to test the relationship between the dependent variable and explanatory variable, one model tests without financial crises, and in second model with financial crises, furthermore control variable is also included in both models. Model 1 and model 2 report the two-step-difference-GMM estimation technique and two-step-system-GMM technique in Columns 1, 3 and column 2, and 4 respectively. Table 4 shows the most economically significant result obtained by the Bank of Pakistan.

Discussion

The main task of our research is to study the impact of liquidity risk, funding-liquidity risk, bank activities, and BRT from the period 2008 to 2017, data collected from 30 banks in Pakistan. Our research identifies relationship the between funding liquidity risk, liquidity risk, and bank activity as the main explanatory variable and the dependent variable of BRT without financial crises.

Table 4 shows the empirical analysis, our first task is to study the relationship between liquidity risk and BRT. In column 2 system GMM liquidity coefficient of 0.139 shows high significance at a 1% highly significant level, showing the impact the liquidity risk on BRT in the Bank of Pakistan is significant as an increase in a unit of liquidity risk increases the probability of bank-default by nearly 0.139 over the sample period from 2008 to 2017. The Bank of Pakistan is not in the condition of pure liquidity as the coefficient of liquidity risk is less than -1 its mean is 0.139. Banks of Pakistan have the opportunity to diversify their activities. Our result is also steady with previous studies (Githaiga, 2023).

The second task of our research is to see the impact of funding liquidity risk on risk-taking in Pakistani banks. The result shows that negative significant effect of

funding-liquidity-risk on BRT at a significance level of 1%. Outcomes show that a decline in finding liquidity risk increases BRT by 0.831. Our result also shows that the increase in BRT is due to an increase in deposits, which creates problems and moves toward financial instability of banks. Our result favors the previous studies (Arif & Nauman Anees, 2012; Ayub et al., 2023; Aziz, Salsabila, & Rodoni, 2023; Githaiga, 2023). Our result shows that the relationship between BRT and bank activity is negatively significant; a decrease in Bank Activity in the Bank of Pakistan increases BRT by 0.815. In the economic condition of Pakistan if banks decrease the Bank Activity it increases the chance of bank failure.

The control variable for bank specific impact of our study has been confirmed with significant sign impact. The bank-specific impact variables include Bank Size (LSZit), bank capital (ETAit), and net income to total assets (NTAit). Firstly Bank-Risk-Taking has a negative and significant impact on the Bank-Size at-1%-significant level, showing that a-unit decrease in Bank-Size decreases the one unit of BRT in Pakistan by 0.0512. Additionally, large banks are more involved in the market to give funds or loans to their customer and government institutions. Due to the uncertain political situation of Pakistan banks hardly recover their loan from government institutions. Second, the bank capital has a negative and significant impact on bank risk showing that BRT reduces by 0.874 by a decrease in Bank Capital. The result is also in favor of previous research (Khan et al., 2016, Dahir et al., 2017). In last Bank-Profitability has a positive and significant impact on bank-risk-taking. Results are signifying that strengthened bank profitability increases bank-risk-taking by 3.229. Moreover, if banks will generate more profit then banks become stable.

Gross Domestic Product and inflation rate were used as macroeconomic control in our study. Positive but not significant effect of GDP growth rate on Bank-Risk-Taking. Moreover, GDP is the indicator of economic activity which shows an increase in business activities. However, banks in Pakistan play a major role in increasing the GDP rate of Pakistan by giving loans to the biggest industries as well as small industries farmers, etc. The impact of the inflation rate and BRT is negative and significant. The inflation rate shows that BRT decreased with an increase in the inflation rate.

Conclusion

Banks affected by Global Financial Crises 2007 – 08. Our study aims to find the relationship among Funding Liquidity Risk, Liquidity Risk, Bank Activity, and BRT. Data was collected from 30 banks listed in Pakistan from their financial statement from 2008 to 2017, Two Step System GMM technique is used for the analysis of data. The outcomes show that the bank's taking is increased by decreasing Funding Liquidity Risk and increasing Liquidity Risk. Our result also showed that BRT is decreased by increasing Funding Liquidity Risk and decreasing Liquidity

Risk. The chances of Bank default are increased by lower Funding of Liquidity and increases in Liquidity Risk by approximately 0.831 and 0.139 without financial crises respectively. The results also show that there is a negative effect of Bank Activity on BRT this means that banks are less susceptible to crises due to their activities and banks have many opportunities to mitigate their risky activity to less risky activity.

Previous studies have been conducted in countries like China, Russia, India, and Brazil all countries have very big populations and -are economic. The political situation is stable. Government policy and regulation help banks to extend their activity and invest their investment throughout the world. We conducted the study on Pakistani banks which are very affected by political disabilities and –law and order situation Investor are not fully confident whether to invest their fund in banks or not. Pakistani banks also face such problems as black money and money laundering. In this situation, policymakers and regulators should make such policies and regulations to stop this kind of problem. Finally saying that economic growth depends upon the stability of the banking system and financial institutions, if banking stability decreases then economic growth also decreases. A well-functioning banking system is an essential element in promoting the economic growth attained by channeling savings into productive investments. This saving investment facilitation results in the fundamental task of funding liquidity by the banking industry. Despite the importance of this fundamental task in the economy, a comprehensive measure of liquidity creation specifically did not exist in the case of our country.

Managerial implications

Our findings have several implications for policymakers who make policies for banks and their customer, easily identify the problem, and recommend solutions. For practitioners who are working in the field, helpful to make decisions, for academics and researchers because researchers have the opportunity to conduct more research on BRT in Pakistani economies. Our studies are also helpful for policy discussion and investors.

Future Recommendations

Managers, policymakers, should identify opportunities and challenges to improve their liquidity and mitigate their risk and make decisions before rising problems. It is very helpful for managers and policy makers of the banks to increase their liquidity by mitigating risk and increasing the profitability because the Liquidity problem also affects the profitability of banks, Banks that face liquidity problems may increase the difficulties to full filling the gap between customer demand and supply. It is also recommended that future researchers increase data collection by increasing the number of banks and countries then the researcher will find more generalizability

and authenticity. It is also suggested that future researchers increase data collection by increasing the number of years to meet with accurate results. We used only Bank-Risk-Taking as the dependent variable and Funding Liquidity Risk, Liquidity Risk, and Bank Activity as independent but future researchers can add more variables to analyze the Bank-Risk-Taking-Behavior such as CEPEC, Black Money, Political Stability, etc.

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