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Published online: 25 September 2022

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Article

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Abstract

This study investigates the effects of liquidity and credit risks on the stability of banks with empirical evidence from the Afghanistan banking sector over the period 2014–2020. The stability of a bank is measured through the dependent variable of its capital adequacy ratio. Credit risk (calculated by the ratio of impaired loans) is included as an independent variable along with liquidity risk. The bank specific factors, namely bank net interest margin, size of the bank, return on assets, loan growth rate, liquidity gap, return on equity, loan to asset and macro-economic factors, inflation and GDP growth rate are included as control variables. This study includes all 10 operationalized banks in Afghanistan, excluding the two branches of foreign banks. The penal dataset was collected from banks' websites and the macroeconomic data was derived from World Bank reports. This study employed the simultaneous equation approach of a two-stage least square and a fixed effect panel regression model to investigate the affiliation between liquidity and credit risks and their effects on the stability of banks. The results of this study indicate that liquidity and credit risks don't have a mutual relationship, while the interaction of both types of risks jointly impacts bank stability. It shows that NIM, loan assets, ROA, liquidity gap, loan growth rate, and ROE have positive impacts on bank stability, whereas the size of the bank has negative effects on bank stability. Among the macroeconomic variables, only the growth rate of GDP signifies a negative effect on the stability of banks. The finding under this paper recommends that the governance body of the banking sector drafts policies aimed at strengthening bank capital and taking liquidity measurement according to the best standards introduced by the Basel committee. Also, to create frameworks for measuring liquidity and capital standards.

Keywords*: Bank; Capital Adequacy Ratio; Liquidity Risk; Credit Risk; Bank Stability; Afghanistan*

JEL Classification: *C23; E58; G21; G32; G33*

Introduction

Banks in the role of financial intermediaries in a complicated and dynamic business environment are confronted with various financial and non-financial risks categorized as credit, market, liquidity, regulatory, reputational, operational, and strategy (Crouhy, Galai, & Mark, 2012). Credit risk (CR) relates to a loan or finance given by a bank, which on time isn't reimbursed partially or fully by the borrowers (Campbell, 2007). Liquidity risk (LR) derives by lack of required liquid assets to meet or fulfill the immediate debt commitments and un-expected withdrawal of deposits or outflow of cash (Diamond & Rajan, 2005). Among the risk categories, liquidity and credit risks aren't the exclusive risks that banks are exposed to, yet both these risks have a direct relationship with bank stability (Ghenimi, 2017). These risks are highly inter-dependent or inter-connected and an event(s) that effects one risk can have

ramifications or influence on other risk categories. The study of credit and liquidity risks has been recognized as an important area among banking professionals and economists. Studies demonstrate that liquidity risk has a huge cost on banks' profitability. Defaults of loans increase the liquidity risk since the expected cash inflows are not arriving on time to meet depositors' cash withdrawal demand. Therefore, most literature shows a positive relationship between credit and liquidity risks, which both influence each other at the same time. The literature demonstrates that although there is a positive relationship between credit and liquidity risks, there is no reciprocal relationship between them. According to Dermine (1986), liquidity risk is a sign of crucial circumstances that minimize the revenue and expose the bank to failure and financial trouble. As cited by Samartin (2003), credit and liquidity risks at the same time have a key role in the bank's crisis. Well-capitalized and liquid banks are less likely to experience credit and liquidity risks. The world financial crisis of 2007 was caused as a result of the interaction of credit and liquidity risk, leading to banking collapse, thus negativly impacting the world's economic system. The crisis influenced the economic environment of almost every country, which caused an increase in inequality, a drop in economic growth, political instability, and social pressures. In total, more than 300 banks failed in the period of the global financial crisis (Bradrania, 2017). The collapse of financial institutions is considered a threat to the world's economic system (Owojori, 2011). The 2007–08 global financial crisis proves that liquidity and credit risks, as two main elements, impact bank stability and survival (DeYoung & Jang, 2016). Therefore, specific consideration towards the effect of financial system instability to country's economic direction has been formed. Since for banks, sources of uncertainties for credit and liquidity risks come from both the external and internal environment of the bank (Chernobai, 2021), and when the economic environment is categorized as an imperfection market, this is crucial to safeguarding the deposits of customers against the failure of banks (Dewatripont, 1994).

1.1 Banking Scenario in Afghanistan

Since 2000, after post-war reconstruction, it has been the prerequisite to have a banking system that follows the international requirements and standards to expand the economic boundaries, boost economic opportunities, and have a relationship with the world financial sectors. As a result, private banks were established. As the 2007 world financial crisis originated, the banking sector of Afghanistan also experienced difficulties. In the year 2010, Kabul Bank, the first private bank to collapse, lost a significant amount as a result of fraudulent lending. The Kabul bank crisis seriously stressed the financial system. When the customers realized that their deposits were stolen, they "Run to bank" As a result, $500 million of deposits were withdrawn by customers in a few days (McLeod, 2016). The fraudulent lending leads the bank to liquidity risk. Following the Kabul bank collapse, the Afghan government provided $825 million from the central bank reserve to prevent further failure and collapse of the financial system (McLeod, 2016). The evidence from the collapsed banks during the world financial crises of 2007 and Kabul bank crisis and official published report of Material loss by FDIC and OCC on the causes of collapse of banks; clearly point out that the majority of bank failure was as a result of intersection among both risks credit & liquidity. Liquidity risk detriments banks as it undermines profitability and stability. Default of loans or non-payment of debts by counterparties raises liquidity risk, which leads to dropping cash or fund inflows (Dermine, 1986). Since information in the credit market was asymmetry, banks were exposed and suffered credit risk at the time of the global financial crisis of 2007, when the risk of withdrawal of deposits shifted to the risk of drying up of other sources of funding, particularly the inter-bank market (Heider, 2009). In view of the above evidence, it is crucial to identify the interdependency between liquidity and credit risks and their effects

upon the soundness and stability of the bank. A majority of the experts recommend that credit and liquidity risks be regulated jointly. Both capital strengthening and liquidity measurement tools can be considered as a regulatory prudential measure for both liquidity risk and insolvency.

The management of credit and liquidity risks remains an important and prominent function for the banking sector. Credit risk is defined as the possibility of an economic loss associated with the failure of counterparties or borrowers to fulfill the contractual obligations or credit risk is the risk of diminution in the credit quality of debtors linked to default during the term of the transactions. Liquidity risk is defined as the risk of inability to raise the required cash to meet debt obligations or to meet cash, collateral, and margin withdrawal requirements of counterparties or to fulfill capital withdrawals. (Crouhy, Galai, & Mark, 2012). If a bank doesn't properly and effectively manage its liquidity position, it may find itself unable to immediately fulfill depositors' demands for cash withdrawals or to reimburse other debt obligations. Therefore, liquidity risk, along with credit risk, is considered the two major types of risks that banks in the role of financial intermediaries are largely exposed to.

In today's dynamic and complex business environment, banks' financial and operational transactions are exposed to different types of risks. Therefore, risk management divisions and their mitigation tools are the key elements of banks in safeguarding the assets exposed to various risks. Typically, the nature of the banking activities is to convert the short-range liabilities or customers' deposits to long-term investments for gain purposes. This liquidity transformation exposes the bank to various kinds of risks that require prudential regulations and practical management. One of the prudential regulatory requirements for banks is to maintain the minimum capital and liquidity to meet and absorb unexpected losses. As of the second quarter of the year 2020, demand deposits in Afghanistan's banking sector include 72.21% of total deposits (ABA, 2020). Under this situation, long-term financing by banks may expose them to liquidity risk. Political and security instability, along with an increase in non-performing loans, deteriorate asset quality and undermine the bank's profitability.

2. Literature Review

2.1 Theoretical Background

The theoretical framework under this paper focuses upon the impacts of credit and liquidity risks on the stability of banks, with empirical evidence from Afghanistan's banking sector. Two theories, the Financial Intermediation theory and the Monti-Klein Model, support this study. The banks' stability is included as a dependent variable which is calculated by the capital adequacy ratio. Where credit and liquidity risks are the independent variables.

Financial Intermediation Theory and The Monti - Klein Model

One of the leading theories that supports this study is the financial intermediation theory, which was cited by Bryant (1980), Diamond and Dybvig (1983). Banks, in the role of financial intermediaries, accept individual and corporate deposits and make investments or flow funds to the economy. This theory explains that there is an affiliation between liquidity and credit risks, where it is cited that risky assets are the cause of the failure of banks. Liquidity and credit risks are interrelated and mutually influence the bank's stability. Traditional intermediation theories are based on asymmetric information and transaction costs. They are developed where contribute to the institutions to accept deposits and channel the flow of funds to the business. Financial Intermediaries by trading with financial assets are exposed to financial risks. As the financial intermediaries originate, deal, trade or provide the service for

financial assets, in fact, they are managing and trading the risks. Bundling and unbundling of the risks are the main attributes of their franchise. The intermediaries' franchised inherent risks are directly not tolerated by them. Some of the risks are financed or transferred to third parties (Allen & Santomero, 1997).

Klein (1971) and Monti (1972) developed and explained the model. The original model focuses on a monopolistic bank exposed to a rising supply of deposits and falling demand for credit and loans. The original model was designed using the inverse function of banks. The variable used under this model was the amount of loans and amount of deposits. The original model results show that if substitute products for a bank's products emerge in the financial market, the intermediation profit margin is affected adversely (Freixas & Rochet, 2008). The Monti-Klein model demonstrates that the balance sheet items of the assets and liabilities structure of a bank are closely and strongly interconnected, particularly with respect to deposit withdrawals and loan defaults by borrowers. Banks as financial intermediaries generate liquidity for the economy from their balance sheet items through financing risky projects by employing depositor's funds or from their off-balance sheet items by issuing guarantees or lines of credit (Holmstrom, 1998; Kashyap, 2002).

2.2 Empirical studies

The Relationship Between Liquidity Risk and Credit Risk

The reciprocal affiliation between credit and liquidity risks was examined by Ghenimi (2017) and Ahmad (2019) through employing the TSLS and panel vector auto-regression models. Impaired loan ratio used as proxy for Credit risk & ratio of liquid assets for liquidity. The results illustrate that there is no mutual relationship between LR and CR from a statistical point of view. Whereas, the effect of credit risk on bank liquidity is negative. The relationship between credit and liquidity risks with regard to conventional and Islamic banks was investigated by Hassan, Khan, and Paltrinieri (2019). Liquidity risk is measured through the difference between the customer liabilities that can be withdrawn by depositors in a short time over the assets. Credit risk evaluated by credit recovery, charge-offs and allowance for NPL. The study employed the simultaneous structural equation of the three-stage least square method and the results showed that LR & CR have a negative affiliation with each other. Abdelaziz (2020) employed the seemingly unrelated regression model to examine the connection between CR and LR. For liquidity risk, the ratio of loan to deposit is used as a proxy, and the study shows that while credit risk increases, that contributes to drying up the liquidity position of the bank and leads to liquidity risk. The more the NPLs, the more losses and impairment of loans, and that causes a drop in the liquidity position of the bank.Through empirical studies Diamond (2005); Nikomaram (2013) and Ejoh (2014) cited that a positive relationship between credit and liquidity risks exist. If the economic sectors and industrial projects are funded extensively by banks and if these assets deteriorate in their credit values, banks are unable to fulfill the demand of account holders. For the role of maturity transformation, banks are confronted with credit and liquidity risks. A loan default increases liquidity risk as it lowers cash inflows. By employing bank deposits by way of loan expansion, the overall liquidity position of the bank decreases, and its associated consequence is higher liquidity risk, as depositors call back their deposits. Banks need to attract deposits to sanction credit to economic sectors and to continuously renew and employ deposits to finance the projects. In the case of credit defaults, the debts of the bank increase, which leads to liquidity risk "Run to Bank" (Acharya & Viswanathan, 2011). Louati (2015) evaluated Islamic and conventional banks' performance with respect to capital adequacy ratio. The study selects a sample of 117 banks, comprised of 70 conventional and 47 Islamic. The study applied the

Lerner index and concluded that the performance of Islamic banks is largely impacted by their capitalization, not by their liquidity position. The study demonstrates a significant negative affiliation between credit and liquidity ratios with conventional banks. Laidroo (2016) analyzed the differences in elements of credit growth of foreign-owned banks in comparison with private domestic banks. The study includes a sample of the central and eastern European banks during 2004–2012. The study shows that banks' capital contributes as a significant factor of credit growth for private domestic banks during the periods of non-crisis, while bank liquidity positions as a significant factor during the periods of crisis. McLeod (2016) studied the causes of the collapse of the Kabul Bank. The study indicates that Kabul Bank lost a significant amount as a result of fraudulent lending. The Kabul bank crisis seriously stressed the financial system. When the bank customers realized that their deposits were stolen, they "Run on Bank." As a result, $500 million of deposits were withdrawn by customers in a few days. This fraudulent lending leads the bank to liquidity risk. Following the Kabul bank collapse, the Afghan government provided $825 million from the central bank reserve to prevent further failure and collapse of the financial system. The bank was re-structured and re-named as New Kabul Bank in 2011 with new ownership by the government. The crisis of Kabul Bank not only had monetary losses but also negatively affected the customers' trust in the financial system and had a social detriment (Kabul A., 2012). Yet the banks are unable to gain the trust of depositors to deliver to them business transactions through the banks.

The Impact of Credit Risk and Liquidity Risk on Stability of Bank

Through empirical analysis, Ghenimi (2017) and Ahmad (2019) examined the impacts of CR and LR on bank stability. The bank's stability is measured by Z-score, the distance to insolvency. CAR, ROE, ROA, NIM, liquidity gap, loan growth, loan assets, GDP, and inflation are all included as control variables. The study employed the generalized method of moment (GMM) and fixed effect approaches. The results show that the affiliation between liquidity and credit risks influences bank stability. The spread of credit risk leads to a decrease in bank stability, whereas liquidity risk has a negative impact on bank stability. Liquidity risk and credit risk mutually lead the bank toward instability. The study also concluded that control variables of ROA, CAR, and income diversity have positive effects on the stability of a bank, while asset size, loan growth, financial crisis, efficiency, and GDP growth rate negatively affect the stability of a bank. Through many studies, the bank's profitability and performance have been investigated by (Boahene, 2012; Suganya, 2018; Ndoka, 2016). NPL, provisions, charges off, CAR, asset quality, liquidity, and bank size are employed as independent variables, where ROE and ROA are proxies for dependent variables. The study employed fixed and random effect methods. The results illustrate that capital and credit risk have positive effects on the profitability of the bank, whereas operating costs and nonperforming loans have a contrary connection with bank profitability. The study shows that there is no significant relationship between a bank's profitability and capital adequacy ratio.

Alzorqan (2014) studied the two Jordan banks for the period 2008–10. Where return on asset and return on investment used as proxy for bank performance, loan to deposit and current ratio for liquidity. The study illustrates the affiliation between liquidity risk and bank performance. As the basic function of a bank is the acceptance of deposits and endorsement of credits, Therefore, it is required to maintain a certain amount of deposits as liquid asset and a specific amount as cash reserves to meet the interbank liabilities and customer fund demands (Edem, 2017). From the bank's perspective, the liquidity risk arises when suddenly or unexpectedly customers withdraw their deposits. As a result, it impacts the operation and income of the bank. Empirical studies (Hakimi, 2017; Tabari, 2013; Cuong LY, 2015) find that liquidity risk decreases bank performance. Bank capital, bank size, and GDP have a favorable

relationship with the performance of banks. CR and LR adversely impact bank performance and liquidity, in-reversely connected with the performance of the bank. Adusei (2015) studied the key elements of deteriorating bank performance. The study applied the Z-score, a ratio of risk-adjusted equity on assets and a risk-adjusted return on assets. The results of the study indicate that credit risk is destructive to the stability of the bank. Whereas Rashid and Jabeen (2016) in context of Pakistan banks finds that efficient operation, operating costs and reserves are important elements of performance of conventional banks. While market concentration and operating efficacy are important elements of Islamic banks, The study concludes that GDP and lending rates negatively impact the performance of Islamic and conventional banks. The result of Kolari's (2002) study on US commercial bank failures indicates that the risk of default of banks is largely as a result of inadequate capital, insufficient level of profitability, and excessive exposure to specific sectors with extreme loan defaults. Cole and White (2012) observe that huge investment activities, inadequate capital, high concentration in particular industries and critical macroeconomic conditions quickly surrounded commercial real estate loans, raising banks' probability of default during the global financial crisis. Their study finds that credit risk plays a significant role in bank stability, but their study largely overlooks the role of liquidity risk. Ozsuca and Akbostanci (2016) study the specific attributes of the risk-taking behavior of Turkish banks during the period from 2002 to 2012. The result of the study demonstrates that well capitalized and liquid banks are less likely to take the risks. Leland (1996) and Xiong (2012) find that in the situation of corporate debt renewal, the decline in the liquidity position of the market leads to interaction between credit and liquidity risks, which increases the risk premium of credit and liquidity. This relationship leads banks to collapse. Berger (2013) investigated the role of regulatory capital in improving the resilience of banks during the global financial crisis of 2007, which observed that adequate capital decreases the probability of collapse of banks. Imbierowicz and Rauch (2014) examine the connection between credit and liquidity risks and their effects on the healthiness of 4,300 banks in the US from 1998 to 2010, which also included 254 bankrupted banks during the financial crisis of 2007. The outcomes demonstrate that liquidity and credit risks in association with each other affect the banks' probability of default. The evidence shows that banks collapsed as they suffered from insufficient liquidity prior to actual default. Acharya and Mora's (2015) study shows that the bank that bankrupted accepted customer deposits by providing higher interest rates. The result indicates that the occurrence of liquidity and credit risks forces banks to default.

Gap of the Study

The previous studies in the context of Afghanistan concentrated on the macro-economic along with specific determinants of banks and their impacts on profitability of banks (Naderi, 2021). Impacts of economic trends on Afghanistan's banking sector (Wafa & Ahmad Javed, 2014). The practice of credit risk management in both private and public banks (Khan & Ahmadi, 2019) and the influence of credit risk on bank profitability (Rahmanullah, 2021) In this study, the relation between both liquidity risk and credit risk and their effects on bank stability in the context of Afghanistan has been studied.

Based on the theoretical explanation, the below research model is designed for this study, "Effect of liquidity and credit risks on bank stability". The key parameters are capital adequacy ratio, impaired loans, liquid assets, return on assets, return on equity, net interest income, size of the bank, loan growth, and external factors like GDP and inflation. The dependent variable is bank stability, which is measured by CAR (equity to assets). The independent variables are measured as liquidity risk (liquid assets to total assets) and credit risk (impaired loans to total loans).

Figure 1: Theoretical Framework
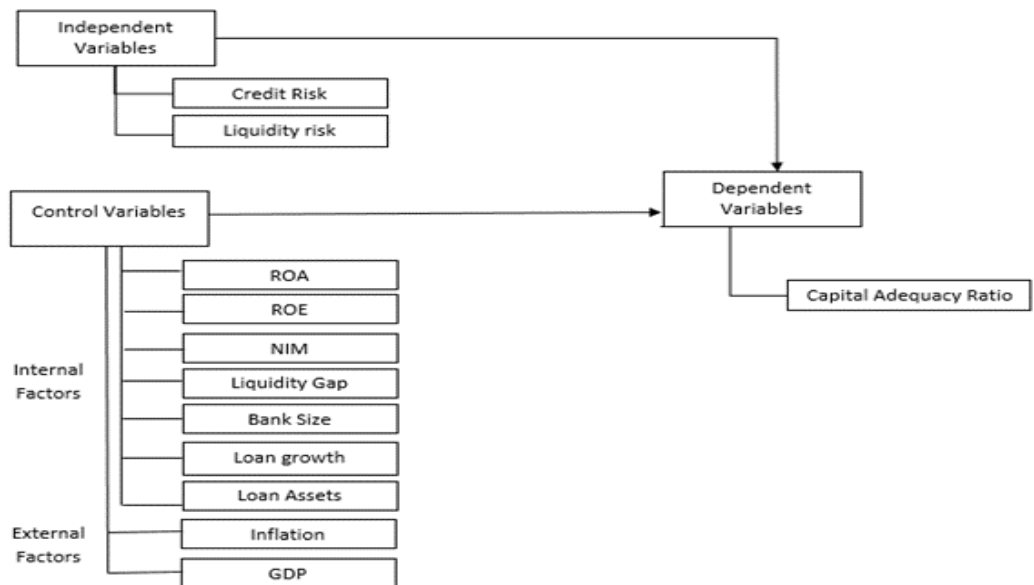
Source: Adapted from Ghenimi (2017)

3. Research Methodology

3.1 Research Approach, Design, and Data Colelction Procedure

This study applies a deductive research approach and the hypothesis are developed since the study intends to examine the effect of credit and liquidity risks on bank stability. To verify the hypothesis, the financial data of banks is collected. This study is independent and free of personal biases of what is observed since the study includes quantitative data and the phenomena are explained numerically and mathematically, and the confirmation of observation is independent and objective. This study includes specific internal factors of banks and external factors of macro-economic indicators that affect banks' stability. This study builds on the hypothesis according to previous studies and the quantitative approaches. Different types of statistical analysis models are tested. For this study, the simultaneous equation approach of Two-Stage-Least-Square and the Panel Data Regression model are used. For this study, all the 10 domestic operationalized banks in Afghanistan have been selected. The dataset in this study is a panel data approach, which includes cross-section and time-series. The data to measure the variables is collected for all 10 operationalized banks and is available on each bank's official website. The data was collected and measured from the annual audited financial statements, mainly balance sheets, income statements, notes, and annual reports over the period of 7 years from 2014 to 2020. The data for the macro-economic variables is derived from World Bank reports. As per BCBS disclosure requirements and central bank prudential regulation, all banks, including state-owned and commercial banks, are required to publish and disclose their financial statements and annual reports on their websites and newspapers. Under each bank's website, we searched for financial statements and/or investor relationships. We looked for the archives of all financial statements since 2014.

Table 1: The Afghanistan Banking Sector

Name of the Bank	Year of establishment
State Owned Bank	

Bank Millie Afghan	1933
Pashtany Bank	1954
Kabul Bank (New Kabul Bank)	2004 (Restructure, 2011)
Private Banks	
Azizi Bank	2006
Afghanistan International Bank	2004
Bakhtar Bank (IBA)	2009
Maiwand Bank	2008
Afghan United Bank	2007
The First Micro Finance Bank	2004
Ghazanfar Bank	2009

Source: Author's compilation

3.2 Operationalization of Variables

In this paper, two key independent variables are used: liquidity risk (LR) and credit risk (CR). Liquidity risk is calculated as the percentage of liquid assets (assets that can easily and quickly be turned into cash without any costs) to total assets. The lower the ratio of liquid assets to total assets, the higher the liquidity risk. Credit risk is calculated as the percentage of impaired loans to total loans extended by a bank. The higher the ratio, the greater the credit risk and the deterioration of bank profitability. Dependent variable of the capital adequacy ratio, which is used to measure bank stability and performance. CAR is calculated as the percentage of equity capital to total assets. Bank specific control variables have an impact on bank performance. Through an empirical study, Waqas (2016) found that bank size, loan to assets, and equity to capital have a positive relationship with the ROA ratio. The study followed random and fixed effect models, and ROA was used as a proxy for bank performance. According to the studies cited in the empirical literature, it has been observed that certain studies examined the performance of banks through various bank-specific variables. Bank specific factors directly related with bank performance. The banking industry plays an important role in the allocation of economic resources to a country. The banking sector is considered a vital element of economic and social development. The purpose of this behavior is to attract savings and direct these savings into productive investments. By employing the attracted savings, banks' behaviors minimize the unemployment rate, facilitate industrialization and attract foreign investment. Besides that, the inflation rate directly or indirectly impacts the bank's profitability, earning aspect, and interest rates. Al-abedallat (2017), through an empirical study, found that deposits from the banking sector along with credit facilities have a significant impact on gross domestic products. This paper aims to highlight the role of external factors, namely GDP and inflation annual rates, on bank stability. A summary of the measurement of variables is depicted in the below table.

Table 2: Measurement of Variables

Variables	Definition	Measures	Sources
CAR	Bank Stability	Capital / Total Assets	Hakimi et al., 2017; Ghenimi et al., 2017)
CR	Credit Risk	Impaired Loans / Total Loans	(Ghenimi et al., 2017)
LR	Liquidity Risk	Liquid Assets / Total Assets	Amara & Mabrouki, 2019; Hakimi et al.,2017)
ROA	Return on Assets	Net Income / Total Assets	Rashid & Jabeen, 2019; Hakimi et al.,2017)

ROE	Return on Equity	Net Income / Total Equity	(Ghenimi et al., 2017)
NIM	Net Interest Margin	Net Interest Income / Bank Earning Assets	(Ghenimi et al., 2017)
Liquidity gap	Gap between assets and liabilities	Natural logarithm of total Assets – Total Liabilities	(Ghenimi et al., 2017)
Size of the bank	Total assets of the bank	Natural logarithm of total assets	Hakimi et al., 2017; Ghenimi et al., 2017)
Loan growth	Increment in the loan amount	Final amount – initial amount / initial amount	(Ghenimi et al., 2017)
Loan assets	Amount of loan in comparison to bank total assets	Bank net loans to total assets	(Ghenimi et al., 2017)
Inflation rate	Rise in the prices of commodities over a specified period of time	Consumer price index	Imbierowicz & Rauch, 2014)
GDP	Production of goods and services in given period of time by a country	GDP growth rate	(Ghenimi et al., 2017)

Source: Author's Compilation

3.3 Econometric Tools and Model Design

Previous studies and papers on effect of liquidity and credit risks on bank stability used different economic models including two/three stage least square, panel vector auto-regression models, seemingly unrelated regression, pearson correlation, experimental research, generalized method of moment (GMM), fixed and random effects models. Since the nature of data under this study is panel dataset that includes both cross sectional and time series and the past studies by (Ghenimi, 2017; Ahmad, 2019) we used the two stage least square to examine the mutual relationship between liquidity risk and credit risk and to investigate the effect of credit risk and liquidity risk on bank stability we employed the panel data regression model fixed effects as applied in the past study by (Ahmad, 2019).

Two-Stage-Least-Squares "TSLS"

Different types of methods have been developed by econometricians to examine the linear simultaneous equation. Two-Stage-Least-Squares "TSLS" is one of the most common techniques used in structural equations analysis. For this study, the relationship between credit and liquidity risks was evaluated by the TSLS model. This model was applied by (Shen, 2018 and Ahmad, 2019.

$$\text{Credit risk } i\ t = C + \beta 1 \text{ credit risk}i,t\ \text{-1} + \beta 2 \text{ liquidity risk}i,t + \text{Control variables } i,t + \text{Macroj } t$$

$$\text{Liquidity risk } i\ t = C + \beta 1 \text{ liquidity risk}i,t\text{-1} + \beta 2 \text{ credit risk}i,t + \text{Control variables } i,t + \text{Macrojt}$$

Where, i represent the 1, n the banks, t the time period. Control variables incudes the banks specific variables like ROA, ROE, NIM, Loan growth, loan assets, and Bank size. Macroeconomic variable includes the GDP and inflation rate in Afghanistan during the period of the study.

Panel Data Regression Model (Fixed effect model)

To analysis and examine the impact of Credit risk and liquidity risk on stability of banks the panel data regression model is used. This model was applied by (Ahmad, 2019).

CAR it= β0 + β1 CAR it-1 + β2 credit risk it + β3 liquidity risk + β4 liquidityR*CreditR it + β5 Bank sizeit + β6 ROA it + β7 ROE it + β8 loan growth it + β9 inflation it + β10 GDP it

Where CAR represent capital adequacy ratio, ROE return on equity, ROA return on assets and GDP gross domestic production.

4. Data Analysis and Findings

This section entails and describes the data analysis, hypothesis testing, and research findings. It consists of a statistic description, a correlation matrix, and simultaneous estimation including Two-Stage Least Square, a Fixed Effect estimation method, and a redundant fixed effect test.

4.1 Variable Statistic Descriptions

Table 3 shows the summary of data statistic. The summary of data statistic includes total no. of observations, the mean and standard deviation value for the dependent, independent and control variables. The mean value of CAR, credit risk and liquidity all are positive. The liquidity has a value of 0.514, which indicates that banks have been liquid and can meet liquidity obligations and customer's deposit withdrawals. The credit risk has a value of 0.086 mean, which indicates that the sanctioned credits in the past 7 years are less risky. CAR has a mean of 0.105, implying that banks' capital is adequate. The loan to assets mean is 0.171, signifies that less portion of bank asset has been financed through loan and advances. ROA and ROE have a positive value of 0.005 and 0.028 respectively, implying that banks generated profit in the past 7 years. The loan growth has a negative value 0.009, illustrates that loan and advances were not extended during the period of 2014-20. The macroeconomic variables indicate that Afghanistan GDP has an average growth of 1.60 and inflation at 3.1 during 2014-2020.

Table 3: Variable Statistics Description

Variable	Observations	Mean	Std. Dev.
CAR	805	0.105	0.071
Credit Risk	805	0.086	0.139
Liquidity	805	0.514	0.149
Liquidity gaps	805	14.25	2.547
Loan assets	805	0.171	0.146
Loan growth	805	-0.009	0.284
NIM	805	0.100	0.088
ROA	805	0.005	0.017
ROE	805	0.028	0.186
Size bank	805	16.938	0.549
GDP	805	0.016	0.019
Inflation	805	0.031	0.023

Source: Data output from EViews 12

4.2 Correlation Matrix

The correlation for all dependent and independent variables is calculated in this section. CAR shows a positive relationship with credit risk and a negative with liquidity. Whereas credit risk shows a positive correlation with liquidity. CAR has a positive relationship with bank specific control variables such as liquidity gaps, loan assets, loan growth, NIM, ROA, ROE, and a negative correlation with bank size. Credit risk and liquidity have a negative relationship with loan assets, loan growth, ROA, ROE, bank size and a positive relationship with NIM. In respect to macroeconomic variables, GDP has a negative relationship with CAR

& credit risk and a positive relationship with liquidity. Inflation has a positive correlation with CAR and a negative with credit risk and liquidity. (See table 4)

Table 4: Correlation Matrix

	CAR	CREDIT_RISK	LIQUIDITY	LIQUIDITY_GAPS	LOAN_ASSETS	LOAN_GROWTH	NIM	ROA	ROE	SIZE_BANK	GDP	INFLATION
CAR	1.0000											
CREDIT_RISK	0.0378	1.0000										
LIQUIDITY	-0.1364	0.2661	1.0000									
LIQUIDITY_GAPS	0.7860	0.0910	-0.1006	1.0000								
LOAN_ASSETS	0.4137	-0.0748	-0.3132	0.1660	1.0000							
LOAN_GROWTH	0.1476	-0.3782	-0.2538	0.0362	0.1683	1.0000						
NIM	0.2806	0.3621	0.4890	0.0157	0.1512	-0.1838	1.0000					
ROA	0.3696	-0.0327	-0.0735	0.2102	-0.1011	0.1227	0.2221	1.0000				
ROE	0.1886	-0.1059	-0.1668	0.0923	-0.1996	0.1471	0.0890	0.8572	1.0000			
SIZE_BANK	-0.0903	-0.0258	-0.1211	0.2331	-0.4598	0.0029	-0.3139	0.0418	0.0827	1.0000		
GDP	-0.0115	-0.0155	0.1217	-0.0562	0.0678	-0.1068	0.1939	0.0446	0.0228	-0.1093	1.0000	
INFLATION	0.0598	-0.0027	-0.0091	0.0916	-0.0662	-0.0927	-0.0324	0.1231	0.1343	0.0532	-0.2021	1.0000

Source: Data output from EViews 12

4.3 Two Stage Least Square (The relationship between CR and LR)

By employing the 2SLS regression model, we analyze the mutual relationship between credit risk and liquidity risk. The ratio of impaired loans is used as a proxy for credit risk and the ratio of liquid assets is used for liquidity risk. To examine the autocorrelation between the variables, the Durbin-Watson statistic is incorporated. The effect of credit risk on liquidity is negative and insignificant, whereas the reverse relationship is insignificant and negative. This study shows that there is no reciprocal relationship between credit and liquidity risks from a statistical perspective. The first hypothesis, credit and liquidity risks have a mutual relationship is rejected (See table5).

Table 5: The relationship between credit risk and liquidity risk

Model 1 Credit Risk	Coefficient	P-Value
Constant	-0.631	0.681
Liquidity	-0.009	0.981
Size Bank	0.022	0.795
ROA	-1.848	0.528
Loan_ Assets	-0.136	0.714
Inflation	4.436	0.673
GDP	14.256	0.264
Durbin-Watson Stat	2.62	-

Source: Data output from EViews 12

Table 6: The relationship between credit risk and liquidity risk

Model 2 Liquidity Risk	Coefficient	P-Value
Constant	1.556	0.724
Credit risk	-0.514	0.697
Size bank	-0.088	0.744
ROE	-0.656	0.641
ROA	3.176	0.819
NIM	2.929	0.462
Liquidity Gaps	0.022	0.806
CAR	-2.406	0.540
Inflation	21.235	0.656

GDP	-30.747	0.623
Durbin-Watson Stat	2.11	-

Source: Data output from EViews 12

4.4 Fixed Effect Estimation Method (The effects of CR and LR on bank stability)

In the previous section of literature and empirical studies, it has been explained that the fixed effect model used in certain past studies (Boahene, 2012; Suganya, 2018; Ahmad, 2019) to investigate the effect of credit and liquidity risks on bank stability has been modified. Table 7 shows the fixed effect regression results for the dependent variable (CAR) and independent variables (LR and CR). The redundant fixed effects and Hausman tests are examined. The results of the test validate and indicate that a fixed effect model is appropriate for this penal dataset. The Durbin-Watson statistic shows that there is a positive autocorrelation between variables. The R-square is 0.98, implying a 98% relationship between dependent and independent variables. As per this result, credit risk has a positive but significant effect on bank stability. Whereas liquidity (reverse of liquidity risk) has a negative and significant effect on bank stability. The interaction or inter-relationship of both risks, LR and CR, on bank stability is negative and significant. The liquidity gap, ROA, and inflation rate have positive and significant effects on CAR. Unlike loan growth, NIM and loan assets have a positive but insignificant effect on bank stability. Bank size has a negative but significant effect on bank stability. The second hypothesis of credit risk and liquidity risk that significantly affect bank stability is accepted. (See table 7).

Table 7: The effect of liquidity risk and credit risk on bank stability

Independent variables	Coefficient	P-Value
Constant	0.963	0.000
CAR(-1)	0.068	0.071
Credit Risk	0.164	0.015
Liquidity	-0.035	0.020
Liquidity*credit risk	-0.221	0.014
Liquidity Gaps	0.017	0.000
Loan Assets	0.051	0.191
Loan growth	0.000	0.934
NIM	0.001	0.974
ROA	0.334	0.064
ROE	0.008	0.642
Size Bank	-0.066	0.000
Inflation	0.082	0.179
GDP	-0.013	0.840
R-squared	0.988	
Adjusted R-squared	0.982	
F-Statistic	147.35	
Pro(F statistic)	0.0000	
Durbin-Watson Stat	1.524	
Redundant Fixed Effects tests		
	Statistic	P-Value
Cross-section F	27.616	0.000
Cross-section Chi-square	122.609	0.000
Hausman Test	-	0.000

Source: Data output from EViews 12

4.5 Discussions

This study shows that the mutual relationship between credit and liquidity risks is negative and insignificant. The findings of this study indicate that, from a statistical perspective, there is no mutual relationship between CR and LR. This result is also proven by (Imbierowicz, 2014; Ghenimi et al., 2017; Ahmad, 2019). Therefore, the hypothesis of H1 in this study can't be verified. Therefore, as the non-existence of a mutual relationship between CR and LR is found in Afghanistan's banking sector, Therefore, it is logical to examine the separate and joint interaction or inter-relationship of CR and LR on bank stability. As past studies indicate, bankruptcy of a bank is mostly a result of the joint interaction of both LR and CR. This study employed the fixed effect regression model as adopted by (Ahmad, 2019) to examine the impact of LR and CR on the stability of banks. Table 7 represents the outcomes. The effect of credit risk on bank stability is positive and significant, whereas liquidity risk has a negative and significant effect on bank stability. While the credit risk increases, that leads to insolvency and the likelihood of a bank's collapse. This study finds that credit risk and bank stability are inversely not related to each other. The result of liquidity risk indicates that stocks of highly liquid assets are stable for the stability of banks, as they provide the possibility of meeting the liquidity obligations and customers' sudden fund withdrawals. In case a bank cannot manage its liquid assets or doesn't have adequate liquid assets, it negatively affects the bank's stability. As the evidence of the global financial crisis of 2007 and the Kabul bank case prove it. This result is similar to (Ahmad, 2019).

The interaction or inter-relationship between liquidity risk and credit risk on bank stability is negative but significant. The findings of this study indicate that liquidity and credit risks increase or decrease jointly. In the case of high credit risk, liquidity risk negatively impacts the bank's stability. A bank is considered healthy as the degree of liquidity risk is lower. This study implies that interaction between LR and CR impacts bank stability. This result is also supported by (Nikomaram et al., 2013). Liquidity gaps have positive and significant effects on bank stability. Whereas loan assets and loan growth have a positive but insignificant effect on bank stability. Loan growth rates do not significantly contribute to the instability of banks. As the loan growth rate increases, it leads to larger credit risk. The bank's size has negative but significant impacts on bank stability, which contribute to the bank instability and likelihood of bank collapse. As the bank's size becomes larger, the risk of assets also becomes larger. NIM, ROA, and ROE have a positive and insignificant impact on bank stability. The result of these findings indicates that management performance, efficiency, and competency are a major element of bank stability. The finding of this study indicates that profit generation, return on equity, and return on assets positively impact bank stability. The two macroeconomic variables, GDP has negative and insignificant whereas inflation has positive but insignificant effect on bank stability. This result is also proven and supported by (Ahmad, 2019; Imbierowicz, 2014). The interaction between financial intermediaries and economic growth indicates that, growth in the financial market leads to economic development. The findings of this study indicate that credit risk and liquidity risk significantly and negatively impact bank stability. The hypothesis of 2 under this study is validated and accepted.

5. Conclusion and Recommendations

Credit risk and liquidity risk are the two most imperative elements for banks' survival and are key determinants of bank profitability. The results of this study indicate that credit and liquidity risks don't have a mutual relationship with each other. This study investigates the effect of credit risk and liquidity risk on the stability of banks by using a panel dataset

including cross-sectional and time series for the period of 2014–2020, where the data was collected from the annual audited financial statements of all 10 domestic operationalized banks in Afghanistan. This study follows the Two-Stage Least Square and panel data regression estimations. Those economic estimations are also applied by (Ghenimi, 2017; Ahmad, 2019). This study follows two steps of analysis. The first step involves testing the reciprocal relationship between credit risk and liquidity risk by applying the TSLS model. The ratio of impaired loans is used as a proxy for credit risk and the ratio of liquid assets for liquidity (reverse of liquidity risk). The second step consists of testing the effect of credit risk and liquidity risk on bank stability. The capital adequacy ratio (equity capital to total assets) is used as a proxy for bank stability. The findings of this study indicate that despite the relationship between credit risk and liquidity risk, but those risks don't have a significant reciprocal relationship with each other from a statistical perspective, while the interaction or inter-relationship of both risks negatively and significantly impacts bank stability. The result of this study is similar to the findings of (Ghenimi, 2017; Ahmad, 2019). The results of this study have key valuable policy suggestions and are a good insight for officials, governance bodies, and policy makers engaged in the management of the bank. The governance body of each bank can develop policies to strengthen the capital and to take liquidity measurements in line with the Principles of Sound Liquidity Risk Management of BCBS and the Basel International Framework for liquidity risk measurement and capital standards. Identifying and monitoring the key internal and external factors impacts the performance of loans and to design the policy in areas of bank deposit, bank asset size, credit quality, liquidity and risk management practices. Designing Risk Appetite and tolerance approach and to set up a strong risk review mechanism including risk monitoring, risk controlling, and risk reporting. Finally, to maintain adequate liquid assets and to develop contingency funding plans and stress event scenarios to predict the expected and unexpected credit and liquidity risks and associated losses and to set mitigation tools.

5.1 Theoretical and Practical implications

This study indicates that, from the theoretical point of view, liquidity and credit risks influence each other and both significantly affect the bank's stability. Banks are highly regulated; each country's central bank imposes prudential regulatory requirements to manage different types of risks. The finding of this study has an important insight to bank policy makers to formulate and implement appropriate risk management policy to measures and mitigate the possible financial losses, liquidation, bankruptcy or crisis to the economic system. The Basel committee on banking supervision has the formal responsibility to issue prudentially sound guidelines and principles for the banking industry. The sound principles and guidelines on managing liquidity and credit risks were formulated by the Basel committee and adopted with some changes by the central banks. This study, in line with Acharya (2015), recommends an optimum capital for banks to deal with credit and liquidity risks, the optimum regulatory capital requires a charge of capital on two levels. In the first tier, the minimum capital requirement will deal with asset substitution problems. The second tier, the callable capital or supplementary capital. The bank will be more stable by providing capital requirements at both levels. Banks use two types of capital. Tier 1 consists of core capital, or the highest quality capital that is used to absorb the losses. Tier 2 consists mainly of supplementary capital that contributes to the capital strength. In banks' practical environment, credit and liquidity risks are closely linked to each other. Typically, the nature of banking activities is to convert short-term liabilities (deposits) to long-term loans and investments to gain from them. This liquidity transformation exposes the bank to liquidity and credit risks, which require prudential and practical management. The asset and liability

structures of the bank are strongly and closely linked. Particularly, with respect to deposit withdrawal and loan defaults by borrowers. Banks, in the role of financial intermediaries, generate liquidity for the economy from their balance sheet items through financing risky projects by employing depositor's funds or from their off-balance sheet items of issuing guarantees or lines of credit. As per the banking liquidity requirements, banks must keep enough liquid assets that allow them to deal with liquidity risk. Principally, the bank must practice and formulate systems for monitoring and managing risks practically the liquidity position and credit portfolio and its concentration.

5.3 Limitations and Future Scope

This study includes only two categories of risks that largely banks are exposed to, called credit and liquidity risks. Future studies may include other categories of risks such as operational risk, regulatory risk, market risk, reputational risk, systematic risks. The period of the study and collection of data only limited to domestic operationalized Afghanistan banking sector and doesn't includes the branch of foreign banks in Afghanistan. This study doesn't incorporate the period of the impact of systemic risk on stability of banks and country risk including political and governmental changes that significantly damages the financial stability and economy broadly.

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