Academic Journal of Nawroz University (AJNU), Vol.12, No.4, 2023

https://doi.org/10.25007/ajnu.v12n4a1573

Stress Tests Scenarios: An Approach to Determining the Effect of Credit Risk on Loans, Capital Adequacy and Bank Efficiency: A Comparative Study in a Sample of Commercial Banks from Iraq, Qatar, and USA

Huzan Tahseen Tawfeeq Al-Bedouhi [1] and Saad Fadhil Abas Al–Mahmood [2]

1 Financial & Banking Sciences, College of Administration and Economics, University of Duhok, Duhok City, KRG – Iraq
2 Business Department, College of Administration and Economics, University of Duhok, Duhok City, KRG – Iraq

ABSTRACT: While most of the previous studies have dealt with the impact of a number of factors on non-performing loans, this paper is an attempt to verify the influence of non-performing loans on each loan, capital adequacy and bank efficiency. This study is carried out within a Stress Tests framework as a comparative applied study conducted on the data of a sample of commercial banks in Iraq, Qatar, and the United States of America for the period from 2018-2020.

The Stress Tests method with a single factor is adopted according to three scenarios ranging in intensity from light, medium, and high intensity. The test is conducted using Excel and E-views V.12 programs, and the findings show that the three banks in the sample have been exposed to credit risk in the third scenario of high severity. The results show that the banks in the sample have been exposed to three Stress Tests scenarios to varying degrees. Additionally, there has been a negative relationship and effect of the credit risk through non-performing loans on loans, capital adequacy ratio and bank efficiency.

Keywords: Stress Tests, Credit Risk, Non-Performing Loans, Loans, Capital Adequacy, Bank Efficiency.

1. Introduction

In the recent years, the usage of Stress Tests to assess the bank risk and stability has raised rapidly. The financial and economic crisis, which resulted in significant losses for banks and raised widespread anxiety about the banking sector's loss-bearing ability, accelerated this trend. Stress Tests have proven to be a useful method for finding potential risks in the banking sector and examining the industry's resistance to unfavorable events.

Up until the early 1990s, the majority of the world's largest banks had used Stress Tests. After that, smaller financial institutions started to use them as well. Later, regulators began to develop rules for banks to assess their own market risk using internal models. According to a paper produced by the Basel Committee on Banking Supervision (BCBS) in 1996, Stress Tests should be utilized by banks. It has been shown that implementing appropriate tools and techniques to address the impact of financial and economic crises on the commercial banks performance and other financial institutions, as well as preventing deterioration of those banks and institutions activities, are critical in dealing with these crises.

Throughout the first half of 2007, financial firms suffered massive losses in their credit portfolios as a result of the US mortgage crisis. According to the Basel Committee, the losses of most banks surpassed their capital requirements. As a result of this, the Basel Committee imposed the Stress Tests techniques (Onder *et al.*, 2016: 20).

When the Financial Reform Act was passed in response to the 2007-2008 crises, it required banks to report on Stress Tests and capital adequacy, which led to the 2010 Dodd-Frank Act, which significantly increased regulatory reporting for the financial industry. New legislation in the United States obliged the banking industry to file Comprehensive Capital Analysis and Review (CCAR) paperwork beginning in 2011. These rules necessitate that banks report on their internal capital-management strategies and undertake a variety of Stress Tests scenarios. In addition to CCAR reporting, the banks in the United States whose Financial Stability Boards (FSB) were determined too big to fail must also publish Stress Tests bankruptcy preparation reports. In its most current reporting examination of these institutions in 2018, the government listed 22 multinational banks and eight domestic banks as too-big-to-fail. BASEL III is now in

impact for all global banks. This global guideline, like US requirements, requires verification of bank capital levels as well as the implementation of Stress Tests scenarios as a tool for various crises.

2. Literature review

This research deals with the influence of non-performing loans on some factors in the context of identifying the credit risks caused by this type of loans. The following is a review of the research variables and their dimensions.

2.1. Stress Tests

A number of studies and research papers have dealt with Stress Tests in various fields, including the individual level of banks, the partial levels of banking operations and the crises and shocks that the financial system is exposed to in its various institutions. Banks that manage assets and investments frequently use Stress Tests to identify the risks to which they are exposed and then adopt the necessary hedging procedures to avoid potential losses. As a result, the banks use tools to evaluate how well their assets will perform in the face of various market occurrences and external shocks.

Girault (2008) proposes a three-stage methodology for conducting macro Stress Tests on the credit risk of Argentina's banking system. He creates a dynamic panel data model with bank-specific and macroeconomic variables to explain credit risk proxy variables. Then, he applies a Vector Autoregressive model to model the macroeconomic factors that affect bank loan loss provisions (VAR). In the third stage; deterministic, stochastic, and Monte Carlo simulation are combined to create a credit risk loss Stress Tests model. The results show that the Argentinian financial system has sufficient capital to withstand possible losses in challenging circumstances. In the Finnish banking industry, Sorge and Virolainen (2006) developed and applied two techniques for financial Stress Test modelling: Balance Sheet models and Probabilistic Value at Risk models. Certain Balance Sheet components in Balance Sheet models are impacted by changes in the macroeconomic environment. VaR models use probabilities based on the sensitivity of portfolio items to risk factors to estimate the loss distribution. In the same view, (Ramadiah, 2020: 22-23) points out that these tests have been used in academic and professional studies to explain the interactions between financial system institutions (Furfine, 2003; Eisenberg and Noe, 2001; Gai and Kapadia. 2010; Battiston et al., 2012; Huang et al., 2013; Caccioli et al., 2014; Greenwood et al.,2015; Cont and Schaanning, 2017).

In a different view on Stress Tests, Schuermann (2014) and Borio et al., (2014) state that it is possible to use Stress Tests effectively in crisis management, but they cannot be used as an early warning system for the financial system. This is due to the fact that these tests are effective at strengthening the financial stability of each individual financial institution, but they are not suitable to be used for the institutions of the financial system as a whole. According to Hoblet (2019), regulators and supervisors are increasingly using Stress Tests as one of their most important tools. The financial system as a whole benefit greatly from Stress Tests as a useful crisis management tool. Stress Tests' ability to improve banks' financial stability depends on the accuracy of their scenario analysis and the consistency of their implementation. Ong & Jobst (2020) see that applying Stress Tests is not easy and there is difficulty in designing scenarios that increase in severity if the shocks are assumed to reverberate across several countries, affecting financial institutions that have significant cross-border activities.

The researchers argue that Stress Tests are still a field of modern applied knowledge that is in the process of testing and formation and that a theory that controls the contents and dimensions of these tests has not yet been created. There is a long-time horizon for its development, which makes it more useful for financial and economic policymakers and decision-makers, particularly in the banking fields. It can serve as a monitoring aid for banks' performance, financial and banking system as a whole, and it can also serve as a forward-looking tool for what might happen under worst-case scenarios.

2.2. Credit Risk

Commercial banks play a fundamental role in providing the necessary financing to markets, companies and individuals in the form of various credit facilities and for different periods of time. Within this framework, they face many crises that expose them to credit risks. Multiple financial crises have highlighted the importance of strong interdependence between financial system components, including

commercial banks, and the need to study systemic risks that affect the dismantling and weakening of that interdependence, with Stress Tests playing a key role in achieving that goal (Haldane and May, 2011: 352).

Risk managers focus on credit risk related to macroeconomic factors when developing macro credit risk models for the majority of Stress Tests (GDP growth, unemployment, etc.) as in Cihak (2005) and Drehmann (2007). Citing a number of risk factors, Cihak (2007) examines scenario design and provides a logistic model for the inputs (Vasilopulos, 2013). Using a scenario analysis model, Vazquez et al. (2012) have conducted Stress Tests of credit risk with macro level for banking industry in Brazil. In worrying circumstances, the findings are being used to model the evolution of credit quality for particular banks and loan categories. A credit model is also used to predict the banks' capital needs in challenging scenarios to cover tail credit losses.

NPLs are credit risks that threaten the banking sector's insolvency and have an impact on daily operations, according to Michael (2006). High levels of NPLs also have a negative influence on the banks' overall financial performance. Researchers have connected NPLs to a several variables, such as income diversification, profit, capitalization, and operational effectiveness. However, it's unclear how these variables relate to NPLs. Some researchers came to the positive relationships between these factors, but other researchers disagree with those findings (Khan et al., 2020). High NPLs are primarily caused by lax credit principles, unqualified credit staff, high markup spreads, lax credit policies and inadequate borrower monitoring. NPLs are a key indicator of credit risk, which has an impact on the nation's banking system (Khan et al., 2020). NPLs, according to Handley (2010), can be a sign of a banking crisis because they limit credit expansion which has an effect on the nation's economic growth (Ivanovic, 2016).

Additionally, non-performing loans pose a significant challenge to the banking industry because they lower banks' profits and efficiency and are frequently blamed for keeping them from lending to consumers and businesses more, which slows economic growth. According to researchers, the negative effects of non-performing loans on loans, capital adequacy and bank efficiency are directly related to rising levels of credit risk. This paper is an endeavor to demonstrate this correlation and effect.

2.3. Loans

In order for commercial banks and other credit institutions to be profitable while providing loans and credit facilities to others, they must maintain a high level of performing loans by adopting standards for credit quality and vigorously following up on non-performing loans and for the borrowers to default. Rouabah and Theal (2010) use provisions for losses as an estimate for the overall likelihood of default due to a system of macroeconomic factors in a Stress Tests model for the Luxembourg banking industry. Using a Regression Test, the findings of Monte Carlo simulations then reveal that bank capitalization is vulnerable to major macroeconomic shocks.

Alton and Hazen (2001) claimed that loans become non-performing assets (NPLs) if principal and interest are not paid by the maturity date and are not expected to be paid at a later time, but the International Monterey Fund (IMF) states that loans become NPLs if they fail to generate interest and principal for a minimum of ninety days (90). (Khan et al., 2020). When banks have a large number of bad loans, it makes it more difficult for them to repay their debts and limits the amount of credit they can extend to borrowers. This has a negative effect on private investment. The internal and external economic environments are important factors that influence the amount of bad or non-performing loans from another angle (Singh *et al*., 2021).

2.4. Capital Adequacy

The Capital Adequacy Ratio (CAR) assesses the stability of financial institutions. It is a symbol of the company's resilience in the face of unexpected setbacks, as well as its sturdiness and dependability during times of stress. A minimum CAR is required for a company's survival. The equity-to-assets ratio is the metric employed to gauge this metric (Makri et al., 2014). The opposite is true with regard to how bank capital affects NPLs. On the one hand, managers of low-capitalized banks often engage in high-risk investments and issue loans without proper credit monitoring or incentive systems. These actions cause loan default rates to increase, demonstrating the inverse relationship between bank capital and NPLs.

However, banks that have a capital with high levels tend to lend more readily because they are confident that these loans will prevent them from going bankrupt and failing. As a result, banks are heavily involved in these risky credit activities, pointing to a possible link between capital and NPLs (Khan et al., 2020). The (CAR) demonstrates a bank's capacity to withstand unusual losses. Hu and Chiu (2004) came to the

conclusion that when banks make risky advances, the size of bank has a negative impact on NPLs. Makri et al. (2014) find that there is a bad correlation between CAR and NPLs. According to Constant and Ngomsi (2012), NPLs and CAR have a beneficial relationship with one another. In their 2015 study, Amuakwa and Boakye examined the various banking factors that affected NPLs in Ghana and found that while bank capital positively affects NPLs, microeconomic factors have the opposite effect. According to Kumar and Kishore (2019), NPLs and CAR are associated negatively with the banking industry in terms of banking factors. In a study on Nepal's banking industry, Koju et al. (2018) came to the conclusion that CAR has a bad relationship with NPLs.

2.5. Bank Efficiency

A bank can be said to be efficient if it is doing all its business activities at a low cost. Commercial banks' efficiency would therefore have an impact on the likelihood of future loan defaults. If the banks can't control their operating costs and loan portfolio, they'll face the problem of the insufficient bank efficiency. Furthermore, a bank's efficiency is calculated by dividing noninterest expense by noninterest income. The cost function that assumes that banks' income increases can be used to define bank efficiency. However, it is not just about increasing income but also about lowering costs across all levels of bank activities (Daley and Matthews, 2009). Income or revenue over and above expenses is referred to as profit, and it is a metric for measuring a company's financial health. A company's net income is the difference between its total revenue and its total expenses, and it can be found on its income statement. Regardless of the size or scope of the business or the industry in which it operates, profitability is closely related, but with one key distinction. Making money may be an absolute number, but making money is a relative concept. If you want to know the extent of an organization's profit relative to its size, you use this metric (Horton et al., 2021). When customers don't pay or pay late, the bank's net income and market value of capital could be affected, and this is the most significant risk for a bank. It can have a negative effect on a bank's financial health if it is not properly managed. It has been established in numerous studies that non-performing loans have a direct effect on a bank's income and expenses. Among the many internal factors that have a significant impact on Greek banks' efficiency are loan loss provisions, equity to total assets ratio, and operating costs (Athanasoglou et al., 2008).

Non-performing loans and rising costs are major concerns for the banking industry, according to the National Financial Supervisory Commission. Due to the importance of only a few non-performing loan percentages, commercial banks must recover all of the loans they lend to customers in order to earn a high profit (Faisal and Masood, 2020). According to efficiency theory, banks with effective management generate greater profits. Efficient management not only boosts profits, but it also aids banks in expanding their market share and tightening their grip on the industry. In addition, the efficiency theory says that a bank's earnings are boosted when operational expenses are reduced (Tang My and Quoc, 2022).

3. Methodology

This paper comprises an empirical model that relates the credit risk through the increase of non-performing loans with some financial factors. This will be done by means of comparative analysis between the data for three banks of Iraq, Qatar, and the United States of America, using the Stress Tests scenarios to evaluate the relations between the research variables. The main objective is to focus on one of the important risk management tools, which is Stress Tests. These are an early warning tool to reveal the extent to which credit risk affect the bank’s ability to face the financial crises it encounters and prevent it from defaulting. Other objectives will be:

1. Analyzing literature on the research subjects, and reviewing some papers about Stress Tests models.
2. Finding out statistical and mathematical methods that can be suitable for Stress Tests in relation to research variables.
3. Identifying the influence of credit risk which represented by non-performing loans on loans, capital adequacy and bank efficiency by using three different scenarios of Stress Tests.
4. Concluding some findings Conclusion of some results related to the levels of the ability of the banks in the sample to withstand scenarios of different severity in relation to the research variables.

3.1 Research Problem

The mid 2007 crisis hit the global economy hard and the financial crisis inflicted heavy losses on financial institutions such as banks and other business companies. The banking sector in the world was not far from these effects, as banks were exposed to financial crises, and one of its effects was that many of them approached the brink of bankruptcy, had it not been for government intervention to save them from those cases. This raised many questions among those interested in banking affairs about the magnitude of future risks that the global banking sector may be exposed to. The crises that occurred in the past have confirmed that credit risk management is not only carried out under favorable or normal conditions, but multiple scenarios must also be developed to face difficult and unfavorable conditions through the use of Stress Tests as one of the risk management tools for banks.

Many interpretations seemed in dispute about the secret of the failure of credit risk management to prevent financial indicators from slipping into the crisis, or at least the failure of risk management to mitigate the effects of the financial crisis on those institutions. Therefore, the fundamental question of this paper can be identified as (The increase in the volume of non-performing loans or credit risk for various reasons is one of the main problems facing banks, and therefore the study of the ability of loans, capital adequacy, and bank efficiency to bear the losses that is unexpected). Also, the sub-questions for the research problem can be as the following:

1. What is the change that will happen in the credit risk (non-performing Loans) in the event of shock scenarios of different intensities in the loans, capital adequacy and bank efficiency variables?
2. Are there any correlation and effect between the credit risks that the banks may be exposed to and the loans, capital adequacy and bank efficiency variables?

3.2 Research Hypotheses

The hypotheses were created in response to the research problem and its model; these hypotheses read as follows:

1. The increase in the percentage of non-performing loans by more than 25%, 50%, 100% reflects its negative effects on each of the loans, capital adequacy ratio, and bank efficiency.
2. NPLs as a credit risk have a negative association and effect on the loans, capital adequacy, and bank efficiency.

3.3 Research Design

The research design is the schema used to create a response to the research problem. This substantially encompasses a structure and study design. This research was carried out using cross-sectional data that sought to discover the differences among the sample banks in the calendar years between 2018 and 2020. This was considered fitting because it concerned a detailed study of Stress Tests scenarios for the credit risk and their effect on the dependent variables in this research. Mainly the research design is done according to the scientific approach, as a scheduled plan, that is based on the research questions and its structure to specify the relationship between those variables.

To identify the size of the credit risks that the sample banks are exposed, Stress Tests were used according a single factor approach. This means that Stress Tests were applied to the banks individually and then, a comparison was made between the three banks in the sample. The scenario analysis method was also used, as three counter scenarios were assumed that were designed for the purpose of the research. The study also relied on testing of variable represented by non-performing loans as a dimension for an independent variable which is credit risk along with performing loans and credit loss provision as dimensions for the first dependent variable which is Loans, regulatory capital and risk weighted assets as dimensions for the second dependent variable which is capital adequacy, then the income and expenses

as dimensions for the third dependent variable which is a bank efficiency in order to identify the effect between those three variables, through three stress scenarios.

With low, medium, and high shock levels of 25, 50, and 100 percent respectively, three Stress Tests scenarios were created, with the first scenario assuming that the independent variable has an effect on the dependent variables by 25 percent, plus or minus, and so on for the remaining scenarios.

3.4 Sample Design

The sample included three commercial banks from three different countries during the specified period from 2018 to 2020. The banks in the sample were chosen based on the difference between them in the nature of the activities they perform, the size of those activities and the difference in the environment in which they operate. To put this in perspective, the Iraqi Commercial Bank (ICB) is one of the local banks in Iraq, while Qatar Ahli Bank (QAB) is one of the banks that operate within the scope of the Gulf Cooperation Council Region, and JP Morgan Bank (JPM) is one of the large banks that operate within the global scope. Additionally, these banks have been relied upon because they are of most importance to the economy and the financial system of their countries, as well as the different banking environment in which each of these three banks operates. This allows the researchers to identify the fundamental differences between these banks towards the research variables.

3.5 Data Collection

An examination of data collected for a different purpose is called secondary data analysis. This research collects secondary data on the annual bank level from annual reports of the sample banks in addition to the data published by the central banks of the countries of the sample banks. Datasets spans the years from 2018 to 2020 including the annual audited financial statements for the three banks. The empirical analysis depends on yearly data to conduct the comparative analysis from the annual reports and the balance sheet for the three commercial banks.

3.6 Research Variables

The following variables formed the model for the current research, and the data for those variables were obtained from the annual financial reports of the sample banks which were:

1. The independent variable is represented by the Credit Risk (CR) which includes the dimension of non-performing loans which is defined as a bank loan that is subject to delinquency or is not likely to be repaid in full by the borrower through a specific time.
2. The first dependent variable is represented by the Loans (L): The credit or funds provided by the bank to individuals, companies or other financial institutions. They are paid back with interest and within a given period of time as agreed upon in the loan arrangement which in turn will affect the construction of the losses provisions of credit and the Performing Loans dimensions.
3. The second dependent variable represented by the CAR defined as a Capital Adequacy Ratio required by the regulators and calculated by limiting the maximum level of a bank's risk assets and off-balance sheet commitments to a fixed multiple of its capital. It depends on capital regulatory and risk weighted assets.
4. The third dependent variable represented by the Bank Efficiency (BE) which represents the bank's ability to withstand abnormal losses and shows its strength and stability during times of crisis; a ratio that is calculated by dividing expenses by revenues.

3.7 Functional Model

The analysis of variables was performed for the data obtained from the secondary data by using Stress Tests with statistics programs to analyze the effect of the independent variable on the dependent variables. Moreover, to determine the correlation and the effects between the variables according to the scenarios of

Stress Tests, the analysis was performed according to the following equations that test the research hypothesis that the increase in the percentage of non-performing loans by more than 25%, 50%, 100% reflects its effects on each of the loans, capital adequacy ratio, and bank efficiency of the sample. Accordingly, these models were formulated as follows, and table (1) explains the variable's dimensions in these models and their codlings:

$PL_{\text{for bank}} = \beta_0 + \beta\ CR + \varepsilon_i$ ….. (1)

$CAR_{\text{for bank}} = \beta_0 + \beta\ CR + \varepsilon_i$ ….. (2)

$BE_{\text{for bank}} = \beta_0 + \beta\ CR + \varepsilon_i$ ….. (3)

where β_0 denotes the constant, β denotes the independent coefficient, and ε_i denotes the residuals.

Table 1: Variables Description

Variables	Indicators	Dimensions	Code	Data Source
Independent Variables	Credit Risk (CR)	Non- Performing Loans	NPL	Annual reports for the sample banks from 2018 to 2020.
Dependent Variables	Loans (L)	Performing Loans	PL	
		Credit Loss Provision	CRLP	
	Capital Adequacy Ratio (CAR)	Regulatory Capital	RC	
		Risk- Weighted Assets	RWA	
	Bank efficiency (BE)	Income	I	
		Expenses	E	

4. Results

In order to test the hypotheses, the three shock scenarios must be executed on the dependent variables also execute the correlation and regression tests as the following:

4.1. Scenario Hypothesis Test:

4.1.1. The First Scenario: The results of this scenario indicate the following situations:

1. Loans for the three banks were stayed safe at the shock of (25%), during the period of the study and according to the credit risk variable. It was found through Stress Tests for credit risk that the increase of credit exposure for non-performing loans by 25% and under the first less severe scenario contributed to the reduction of performing loans by 25%. On the other hand, the increase in credit exposure led to a reduction provision for credit losses at a rate of (25%) for all the sample banks in the and during the years 2018 - 2020. This indicates the ability of the banks of the sample to face the credit risk rise in the least severe scenario and that they have the ability to cover any losses with their provision for credit risk. Table (2) and table (1) in the appendix (1) show the full results of this scenario.

Table 2: Loans at 1st Scenario

Years	Banks	Actual			Credit Default 25%	1st Scenario		
		PL	NPL	CRLP		PL - 25%	NPL+ 25%	CRLP - 25%
Average 2018-2020	ICB	21222	12715	20746	3179	18044	15894	4853
	QAB	479944	9707	12991	2427	477518	12134	857
	JPM	697759	243623	542645	60906	636854	304529	238116

2. It is noted through Stress Tests for the CAR that the credit exposure by (25%) and under the first less severe scenario contributed to reducing the regulatory capital by 25% and increased the levels of risk-weighted assets by the same percentage. On the other hand, the increase in credit exposure led to the reduction of CARs for all the sample banks during the years 2018 - 2020. It is also noted that ICB and JBM

did not maintain the CAR in the year 2020, as it decreased from the ratio established by the Basel Committee (10.5%) and the central banks in the countries of those banks, amounting to (12%). It also emerged from the general rate of capital adequacy for the average years of study that QAB can be exposed to capital adequacy risks in the event of a crisis of low intensity. This requires the mentioned bank to strengthen its regulatory capital to overcome that crisis. It can be concluded from the results of the average rate with the ability of ICB and JPM banks to face this crisis that they do not need to strengthen their regulatory capital in the least severe scenario and that they have the ability to overcome the capital adequacy risks at this stage, the following table (3) and table (2) in the appendix (1) show the full results of this scenario.

Table 3: CAR at 1st Scenario

Years	Banks	Actual			Credit Default 25%	1st Scenario		
		RC	RWA	CAR%		RC-25%	RWA+25%	CAR%
Average 2018-2020	ICB	16937	172070	23%	3179	13758	175249	18%
	QAB	5953	33099	18%	2427	3526.25	35525	10%
	JPM	250008	1535131	16%	60906	189102	1596037	12%

3. As for the bank efficiency risks, under the first scenario, it is noted that the income decreased in the value of the credit exposure by 25% and the expenses increased by the same percentage. On the other hand, the increase in credit exposure led to varying levels of change in (BE) for all the sample banks during the years 2018 - 2020. It is also noted that QAB has achieved a high negative (BE) in all years of the study as a result of credit exposure. According to this scenario and in view of the high volume of losses, it requires the mentioned bank to cover this exposure and follow credit quality standards for the proper use of its financial resources. It also emerged from the year's average of (BE) that ICB and JPM have the ability to face this crisis, and therefore they are able to achieve profit based on the level of (BE) in the least severe scenario and that means that they have the ability to face these risks, the following table (4) and table (3) in the appendix (1) show the full results of this scenario.

Table 4: Bank Efficiency at 1st Scenario

Years	Banks	Actual			Credit Default 25%	1st Scenario		
		I	E	BE		I -25%	E+25%	BE
Average 2018-2020	ICB	30420	17625	0.58	3179	27241	14446	0.53
	QAB	1148	475	0.41	2427	-1279	-1952	- 1.53
	JPM	97861	65182	0.67	60906	36955	4277	0.12

4.1.2. The Second Scenario: The results of this scenario indicate the following situations:

1. It is noted in the second scenario and through Stress Tests for credit risks that the credit exposure by (50%) and under this medium-severity scenario indicates an increase in the levels of non-performing loans by this percentage, and this will lead to a decrease in the performing loans by (50%). On the other hand, the increase in the credit exposure will lead to the reduction of the provision for credit losses by (50%) and for all the sample banks and during the years 2018 - 2020. It is noted that there is a discrepancy between the three banks in their exposure to credit risks during that years. As for the level of the average years of study, it is clear that QAB bank has exposure to high credit risk and that its provisions for credit losses are not able to cover this exposure, while ICB and JPM banks had the ability to overcome this crisis with their provision for credit losses. The following table (5) and table (4) in the appendix (1) show the full results of this scenario.

Table 5: Loans at 2nd Scenario

Years	Banks	Actual			Credit Default 50%	2nd Scenario		
		PL	NPL	Loss Provision		PL -50%	NPL+ 50%	Provision -50%
Average 2018-2020	ICB	21222	12715	20746	6358	14865	19073	1674
	QAB	479944	9707	12991	4854	475091	14561	-1570
	JPM	697759	243623	542645	121812	575948	365435	177210

2. According to the credit exposure at a rate of (50%) and under the second scenario of medium severity for CAR, it contributed to reducing the regulatory capital by (50%) and increased the levels of risk-weighted assets by the same percentage. On the other hand, the increase in credit exposure led to a reduction in the CARs for all the sample banks during the years 2018 - 2020. It is also noted that QAB and JPM banks are more exposed to this type of risk, as their CAR decreased from the standard ratio, which requires banks the aforementioned to strengthen their regulatory capital to overcome this crisis. On the other hand, the ICB has maintained its ability to overcome this crisis, and therefore it does not need to take any steps to cover this exposure in the medium-severity scenario. The following table (6) and table (5) in the appendix (1) show the full results of this scenario.

Table 6: CAR at 2nd Scenario

Years	Banks	Actual			Credit Default 50%	2nd Scenario		
		RC	RWA	CAR%		RC-50%	RWA+ 50%	CAR%
Average 2018-2020	ICB	16937	172070	23%	6358	10579	178428	13%
	QAB	5953	33099	18%	4854	1100	37952	4%
	JPM	250008	1535131	16%	121812	128196	1656943	8%

3. The results of the second scenario on the (BE) show that there is a decrease in the income by the value of credit exposure (50%) and an increase in expenses by the same percentage. On the other hand, this increase led to varying levels of change in (BE) for all the sample banks during the years 2018-2020. It is also noted from the years average that ICB has an opportunity to overcome this scenario as it is still achieving a level of (BE), whereas it was found that ICB and JPM were not able to face this crisis and therefore they achieved losses in the medium severity scenario and that they do not have the ability to face these risks. The following table (7) and table (6) in the appendix (1) show the full results of this scenario.

Table 7: Bank Efficiency at 2nd Scenario

Years	Banks	Actual			Credit Default 50%	2nd Scenario		
		I	E	BE		I-50%	E+50%	BE
Average 2018-2020	ICB	30420	17625	0.58	6358	24062	23983	1.00
	QAB	1148	475	0.41	4854	-3706	5329	-1.44
	JPM	97861	65182	0.67	121812	-23951	186994	-7.81

4.1.3. The Third Scenario: The results of this scenario indicate the following situations:

1. With regard to the results of the high severity scenario that the credit exposure if increased by (100%), which indicates that the increase in non-performing loans by (100%), will lead to a decrease in the performing loans by the same percentage for all the sample banks. On the other hand, the increase in credit

exposure will lead to a reduction in the provision for credit losses by (100%) for all banks during the years 2018 - 2020. It is noted that the ICB and QAB banks are exposed to credit risks, whether during the study years or in the year's average and that they are not able to cover these risks with their provisions for credit losses. The JPM bank, on the other hand, appeared at a stronger level than other banks in its ability to overcome this crisis based on its provision for credit losses, the following table (8) and table (7) in the appendix (1) show the full results of this scenario.

Table 8: Loans at 3rd Scenario

Years	Banks	Actual			Credit Default 100%	3rd Scenario		
		PL	NPL	CRLP		PL - 100%	NPL+ 100%	CRLP - 100%
Average 2018-2020	ICB	21222	12715	20746	12715	8507	25430	-4684
	QAB	479944	9707	12991	9707	470237	19414	-6423
	JPM	697759	243623	542645	243623	454136	487247	55399

2. It is noted that the impact of the third scenario on the CAR is that the credit exposure at (100%) will affect the reduction of the regulatory capital by (100%) and increase the levels of risk-weighted assets in the same amount. On the other hand, the increase in credit exposure led to a reduction in the CARs of all the sample banks during the years 2018-2020 as well as in the general average, which indicates that ICB, QAB and JPM banks have all been exposed to capital adequacy risks, but in varying proportions, which requires including strengthening its regulatory capital levels to overcome this crisis, the following table (9) and table (8) in the appendix (1) show the full results of this scenario.

Table 9: CAR at 3rd Scenario

Years	Banks	Actual			Credit Default 100%	3rd Scenario		
		RC	RWA	CAR%		RC - 100%	RWA+ 100%	CAR%
Average 2018-2020	ICB	16937	172070	23%	12715	4222	184785	6%
	QAB	5953	33099	18%	9707	-3754	42805.67	-6%
	JPM	250008	1535131	16%	243623	6384	1778755	0%

3. The results of the third scenario show that the credit exposure at a rate of (100%) will lead to a decrease in the income with the value of that credit exposure and contribute to an increase in expenses by the same percentage. On the other hand, this increase has led to the emergence of levels of change in (BE) for all banks during the years 2018 - 2020. It is also noted from the years average that ICB is still capable to generate profit with low level of (BE), while QAB and JPM banks have not been able to face this crisis and therefore they will achieve losses in the high-severity scenario, and they do not have the ability to face these risks, which requires them to activate their income and reduce expenses in order to overcome the risks. It also requires strengthening their regulatory capital levels to overcome these crises, the following table (10) and table (9) in the appendix (1) show the full results of this scenario.

Table 10: Bank Efficiency at 3rd Scenario

Years	Banks	Actual			Credit Default 100%	3rd Scenario		
		I	E	BE		I -100%	E + 100%	BE
Average 2018-2020	ICB	30420	17625	0.58	12715	17705	30340	1.71
	QAB	1148	475	0.41	9707	-8559	10182	-1.19
	JPM	97861	65182	0.67	243623	-145762	308806	-2.12

Based on the results of the analysis of the three Stress Test scenarios and the research variables, it is clear that the increase in the levels of operating loans has negative effects in varying proportions on each of the loans, the capital adequacy ratio and the efficiency of the bank. So, we can accept the first hypothesis of the research.

4.2. Second Hypothesis Tests

The E -Views V.12 program was used to test the second hypothesis in order to find out the correlation and effect relationships between the research variables. Since the units of measurement for the variables are different, including ratios and numerical ones, the researchers have resorted to standardizing those measures using the natural logarithm function, where the results were as follows:

4.2.1 The correlation test: Table (11) shows the correlation coefficients between the research variables. According to the correlation values, there is no correlation inflation between the research variables because all the values were less than (0.80). The results show that there is a negative relationship between credit risk (LogCR) and between LogL, LogCAR, and LogBE. These results had a significant correlation between LogCR and LogL and LogBE because the p-value for these relations was less than (0.05). Also, the results show that there was no significant correlation between LogCR and LogCAR because the p-value for this relation was greater than (0.05) which represents the default level of the significance of the research.

Table 11: Variables Correlations

Variables	LogCR	P-value
LogL	- 0.720**	0.000
LogCAR	- 0.235	0.238
LogBE	-0.505*	0.017

4.5.2 Measurement of Unit Root: Table (12) shows the results of Augmented Dicky- Fuller (ADF) unit root tests for the four variables at the level and at the first difference of the natural log values. Hence, all the variables are stationary at the level and first difference with intercept only or with trend and intercept, So, all the variables do not contain a unit root. In view of this fact, these results have to ensure that all the variables are able to reject the null hypothesis at the level and at the first difference.

Table 12: ADF Unit Root Tests

Unit Root	At Level		At First Difference	
Variables	Intercept	Trend & Intercept	Intercept	Trend & Intercept
LogCR	-1.644770	-3.525063*	-4.47241**	-5.82387***
LogL	-5.772054***	-	-	-
LogCAR	-4.182550**	-5.623185***	-	-
LogBE	-1.594816	-2.487400	-3.14096**	-5.83478***

***, **, * denote significant at 1%, 5%, and 10%.

4.5.3 The Effect Test: Using least squares regression to find out the effect of independent variable LogCR on LogL, LogCAR, and LogBE, it is clear from the results in table (13) that LogCR has an effect on both LogL and LogBE according to the value of R^2, which was equal to (0.52), (0.26) respectively. This indicates that any increase in the levels of credit risk will, in turn, reduce the levels of both loans (operating loans and provisions for credit losses) as well as the efficiency of the bank (by increasing expenses and decreasing the revenues) and vice versa. It is noted that there is a negative effect of the LogCR variable in the LogCAR variable with a weak explanatory value where the value of R^2 is (0.06).

Table 13: The Effect Results

Model	B_0	B_1	R^2	t- value	P-value
LogL	0.582	-0.720	0.518	-5.185	0.000
LogCAR	3.669	-0.235	0.055	-0.332	0.238
LogBE	2.746	-0.505	0.255	-2.614	0.017
Tabulated t with 25 degree of freedom at level 5% = 1.708					
N= 27					

4.6. Discussion

The results of the Stress Tests of ICB revealed that the credit position of this bank is much better than that of QAB and JPM banks in terms of its exposure to credit risks and under the three scenarios. However, the reality may differ from this conclusion due to several factors including that this bank operates within a local environment and that it offers credit facilities that are not up to the level of the other sample banks which provide their credit services in regional and global environments. Moreover, the financial capabilities of QAB and JPM banks exceed those of ICB by far in terms of resources and financial capabilities. Another point to mention is that ICB does not have the skills and experience that the other sample banks have, especially JPM. In this regard, the preference of this bank does not reflect the state of stability and banking security for it due to what has been mentioned in the previous factors. On the other hand, it does not indicate the state of stability and security of the other banks.

In a related context, it appeared that QAB bank is one of the sample banks that could be affected by financial crises resulting from its exposure to credit risks. This conclusion was built by the reality of the results of the three scenarios that the mentioned bank was exposed to, which revealed that the levels of each of the loans, the CAR, and the bank efficiency were significantly affected since the first scenario, which indicates that the increase in the levels of non-performing loans from (25%) led to the emergence of negative results in its credit performance, and then its negative results continued in the most severe scenarios. This requires the bank's management to focus on the weaknesses that may lead in the future to achieve such scenarios, especially in light of global indicators on the emergence of a kind of slowdown in economic growth rates at the level of different countries of the world, which may cast a shadow on the economic sectors in general and the banking sector in particular.

Inferred from the results of the current research that the JPM Bank enjoys high credit strength and financial capabilities, different from ICB and QAB banks based on its exposure to credit risk under the three scenarios, it is noted that it passed the first and second scenarios at better levels than other banks. Its financial resources, which greatly outweigh the financial resources of other banks, also had an influential role in the preference of its credit status over the rest of the sample banks, in addition to its experience and the wide variety of services and credit facilities it provides that contributed to that preference.

In terms of the degree of correlation and influence of the credit risk variable on loans, capital adequacy, and the bank's efficiency variables, and when compared to the studies carried out by various researchers on NPLs as a credit risk and bank-specific factors, our results show that there is a negative association between NPLs and Loans, capital adequacy, and bank efficiency.

The findings support those of (Rajan, 1994), who has discovered a negative correlation between NPLs and bank capital, by demonstrating a negative correlation between NPLs and CAR variables. The findings indicate a bad correlation between banking capital and NPLs.

By using profit as one of the indicators of bank efficiency, these results are consistent with (Berger and DeYoung, 1997) study regarding the relationship between non-performing loans and operating efficiency.

The current study has discovered that there is a negative relationship between non-performing loans and income. This is because profit is the net result of the relationship between income and expenses representing the dimensions of the bank's efficiency variable. Khan et al. (2020) also have found a negative and significant correlation between NPLs and profit.

The findings of this study confirm those of Khan et al. (2020), which claim that income diversification and CAR both have a bad relationship with NPLs. The outcomes also demonstrate that NPLs are negatively and significantly impacted by operating efficiency.

On the other hand, (Ghosh, 2015) find that the NPLs have a negative association with income and this result perpetuates the results that have been reached with the existence of a negative correlation between non-performing loans and the bank efficiency, considering that the income represents as one of the dimensions of the bank efficiency variable adopted in the current research.

5. Conclusions

The aim of this research is to explore the relation and effect of credit risk on loans, CAR, and bank efficiency. To meet this objective, the researchers rely on Stress Tests and by exposing non-performing loans as one of the causes of credit risk to increase by 25%, 50%, and100%, then adopting a number of statistical news to explore the relationship and influence between the study variables and in light of the Stress Test results.

The Stress Tests are one of the modern tools for detecting banking risks. They help assess the financial situation of banks and other institutions, within different scenarios. The aim is to assess the potential effects on the operations of banks to identify weaknesses for early treatment and to address banking risks that can, in turn, help the banks' management to adopt appropriate strategies to manage their risks. The results show that Stress Tests have contributed significantly to the early detection of defects in credit facilities and loans offered by the sample banks as a result of their exposure to credit risks. This is especially the case when the levels of credit exposure to non-performing loans and their repercussions on each of performing loans, provisions for credit losses, capital adequacy, regulatory capital, risk-weighted assets, bank efficiency, incomes, and expenses, as the results of these tests, all show that there are large credit exposures in the sample banks, especially in the high-severity scenario. This scenario reveals the possibility of the sample banks being exposed to credit risks and that it is necessary for these banks to work to draw up policies through which to counter this expectation.

Therefore, it is possible to conclude that it is necessary for the sample banks to work on improving the methods of governance on credit risks. This can be done by monitoring non-performing loans and following them up on an ongoing basis. The procedure contributes to reducing credit losses and provisions prepared for this purpose. There is also the need for the sample banks to work to reduce the levels of non-performing loans instead of relying on expanding in introducing loans which may weaken their banking efficiency. Additionally, those banks must work to strengthen their credit risk management systems in accordance with the requirements of central banks of their countries and the requirements of international regulators such as the Basel Committee.

6. References

1. Alton, R. G., & Hazen, J. H., (2001). As Economy Flounders: Do we see a rise in problem loans, Federal Reserve Bank of St. Louis, USA.
2. Amuakwa–Mensah, F. and Boakye–Adjei, A., (2015). Determinants of non–performing loans in Ghana banking industry, International Journal of Computational Economics and Econometrics, Inderscience Enterprises, Vol. 5 No. 1, PP. 35-54.
3. Athanasoglou, P., Manthos, D., and Staikouras, C., (2008). Determinants of bank profitability in the south eastern European region. Munich Personal RePEc Archive, Available from: https://mpra.ub.unimuenchen.de/10274.
4. Borio, C., Drehmann, M., & Tsatsaronis, K., (2014). Stress-testing macro stress testing: does it live up to expectations ?, Journal of Financial Stability, 12, PP.3-15.
5. Čihák, M., (2004). Stress Testing: A Review of Key Concepts, Czech National Bank Research Policy Note, Working Pares, No. 4/2.
6. Čihák, M., (2007). Introduction to Applied Stress Testing, International Monetary Fund. IMF Working Papers, No. 7/59.
7. Constant, F.D. and Ngomsi, A., (2012). Determinants of bank long-term lending behavior in the Central African economic and monetary community (CEMAC), Review of Economics and Finance, Better Advances Press, Canada, Vol. 2, PP. 107-114.

8. Daley, J. and Matthews, K., (2009). Measuring Bank Efficiency: Tradition or Sophistication? A Note, Cardiff Economics Working Papers, No. 24, Cardiff, Wales, UK.
9. Düllmann, K., & Masschelein, N., (2007). A Tractable Model to Measure Sector Concentration Risk in Credit Portfolios. Journal of Financial Services Research, 32(1-2), PP.55–79.
10. Faisal, A., and Masood, O., (2020). How Do Large Commercial Banks Adjust Capital Ratios: Empirical Evidence from the US ?, Economic Research, Vol. 33, Issue 1, PP. 1849-1866.
11. Handley, N.J., (2010). Growth in a time of debt, CFA Digest, Vol. 40, No. 3, PP. 19-20.
12. Hobelt, J., (2019). Bank Stress Tests: Implications on Accounting Discretion, Transparency and Market Discipline, PhD Thesis submitted to the University of Sussex for the degree of Doctor of Philosophy in Finance, University of Sussex, UK.
13. Horton, M., Potters, Ch., and Munichiello, K., (2021). The Difference Between Profitability and Profit, https://www.investopedia.com.
14. Hu, J., Li, Y. and CHIU, Y., (2004). Ownership and nonperforming loans: evidence from Taiwan's banks, The Developing Economies, Wiley Online Library, Vol. 42 No. 3, PP. 405-420.
15. Ivanovic, M., (2016). Determinants of credit growth: the case of Montenegro, Journal of Central Banking Theory and Practice, Vol. 5 No. 2, PP. 101-118.
16. Khan, M.A., Siddique, A., and Sarwar, Z,. (2020). Determinants of non-performing loans in the banking sector in developing state, Asian Journal of Accounting Research Vol. 5 No. 1, PP. 135-145.
17. Koju, L., Koju, R. and Wang, S., (2018). Macroeconomic and bank-specific determinants of non-performing loans: evidence from Nepalese banking system, Journal of Central Banking Theory and Practice, Vol. 7 No. 3, PP. 111-138.
18. Kumar, V. and Kishore, M.P., (2019). Macroeconomic and bank specific determinants of non-performing loans in UAE conventional bank, Journal of Banking and Finance Management, Vol. 2 No. 1, PP. 1-12.
19. Makri, V., Tsagkanos, A. and Bellas, A., (2014). Determinants of non-performing loans: the case of Eurozone, Panoeconomicus, Vol. 61 No. 2, PP. 193-206.
20. Michael, J.N., (2006). Effect of non-performing assets on operational efficiency of central co-operative banks, Indian Economic Panorama, Vol. 16 No. 3, PP. 33-39.
21. Onder, S., Damar, B., and Ali, A., (2016). Macro Stress Testing and an Application on Turkish Banking Sector, Procedia Economics and Finance, 38: PP. 17 – 37.
22. Ong, L.L., and Jobst, A. A., (2020). Stress Testing: Principles, Concepts, and Frameworks, International Monetary Fund Publishing, Washington DC, USA.
23. Singh, S. K., Basuki, B., and Setiawan, R., (2021). The Effect of Non-Performing Loan on Profit: Empirical Evidence from Nepalese Commercial Banks Journal of Asian Finance, Economics and Business Vol 8 No 4, PP. 709–716.
24. Sorge, M. and Virolainen, K., (2006). A comparative analysis of macro stress-testing methodologies with application to Finland. Journal of Financial Stability, 2(2), PP.113–151.
25. Tang My, S., and Quoc, A., (2022). The Relationship between Credit Risk and Bank Financial Stability: The Mediating Role of Bank Profitability, Journal of Hunan University (Natural Sciences), Vol. 49, No. 1 January, PP. 263-271.
26. Rouabah, A. & Theal, J., (2010). Stress Testing: The Impact of Shocks on the Capital Needs of the LUXEMBOURG Banking Sector, Central Bank of Luxembourg, Working Papers, N.47.
27. Vasilopoulos, C., (2007). Financial Stress Testing: A model based exploration under deep uncertainty, Delft University of Technology Faculty Technology, Policy and Management, Master Engineering and Policy Analysis, EPA Msc Thesis Project.
28. Vazqueza, F; Benjamin, M. T.; & Soutoa, M., (2012). A macro stress test model of credit risk for the Brazilian banking sector, Journal of Financial Stability Volume 8, Issue 2, April, PP. 69-83.

Appendix 1

Table (1) Loans Risk at 1st Scenario

Year	Banks	Actual			Credit Default 25%	1st Scenario		
		PL	NPL	CRLP		PL - 25%	NPL+ 25%	CRLP - 25%
2018	ICB	18609	11883	19461	2971	15638	14854	4607
	QAB	27672	471	638	118	27554	589	49
	JPM	673617	207571	444871	51893	621724	259464	185407
2019	ICB	21855	9298	12971	2325	19531	11623	1349
	QAB	682618	12839	16776	3210	679408	16049	727
	JPM	674813	223707	765585	55927	618886	279634	485951
2020	ICB	23203	16964	29807	4241	18962	21205	8602
	QAB	729543	15811	21559	3953	725590	19764	1795
	JPM	744848	299592	417480	74898	669950	374490	42990
	ICB	21222	12715	20746	3179	18044	15894	4853

Years Average	QAB	479944	9707	12991	2427	477518	12134	857
	JPM	697759	243623	542645	60906	636854	304529	238116

Table (2) CAR Risk at 1st Scenario

Year	Banks	Actual			Credit Default 25%	1st Scenario		
		RC	RWA	CAR%		RC-25%	RWA+25%	CAR%
2018	ICB	15289	44354	34%	2971	12318	47325	26%
	QAB	5614	30784	18%	118	5496	30902	18%
	JPM	237511	1528916	16%	51893	185618	1580809	12%
2019	ICB	15920	54400	29%	2325	13596	56725	24%
	QAB	5897	32735	18%	3210	2687	35945	7%
	JPM	242589	1515869	16%	55927	186662	1571796	12%
2020	ICB	19601	417456	5%	4241	15360	421697	4%
	QAB	6348	35777	18%	3953	2395	39730	6%
	JPM	269923	1560609	17%	74898	195025	1635507	12%
Average	ICB	16937	172070	23%	3179	13758	175249	18%
	QAB	5953	33099	18%	2427	3526.25	35525	10%
	JPM	250008	1535131	16%	60906	189102	1596037	12%

Table (3) Bank Efficiency Risk at 1st Scenario

Year	Banks	Actual			Credit Default 25%	1st Scenario		
		I	E	BE		I-25%	E+25%	BE
2018	ICB	19875	10864	0.55	2971	16904	7893	0.47
	QAB	1087	424	0.39	118	969	306	0.32
	JPM	95868	63394	0.66	51893	43975	11501	0.26
2019	ICB	19082	6554	0.34	2325	16758	4230	0.25
	QAB	1110	435	0.39	3210	-2100	-2775	-1.32
	JPM	101928	65497	0.64	55927	46001	9570	0.21
2020	ICB	52302	35457	0.68	4241	48061	31216	0.65
	QAB	1247	567	0.45	3953	-2706	-3386	-1.25
	JPM	95787	66656	0.70	74898	20889	-8242	0.39
Years Average	ICB	30420	17625	0.58	3179	27241	14446	0.53
	QAB	1148	475	0.41	2427	-1279	-1952	- 1.53
	JPM	97861	65182	0.67	60906	36955	4277	0.12

Table (4) Loans Risk at 2nd Scenario

Year	Banks	Actual			Credit Default 50%	2nd Scenario		
		PL	NPL	CRLP		PL - 50%	NPL+ 50%	CRLP-50%
2018	ICB	18609	11883	19461	5942	12668	17825	1637
	QAB	27672	471	638	236	27437	707	-69
	JPM	673617	207571	444871	103786	569832	311357	133515
2019	ICB	21855	9298	12971	4649	17206	13947	-976
	QAB	682618	12839	16776	6420	676199	19259	-2483
	JPM	674813	223707	765585	111854	562960	335561	430025
2020	ICB	23203	16964	29807	8482	14721	25446	4361
	QAB	729543	15811	21559	7906	721638	23717	-2158

	JPM	744848	299592	417480	149796	595052	449388	-31908
Years Average	ICB	21222	12715	20746	6358	14865	19073	1674
	QAB	479944	9707	12991	4854	475091	14561	-1570
	JPM	697759	243623	542645	121812	575948	365435	177210

Table (5) CAR Risk at 2nd Scenario

Year	Banks	Actual			Credit Default 50%	2nd Scenario		
		RC	RWA	CAR%		RC- 50%	RWA+ 50%	CAR%
2018	ICB	15289	44354	34%	5942	9348	50296	19%
	QAB	5614	30784	18%	236	5379	31020	17%
	JPM	237511	1528916	16%	103786	133726	1632702	8%
2019	ICB	15920	54400	29%	4649	11271	59049	19%
	QAB	5897	32735	18%	6420	-523	39155	-1%
	JPM	242589	1515869	16%	111854	130736	1627723	8%
2020	ICB	19601	417456	5%	8482	11119	425938	3%
	QAB	6348	35777	18%	7906	-1558	43683	-4%
	JPM	269923	1560609	17%	149796	120127	1710405	7%
Years Average	ICB	16937	172070	23%	6358	10579	178428	13%
	QAB	5953	33099	18%	4854	1100	37952	4%
	JPM	250008	1535131	16%	121812	128196	1656943	8%

Table (6) Bank Efficiency Risk at 2nd Scenario

Year	Banks	Actual			Credit Default 50%	2nd Scenario		
		I	E	BE		I-50%	E+50%	BE
2018	ICB	19875	10864	0.55	5942	13934	16806	1.21
	QAB	1087	424	0.39	236	852	660	0.77
	JPM	95868	63394	0.66	103786	-7918	167180	-21.11
2019	ICB	19082	6554	0.34	4649	14433	11203	0.78
	QAB	1110	435	0.39	6420	-5310	6855	-1.29
	JPM	101928	65497	0.64	111854	-9926	177351	-17.87
2020	ICB	52302	35457	0.68	8482	43820	43939	1.00
	QAB	1247	567	0.45	7906	-6659	8473	-1.27
	JPM	95787	66656	0.70	149796	-54009	216452	-4.01
Years Average	ICB	30420	17625	0.58	6358	24062	23983	1.00
	QAB	1148	475	0.41	4854	-3706	5329	-1.44
	JPM	97861	65182	0.67	121812	-23951	186994	-7.81

Table (7) Loans Risk at 3rd Scenario

Year	Banks	Actual			Credit Default 100%	3rd Scenario		
		PL	NPL	CRLP		PL - 100%	NPL+ 100%	CRLP - 100%
2018	ICB	18609	11883	19461	11883	6726	23766	-4305
	QAB	27672	471	638	471	27201	942	-304
	JPM	673617	207571	444871	207571	466046	415142	29729
2019	ICB	21855	9298	12971	9298	12557	18596	-5625
	QAB	682618	12839	16776	12839	669779	25678	-8902
	JPM	674813	223707	765585	223707	451106	447414	318171
2020	ICB	23203	16964	29807	16964	6239	33928	-4121

	QAB	729543	15811	21559	15811	713732	31622	-10063
	JPM	744848	299592	417480	299592	445256	599184	-181704
Years Average	ICB	21222	12715	20746	12715	8507	25430	-4684
	QAB	479944	9707	12991	9707	470237	19414	-6423
	JPM	697759	243623	542645	243623	454136	487247	55399

Table (8) CAR Risk at 3rd Scenario

Year	Banks	Actual			Credit Default 100%	3rd Scenario		
		RC	RWA	CAR%		RC - 100%	RWA+ 100%	CAR%
2018	ICB	15289	44354	34%	11883	3406	56237	6%
	QAB	5614	30784	18%	471	5143	31255	16%
	JPM	237511	1528916	16%	207571	29940	1736487	2%
2019	ICB	15920	54400	29%	9298	6622	63698	10%
	QAB	5897	32735	18%	12839	-6942	45574	-15%
	JPM	242589	1515869	16%	223707	18882	1739576	1%
2020	ICB	19601	417456	5%	16964	2637	434420	1%
	QAB	6348	35777	18%	15811	-9463	51588	-18%
	JPM	269923	1560609	17%	299592	-29669	1860201	-2%
Years Average	ICB	16937	172070	23%	12715	4222	184785	6%
	QAB	5953	33099	18%	9707	-3754	42805.67	-6%
	JPM	250008	1535131	16%	243623	6384	1778755	0%

Table (9) Bank Efficiency Risk at 3rd Scenario

Year	Banks	Actual			Credit Default 100%	3rd Scenario		
		I	E	BE		I-100%	E+ 100%	BE
2018	ICB	19875	10864	0.55	11883	7992	22747	2.85
	QAB	1087	424	0.39	471	616	895	1.45
	JPM	95868	63394	0.66	207571	-111703	270965	-2.43
2019	ICB	19082	6554	0.34	9298	9784	15852	1.62
	QAB	1110	435	0.39	12839	-11729	13274	-1.13
	JPM	101928	65497	0.64	223707	-121779	289204	-2.37
2020	ICB	52302	35457	0.68	16964	35338	52421	1.48
	QAB	1247	567	0.45	15811	-14564	16378	-1.12
	JPM	95787	66656	0.70	299592	-203805	366248	-1.80
Years Average	ICB	30420	17625	0.58	12715	17705	30340	1.71
	QAB	1148	475	0.41	9707	-8559	10182	-1.19
	JPM	97861	65182	0.67	243623	-145762	308806	-2.12