

Stress tests as a mechanism to measure banks' resilience to the Corona crisis – Jordan's Experience Study-

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Abstract:

This study aims to determine the role of stress tests in measuring the resilience of Jordanian banks to shocks caused by the emerging corona epidemic.

The study reached a series of findings, the most important of which was that stress tests showed that Jordan's banking sector would have capital adequacy of 16.7%, 14.9% and 14.2% for 2020, 2021 and 2022 respectively. This is after assuming the worst-case scenario of the increasing negative consequences of the new corona virus and the challenges it poses to the national economy. That is, assuming the above scenario, the capital adequacy ratio will remain higher than Jordan's minimum of 12% and Basel Committee's minimum of 10.5%. This means that the Jordanian banking system is generally able to withstand the high risks of the emerging CORONA virus.

Keywords: Stress tests; shocks; Corona virus; central bank of Jordan.

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1. INTRODUCTION

Stress tests are an important tool and a key part of risk management and its importance has recently grown in light of current crises. It has a future dimension in risk assessment in contrast to models based solely on historical data that do not take into account unexpected future events.

The Central Bank of Jordan uses these tests periodically and regularly to measure the resilience of banks to high shocks and risks resulting from the negative consequences of the new corona virus and assess the bank's financial situation under severe but viable scenarios. The results of the stress tests obtained are used to determine the level of capital and liquidity to be retained by banks in order to be able to withstand financial shocks, crises and high risks.

This study aims to:

- Theoretical Synthesis of Stress Tests.
- Recognize the role of stress tests in determining the capacity of Jordanian banks to withstand the high shocks and risks caused by the negative consequences of the emerging corona virus, and seek advice and guidance that would benefit the Algerian banking sector.

This research seeks to address the problem embodied in the following key question:

How responsive are the stress tests of Jordanian banks to the negative repercussions of the coronavirus?

To answer this question, it will first present the theoretical concepts relating to stress tests, then it will carry out an analysis of the Jordanian experience during Corona crisis.

2. Basics about stress tests

Many central banks in the world have been using stress testing technology to test the ability of the banking and financial sector to cope with shocks and crises that it may face under highly influential but potentially occurring economic conditions.

2.1. The concept of stress tests

Several definitions have been provided to stress or pressure tests, or as some call them financial stress tests, the most important of which are as follows:

According to the Bank for International Settlements (BIS), stress tests are described as assessing the bank's financial situation under harsh but reasonable scenarios in order to help bank decision makers make appropriate decisions within different risk scenarios that they may face during their work (Salah Din & Shamri, nd, p. 39).

It was also defined by the Basel Committee on Banking Oversight as a comprehensive term describing the techniques used by financial institutions to measure the probability of exposure to exceptional events (Osman, 2008, p. 8).

The International Monetary Fund (IMF), on the other hand, spoke of it as a technology that measures the sensitivity of securities portfolios, institutions or the financial system as a whole when exposed to hypothetical events or specific scenarios; they are quantitative tests that predict what will happen to capital as a whole if some or more risks are realized (Ben Rabie & Ben Zaba, 2014, p. 64).

2.2. Stress test objectives: stress tests are used to achieve the following objectives: (Arab Monetary Fund , Financial Stability Report in the Arab countries , 2019, p. 118):

- Identifying and controlling key risks;

- Assisting in the capital planning process;
- Helping with liquidity management;
- Stress tests are complementary to other risk management tools;
- Providing detailed data on the Bank's exposure to risk, the Bank's business model, the Bank's risk system, and introducing a comprehensive analysis of the Bank's weaknesses;
- Strengthening public confidence by the stability of the banking sector.

2.3. Stress tests importance: The importance of these tests can be summarized in:

- Stress tests provide the necessary knowledge for banks to assess the risks of potential exposures in difficult situations, thereby enabling them to hedge such situations by developing and selecting appropriate mitigation strategies; (Central Bank of Kuwait , 2014, p. 183)

- Enable the boards and senior administrations of banks to determine whether the risk of exposure is consistent with their risk tendency among these banks;

- Strengthen statistical risk measures used by banks in different business models based on historical assumptions and data;

- Assess banks' resilience in difficult situations, in terms of measuring both profitability and capital adequacy;

- Identify the private funds needed to absorb losses in the event of significant shocks. (Hull, 2007, p. 370).

2.4. Stress tests design

- The design of the stress tests program, the testing of its impact on the Bank and the utilization of results require collaboration among the different experts and the concerned in this area in the Bank. An appropriate dialogue format should be organized between them to take their views on potential shocks and pressures in order to identify hypotheses and scenarios commensurate with internal and external risks to the Bank.

- The stress tests program must include quantitative and qualitative methods to improve the inclusiveness of tests and make them supportive of the Bank's risk management models. Tests must also range from simple sensitivity tests based on changes in a single risk factor to scenarios based on statistical methods that take into account the relationships between systemic risk causes in times of crisis (Central Bank of Jordan , Stress tests intructions for banks operating in Jordan, 2016, p. 3).

A- Sensitivity analysis tests

Sensitivity tests are used to measure the impact of each risk factor movements on the Bank's financial situation, where the relationships and overlaps between those factors are not taken into account. These tests aims to determining the sensitivity of the Bank's financial situation towards a single risk factor and assessing the Bank's ability to cope with it.

In these tests, the source of the shock is not determined, but the Bank has to identify the risk factors that can affect it, especially risks related to macroeconomic variables. The bank also conducts stress tests on those factors identified using different degrees of severity based on historical data at the banking or economic level as a whole supported by reasonable assumptions. Furthermore, the bank conducts sensitivity analysis tests at several levels within

it, which include credit risk, concentration risk, market risk, operating risk, and liquidity risk (Arab Monetary Fund, The modern methodology of stress testing, 2018).

B- Scenario tests

These tests assess the impact of scenarios that, while their likelihood is low, have a significant impact on the Bank's financial situation if they occur. In general, scenario tests should include two types of tests:

- Tests based on historical events both in Jordan and some countries of the world: Dinar crisis 1988-1989 and global financial crisis... (Syrian Audi Bank, 2012, p. 29).
- Hypothetical tests that can occur like: Sharp drop in GDP growth, high unemployment...

In general, hypothetical tests include fundamental changes in macroeconomic variables, which may have negative effects on the Bank's situation, such as high ratios of non-working debt and thus low profitability of the Bank, which may affect its solvency. In addition, hypothetical tests may include factors that may severely affect bank liquidity.

The Central Bank of Jordan will provide banks with annual sensitivity and scenarios tests taking into account local, regional and international risk developments. The new tests can also include different levels of intensity compared to previous tests, and can be partially or completely changed if there are significant economic or financial developments (Central Bank of Jordan, Stress tests instructions for banks operating in Jordan, 2016, p. 7).

3. RESULTS AND DISCUSSION

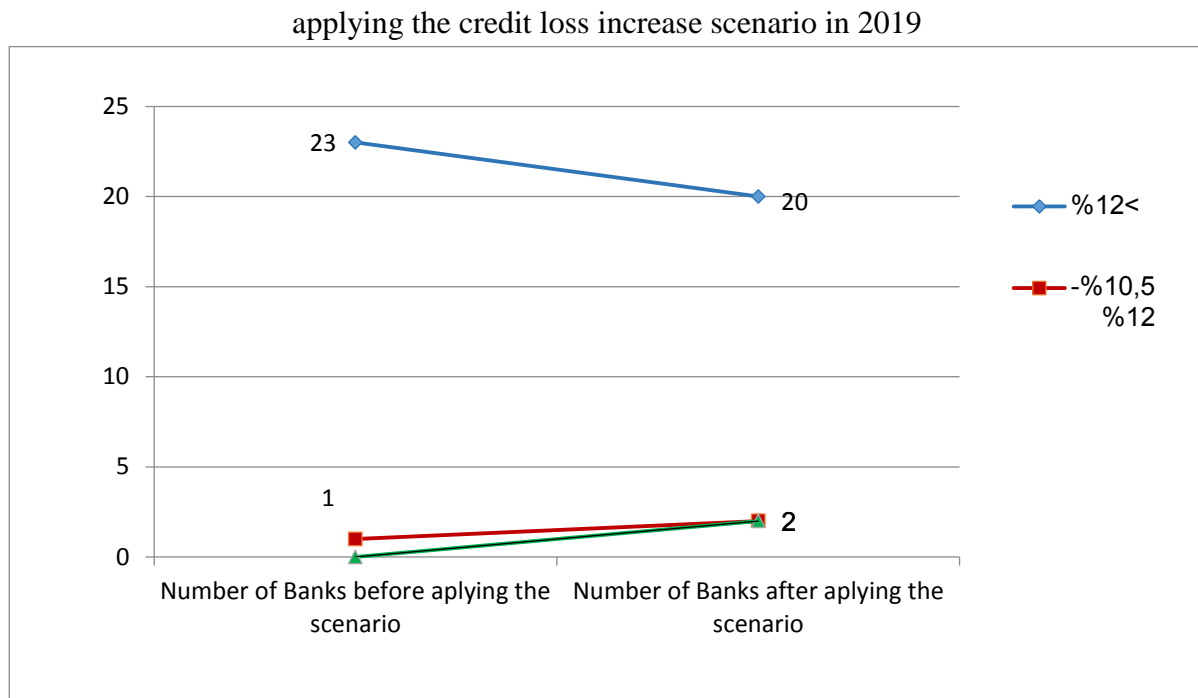
3.1. The response of stress tests concerning Jordan's banks to the Corona epidemic

Sensitivity analysis tests are generally used to measure the impact of movements in risk factors –individually- on the bank's financial situation, such as high non-performing debt, changes in interest rates, exchange rate changes and changes in stock prices. The source of the shock (the source that results in this type of risk) is usually not identified in these tests. The following are credit risk sensitivity tests performed on a number of risk factors in banks operating in the Kingdom.

3.1.1. Tests of credit risk sensitivity analysis

In order to assess the ability of banks to withstand greater repercussions of the Corona pandemic, the test was further intensified as Jordanian banks assumed a 100% increase in non-performing debt (bank default rate) and a 75% decrease in bank profits in 2020 compared to 2019. This is due to the CORONA pandemic and its impact on Jordan's economic situation, as it was assumed that the loss at the time of default would be 85% of the value of the non-performing loans.

Fig.1. Capital adequacy ratio before and after



Source: Central Bank of Jordan, financial stability report, 2019, Jordan p. 64

Following the application of the above scenario, the level of capital adequacy in Jordan's banking sector decreased from 18.3% to 16.6%. This means that the ratio of the post-traumatic banking sector remains higher than the minimum of 12% applied in Jordan, indicating that the banking sector in general is able to withstand this shock and this harsh hypotheses.

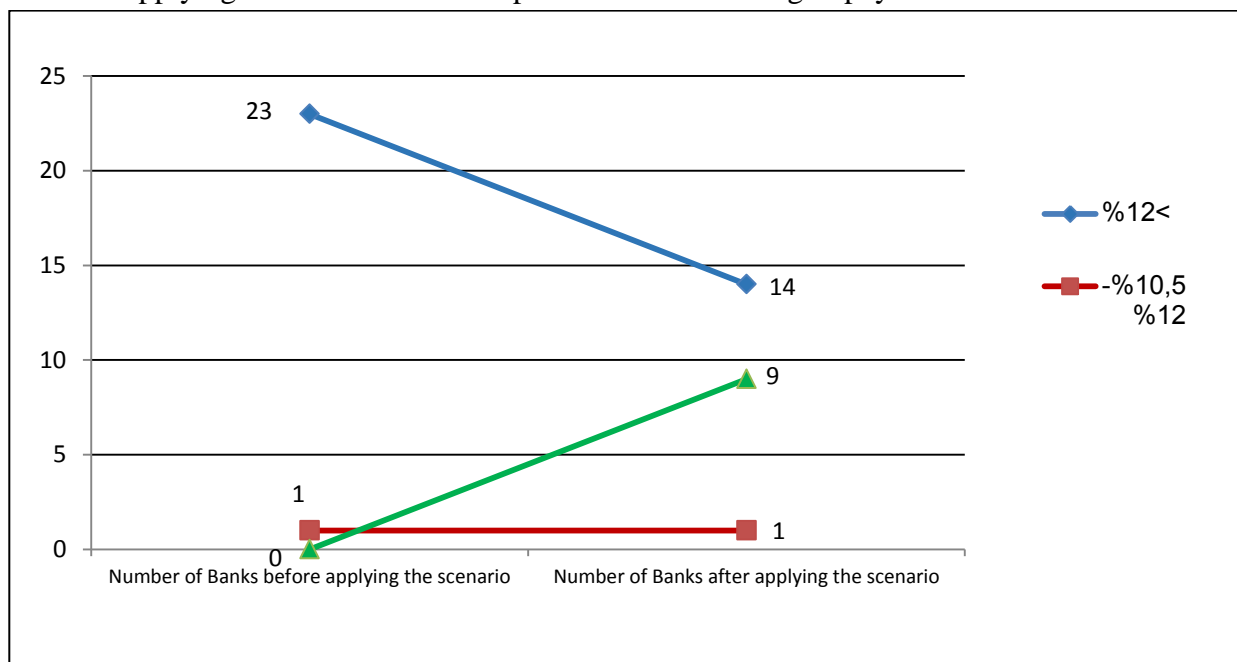
Individually, the ratio will remain above 12% at 20 banks and below 12% at 4 banks. Two of them will still have an adequacy rate above the global minimum of 10.5%, which shows that most banks in Jordan can withstand this shock (Central Bank of Jordan , Financial stability report , 2019, p. 64).

3.1.2. Tests of risk sensitivity analysis for credit concentrations

With regard to the risk of credit concentrations and if the top six borrowers (excluding Jordanian government facilities and guaranteed facilities) did not pay their debts at the level of each bank, the ratio of capital adequacy at the level of the total banking sector will decrease from 18.3% to 12.8%. That is, at the level of the total sector, the ratio will remain above the minimum required, whereas at the level of each bank, the capital adequacy ratio will remain above 12% at 14 banks, while at 10 banks it will fall below 12%; 9 of which will fall below the globally applicable minimum of 10.5%. This indicates that some banks need to reduce their concentration risk, knowing that the Central Bank consistently follows the banks' concentration risk through the Credit Concentration Instructions (Arab Monetary Fund , Financial stability report in the Arab countries , 2020, p. 137). This is what the following figure demonstrates:

Fig.2. Capital adequacy ratio before and after

applying the scenario of the top six borrowers failing to pay their debts in 2019



Source: Central Bank of Jordan, Financial Stability Report, 2019, Jordan, p. 64

3.2. Overview of Jordan bank scenarios during the Corona pandemic

The Central Bank has developed stress tests to make it possible to predict the ratio of non-performing debt and its impact on the capital adequacy ratio of banks for the next several years instead of just one year. Accordingly, the ratio of non-performing debt for 2020-2022 has been predicted based on the supposed change in the rate of economic growth, unemployment, interest rates and equity prices. The following scenarios have been assumed knowing that the model used is based on the assumption that bank profits in 2020 are 75% lower than those in 2019 as a result of the Corona pandemic, as well as the assumption of loss estimated at 85% of non-performing loans (Central Bank of Jordan , Financial stability report , 2019, p. 67).

Table 1. Assumed Scenarios from 2020 to 2022

Year	Variable	Economic growth rate	Unemployment rate	Actual interests rate	Stock price index
2020 scenarios	Expected current scenario	-3.4	22.9	7.7	3514
	Medium intensity scenario	-5.6	24.8	8.7	2635
	High intensity scenario	-7.9	26.7	9.2	1318
2021 scenarios	Current scenario expected	3.6	19.1	8.7	1318
	Medium intensity scenario	1.4	21.0	9.7	988
	High intensity scenario	-0.9	22.9	10.2	494
2022 scenarios	Current scenario expected	3.5	19.1	9.7	494
	Medium intensity scenario	1.3	21.0	10.7	371
	High intensity scenario	-1.0	22.9	11.2	185

Source: Central Bank of Jordan, Financial stability report, 2019, Jordan, p. 67

The previous scenarios (expected current scenario, medium intensity scenario, and high intensity scenario) have been assumed in order to assess the extent to which Jordanian banks can withstand the negative consequences of the new corona virus and the challenges it poses to the national economy through tourism income and direct investment reduction, national exports decline and expatriates return from abroad. We also assumed that these factors lead to a significant decline in economic growth rates compared to the expected, high unemployment, interest rates and lower stock prices.

Lower economic growth will lead to higher non-performing debt as a result of declining economic activity, and thus lower customers and clients' capacity to pay their debt. The same is true in the case of high rates of unemployment, high interest rates and lower stock prices, which will increase the volume of non-performing debt and thus affect the adequacy of the capital of banks, as higher non-performing debt will lead to a reduction in capital adequacy.

The final results of macro-variables impact, including the economic growth rate, unemployment, interest rates and stock prices on non-performing debt, thereby on capital adequacy can be summarized according to the three scenarios previously assumed in the following table:

Table 2. Ratio of capital adequacy and non-performing debt

after applying all scenarios from 2020 to 2022

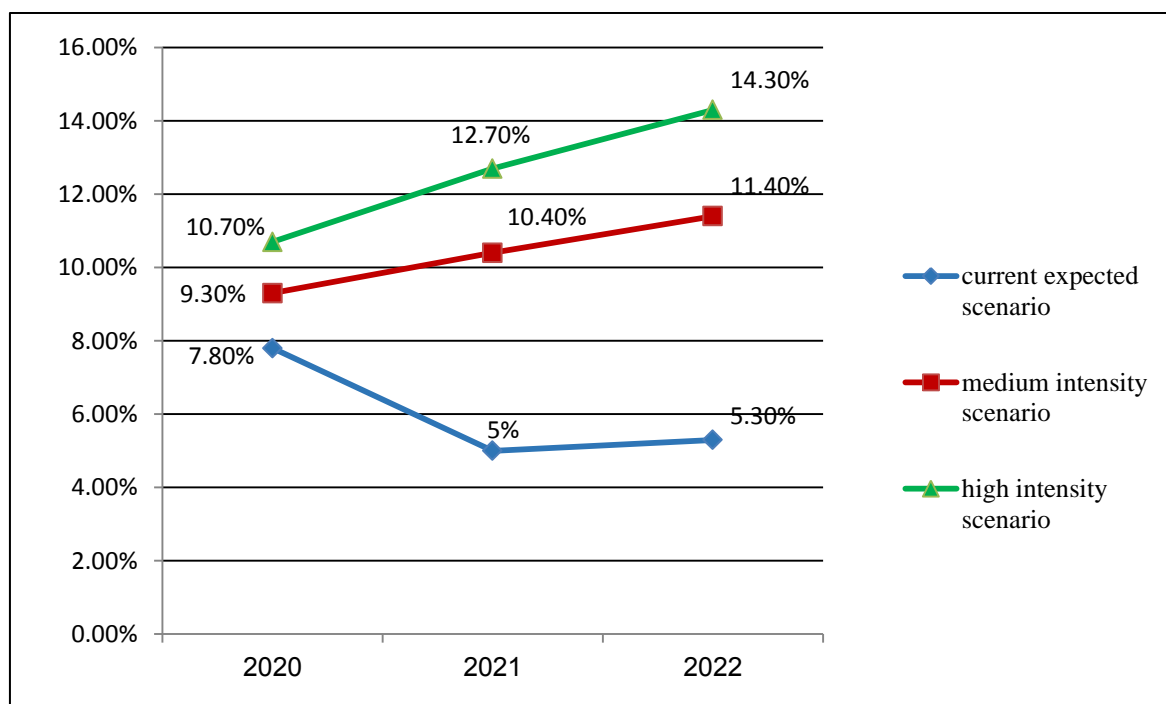
Assumed scenarios	Non-performing debt			Expected capital adequacy		
	2020	2021	2022	2020	2021	2022
Expected current scenario	7.8%	5.0%	5.3%	17.3%	17.0%	15.6%
Medium intensity scenario	9.3%	10.4%	11.4%	17.0%	15.6%	14.4%
High intensity scenario	10.7%	17.7%	14.3%	16.7%	14.9%	14.2%

Source: made by the researchers based on the Central Bank of Jordan, Financial stability report, 2019, Jordan, p. 67.

From the above table, it is clear that there is an inverse relationship between the ratio of non-performing debt and capital adequacy i.e. the higher the ratio of non-performing-debt as assumed during 2020-2022, the lower the capital adequacy during the same period.

The ratio of non-performing debt in Jordanian banks according to the scenarios assumed during the period 2020-2022 can be explained in the following figure:

Fig.3. non-performing ratio after applying all the scenarios from 2020 to 2022



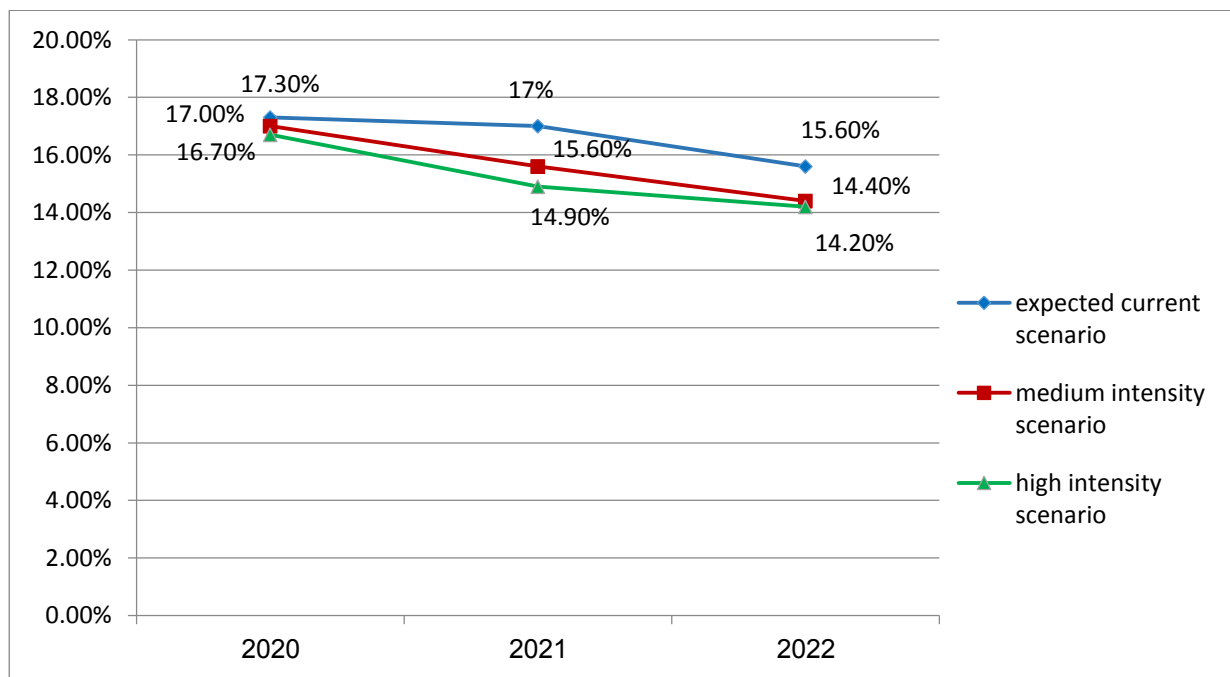
Source: made by the researcher based on table 2.

The above figure shows that the ratio of non-performing debt of Jordanian banks is rising following the application of the scenarios assumed during the period 2020-2022. Assuming a medium intensity scenario, the ratio of non-performing debt will rise from 9.3%

in 2020 to 10.40% in 2021 and 11.40% in 2022. The rise ranged from 1% to 1.10% over the three years. If the most severe scenario was assumed, the ratio of non-performing debt will increase from 10.70% in 2020 to 12.70% in 2022, while in 2022 it will rise to 14.30%. The rise ranged from 1.60% to 2% over the three years due to high levels of unemployment, interest rates and low share prices during the same period.

The high ratio of non-performing debt in Jordanian banks will reduce the capital adequacy of these banks, which can be illustrated in the following figure:

Fig.4. Capital adequacy ratio after applying all the scenarios from 2020 to 2022



Source: made by the researcher based on table 2.

From the figure above, the capital adequacy ratio of Jordanian banks is declining after the implementation of the assumed scenarios from 2020 to 2022. Assuming the medium intensity scenario, the capital adequacy ratio will reduce from 17% in 2020 to 15.60% in 2021, while in 2022 it will be 14.40%. However, the ratio remain above 12% for the three years and by a comfortable margin, which means that Jordan's banking sector is able to withstand this shock.

If the high intensity scenario is assumed, the capital adequacy ratio will fall from 16.70% in 2020 to 14.90% in 2021, while in 2022 it will be 14.20%. The ratio will remain above 12% over the three years, which means that Jordan's banking sector is able to withstand this shock too.

4. CONCLUSION

The results of stress tests conducted by the Central Bank to measure the resilience of banks operating in Jordan after the Corona shock hit the global and domestic economy showed that the Jordanian banking system is still generally able to withstand high shocks and risks.

A number of conclusions have been drawn:

- Central bank stress tests are considered to be a comprehensive analytical review of capital adequacy, and provide structural means for observers and regulators to assess whether banks have sufficient capital, and also whether banks are able quickly and accurately to determine their risk exposure;

- The Central Bank of Jordan has developed a hypothetical scenario of increasing negative consequences of the new corona virus and its challenges to the national economy. The main assumptions were the decline in tourism income and direct investment, the decline in national exports and the return of expatriates from abroad. It was also assumed that these factors were leading to a significant decline in economic growth rates compared to the expected, high unemployment and a decline in the financial market. Higher interest rates over the dinar was also assumed to maintain the attractiveness of the dinar as a saving currency;

- The results of the tests showed that the capital adequacy ratio for the banking sector in Jordan will be assumed to be 16.7%, 14.9% and 14.2% for 2020, 2021 and 2022, respectively. That is, assuming the worst-case scenario, the capital adequacy ratio will remain above Jordan's minimum of 12% and the Basel Committee minimum of 10.5%.

- The Jordanian banking sector is a proper and stable sector capable of withstanding the high shocks and risks caused by the Corona virus as a result of the high levels of capital enjoyed by Jordanian banks;

- The increase in capital is mainly because the central bank requested banks not to distribute profits in order to support the bank's capital base and enable it to cope with the repercussions of the Corona pandemic, as well as support the national economy; hence, the wisdom of the central bank's decision appears in not distributing profits.

Based on the previous findings, the researchers suggested the following:

- Banks must conduct stress tests on a continuous and periodic basis so that they can accurately assess their financial situation and make sure that the capital is sufficient, and thus can cope with shocks;

- Algerian banks should benefit from the successful international experiences in the field of stress tests and draw lessons from them, especially the Jordanian experience, given the convergence of the banking system of the two countries, as well as the fact that there are many branches of Jordanian banks in Algeria. The aim is to assess the efficiency of the Algerian banking and financial system in managing potential risks and crises.

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