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The impact of non-performing loans on banking intermediation activity for a sample of Arab countries during the period 2014-2021

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Abstract

We aim within this research to clarify the impact of non-performing loan levels on banking intermediation activity for a sample of Arab countries during the period 2014-2021, and by using panel models within the inductive approach, we concluded with a pessimistic analysis. Scenarios, that the occurrence of high shocks in the levels of non-performing loans leads to a decrease in banking brokerage activity, ie a rise in the rate of non-performing loans. By one unit, it leads to a decrease in banking brokerage activity by 1.16 units, so we recommend the continuous activation of banking supervision in the follow-up of lending operations in order to reduce the volume of non-performing loans.

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1. *Introduction*

The effectiveness of a country's economy is measured by the effectiveness of its banking institutions, which act as the main engine for achieving economic development, through the role that plays in mobilizing the available financial resources in the economy, and granting them in the form of credit facilities to economic institutions. However, the expansion of this function results in the emergence of what is known as with non-performing loans.

The global financial crisis of 2008 allowed to strengthen the results of empirical research that found that the cause of this crisis resulted from the default of loans with mortgage companies in the United States of America, which led to a rise in debt burdens as a result of excessive indebtedness, which contributed to the bankruptcy of a large number of banking institutions Therefore, non-performing loans, according to many empirical studies, are considered among the most important factors that impede the volume of bank brokerage activity in the performance of its tasks, and the low volume of gains and available opportunities.

The success of the bank intermediation in performing its tasks effectively in mobilizing the available financial resources and granting them in the form of credit facilities is based on a clear scrutiny by competent authorities within the bank to monitor non-performing loans and evaluate the credit portfolio position on a regular and continuous basis, in addition to identifying and analyzing the most important reasons that lead To exacerbate the problem of non-performing loans, in order to correct credit decisions in a rational and effective manner.

Based on the foregoing, we can ask the following main question: **How do the levels of non-performing loans affect the volume of banking intermediation activity for a sample of Arab banks using pessimistic scenarios?**

Sub-questions: Based on the main question posed, we can present the following sub-questions:

- What do we mean by non-performing loans within the banking intermediation activity?

- Is banking activity in Arab countries affected by credit policy?

- Is banking activity in Arab countries affected by changes in the macroeconomic environment?

Hypotheses To answer the content of the main question, the following hypotheses should be formulated:

- Loans granted to the private sector are negatively affected by the high levels of non-performing loans in Arab countries;

-Economic environment variables affect the volume of banking intermediation activity.

research importance: The topic of the research is important because the governments of Arab countries, like the rest of the world, seek to build and develop effective strategies to reduce non-performing loans, which, according to many studies, are considered among the most important determinants that impede the ability of banking institutions to perform their tasks and contributions to achieving economic development. Part of it is to identify and understand the reasons leading to the increase in the percentage of non-performing loans in the banking institution.

The aim of the research: We aim through this research to reveal the impact of the shocks of non-performing loans on the activity volume of banking institutions in carrying out their tasks of financing economic projects, through pessimistic scenarios, based on standard models.

The limits of the research: the components of the problem, especially the question posed and the hypotheses formulated in the research, in light of achieving the desired goal, provide us with the possibility of limiting the time and spatial framework as follows:

-Spatial framework: pertains to a some of Arab countries: Jordan, United Arab Emirates, Algeria, Sudan, Iraq, Oman, Qatar, Kuwait, Lebanon, Libya, Egypt, Morocco, Mauritania,

- Time frame: The study period extended from 2014 to 2021;

Research methodology: The nature of the research subject requires us to rely on the inductive approach by using statistical and econometric tools to estimate the relationship between banking intermediation activity and the volume of non-performing loans.

With regard to the research plan, the research was divided - within our perception of its treatment in two aspects, one theoretical and the other applied - into two axes:

- bank intermediation activity faltered;

- Measuring the impact of default shock on bank intermediation activity.

2. *bank intermediation activity faltered*

Bank intermediation is the core of the financial system and one of the main financial channels that contribute to achieving economic development, through its mobilization of financial resources and granting them in the form of credit facilities. The main factors that limit the development of the volume and continuity of banking intermediation activity.

2.1 bank intermediation

With the expansion of economic activity and the multiplicity of its parties in a way that the old mechanisms of work are impossible, the need for the emergence of new parties whose mission is to collect and redistribute funds has become a vital necessity for the development of the economy and the continuation of its expansion, hence the banking intermediation as a link between the owners of the financial surplus and those of the financial deficit (Latrash, 2005, p. 3).

2.1.1 Definition of bank intermediation

Banking intermediation is considered one of the most important types of financial intermediation, and it means that it is a group of banking institutions that collect financial resources owned by individuals, institutions and the state in the form of savings, and then direct these resources to cover the financial needs of individuals and other institutions and economic and investment projects in the form of loans (Laraj, 2019-2020, p. 120) , It is clear from the previous definition that banking mediation combines two parties (Koueider Kochieh & Barish, 2016, pp. 176-177):

- **Owners of financial surplus**: i.e. units that have surplus savings from their consumer income, or whose total income exceeds the total expenses they incur, whether they are units from the family sector, government, business sector or abroad. the world, they represent the party that has the ability to finance and are motivated by the aims of searching for the best jobs for their surpluses;

-**People with a financial deficit**: that is, units whose total spending exceeds their total income, whether they are units of the family, government, business sector or the outside world, and they are in constant need of funds to cover the deficit and represent the party that has the need for financing, and the government sector is the largest deficit unit In the countries that adopt the planning system, and in the countries that adopt the free market system, the units of the private business sector occupy the first place in the fiscal deficit units.

2.1.2 Characteristics of Bank Intermediation

The general characteristics of bank intermediation are represented in (Al-Arabi, 2008, p. 52):

-Banking institutions enjoy legal guarantees that help protect savers' money from the risks of non-payment to which they are exposed through their direct dealings with borrowers;

-Banking institutions provide saving opportunities for small savers in any amounts they want to save without being restricted to a minimum investment in the securities offered by borrowers;

-The financial instruments offered by banking institutions have greater liquidity, that is, they can be converted into money quickly and with the least possible loss for savers ;

-Banking institutions provide better services to borrowers, as they cover their needs in large amounts at a lower cost compared to collecting these amounts directly from savers, which may require dealing with thousands of savers and persuading them to buy the securities offered by investors or borrowers.

2.1.3 *The importance of bank intermediation*

The importance of bank intermediation: Based on the foregoing, the presence of bank intermediation in today's economy is considered a vital necessity, not only because it is an important economic operator, but it has allowed finding solutions to many problems related to finance, and in fact the importance of bank intermediation can be recorded for each party of The parties to the financing relationship, and accordingly, this importance can be limited according to the following (Latrash, 2005, pp. 8-10):

-For surplus owners: For this category of individuals, the bank mediation allowed to achieve many advantages, the most important of which are as follows:

- The credibility of the financial intermediary is guaranteed, and the reason for this is not only the volume of liquidity that it runs, but mainly in view of the laws and regulations designed specifically to protect depositors. The depositor's money is if safe to be kept, which is not always available in the case of a direct financing relationship;

- The presence of bank intermediation allows the holder of the financial surplus to obtain liquidity at any time. Banking institutions are obliged to keep part of the funds in liquid form to face such possibilities;

-The holder of the financial surplus avoids the risks of non-payment, which may be great in the case of direct lending. Banking institutions, due to the huge funds available to them, and their strong financial position, are generally in a financial position that allows them to implement all their obligations towards depositors whose deposits are considered Small sums compared to what is held in their possession;

- The presence of a bank intermediation exempts those with a financial surplus from spending time and effort in searching for potential borrowers, as they know in advance the places in which they deposit their money.

-For those with financial disability: Bank mediation provides people with financial disability with several services that can be listed as follows:

- Bank intermediation provides the necessary funds sufficiently and at the right time for the financially incapable, and it achieves this process due to the huge funds that it collects on an ongoing basis, and since there is a stream of deposits, the funds required by the financially incapable are available at the right time;

- The presence of a bank intermediation spares the borrower the hassle of searching for those with financial surpluses, assuming that other difficulties do not exist. Bank intermediation, as a loan agency, is always ready to provide this support;

- Bank intermediation also provides loans at relatively lower costs, compared to what it was in the past, i.e. direct financing;

-As for the bank intermediation itself: If bank intermediation provides all these services to the owners of financial surplus and those with financial deficit, what do you benefit from that? In fact, financial intermediation does not do this for free, but rather benefits from many gains, the most important of which can be mentioned as follows:

- It first benefits from the interest on loans, and this interest is considered one of the incomes that maximize its returns, but rather on the only income it achieves or on which its activities are based;

-The use of resources is mostly inexpensive, as current deposits are the predominant part of financial intermediation resources, and we must know that this type of deposits do not cost them anything, as global monetary systems prevent the granting of interests on this type of deposits;

- Obtaining deposits allows the bank intermediary to expand its ability to grant loans by creating deposit money, and this means that banks can grant more loans than they actually get from deposits, and this naturally leads to an increase in their potential in profits.

-With regard to the economy as a whole: if banking intermediation allows those who have a financial surplus and a financial deficit to avoid many of the difficulties associated with the direct financing relationship and to benefit from the many advantages resulting from the transition to the indirect financing relationship, then the economy, in turn, benefits from the presence of bank intermediation in many aspects:

-Avoiding the possibility of impeding economic activity due to the incompatibility of desires between those with a financial surplus and those with a financial deficit, and the existence of such a conflict of desires, whether in terms of time or amount, will lead to the creation of many imbalances in economic performance;

- Bank intermediation allows the provision of funds necessary for financing by mobilizing small savings and converting them into loans of large amounts;

- The third result of the existence of bank intermediation, which is related to the previous result, is to reduce the resort to the new monetary issuance (of an inflationary nature) by mobilizing the existing liquidity, but this mobilization is largely related to the effectiveness of the bank intermediary himself in performing his role as a collector of funds.

2.2 *non-performing loans*

Bank loans are the main resource that banks rely on to obtain their revenues, despite this, there is no sure guarantee of their collection, as there are some customers who do not pay at the agreed time, and there are those who refuse to pay completely, and thus these loans turn into non-performing loans (burdimat & mirimit, 2022, p. 167).

2.2.1 *The concept of non-performing loans*

There are many names that indicate the concept of non-performing loans, the most important of which are: bad debts, frozen debts, suspended debts, critical debts, non-performing debts, difficult debts, bad debts, stagnant debts, doubtful debts, but the most common names in the Arabic language They are: Non-performing loans, and despite the different and multiple names that indicate the concept of non-performing loans, the definition of this concept is similar in most references (Ben Madani & Saudi, 2015, p. 71) , as it was defined as follows:

-Non-performing loans are defined as loans that no longer bring the bank interest income or loans that the bank finds itself obligated to schedule in accordance with the current conditions of the bank (Batoura, 2015, p. 111);

- It is also defined as including all credit facilities that the client has received and has not paid on time. The debt shifts from ongoing credit facilities to stalled city balances. Over time, the debt becomes stalled (Bousta & Mostefi, 2015, p. 534);

- As for its definition from the banking point of view, it is the loans that do not manage a return, i.e. the debts whose returns are not added to the bank's revenues, but rather are placed in a separate account after studying and analyzing the debt. The components and capabilities of the project, considering it an irregular debt, and making allocations and reserves for it (Ben Shanna, 2009-2010, p. 85), As for the International Monetary Fund, it defines non-performing loans, according to the manual on financial soundness indicators, that the loan is non-performing and ineffective when the customer records a default in the payment of interest or the principal is in arrears for more than 90 days, This is the same direction reached by the decisions of the Basel 02 Committee in the definition of non-performing loans (Jamal Qassem, 2019, p. 1) (Asif Khan, Siddique, & Sarwar, 2020, p. 139)

Based on the foregoing, it is possible to determine the non-performing loans in which the borrower fails to pay the installments agreed between him and the bank after the due date.

2.2.2 *Non-performing loan ratings*

The debts are generally divided into two parts. The first is the debt that produces the returns and is classified into good credit. It is the credit in which the customer has the full ability to pay the amounts and interest. The second category is called medium credit, which is the credit that is more than 30 days or less than 90 days since the loan's due date, premiums or interest. The second section is distressed debt or non-yielding debt, which can be classified in terms of length of time to (Ammar & Nouri Daoud, 2019, p. 9):

-Credit below average: Credit that is at least 90 days and not more than 180 days after the date of repayment of the principal of the loan or interest due, which requires taking the necessary measures from the bank to correct the existing imbalance and establish a program to activate the repayment of the loan and its interest within a certain cap.

- Questionable credit collection: Credit that has been stalled 180 days and less than a year with high repayment risk and insufficient collateral, and a high risk of bank losses resulting from non-repayment of a portion of the loan and interest The Bank must follow up effectively and expeditiously on such a loan and take a decision within a period not exceeding 180 days to find out what developments are taking place.

- Loss of credit: credit that is uncollectible, although only a small portion of it can be recovered in the future, and includes all credits granted that have been due 1 year or more and have not been repaid.

2.2.3 *Reasons for defaulting on a bank loan*

The economic vision in tackling the problem of bank loan stumbling lies in knowing and determining the causes of the debt that led to the stumble. Stumbling is not a product of a moment but a result of many factors and causes that interact and interact across time stages (Ben Madani S. , 2017, p. 18), thus these reasons can be divided into three groups:

-Bank related reasons: Banks may be involved in the defaults of their customers or therefore the problem of non-performing loans in one of its main aspects is the problem of the bank. His own problem, these reasons can be limited from more details see this (Ben Madani & Saudi, 2015, pp. 73-74) (Ben Madani S. , 2017, p. 24) (masawi, 2015-2016, pp. 36-37):

- Insufficient credit study on which the bank may rely owing to the lack of experience of some of the bank's credit officers and financial analysts;

- Lack of clear lending and banking policies that define the route, define its objectives and identify ways of achieving them;

-Not taking sufficient guarantees from the borrower or taking guarantees that do not meet the basic characteristics, such as damaged, incomplete or not easy to sell goods;

- Weak ability of the Bank to assess the borrower's cash needs: if the value of the loan is greater than the value of the borrower, the excess will be spent in other journals not related to the end of the loan, thereby increasing its burden and reaching a stage where it cannot pay because the capacity of the financed project will not be sufficient to repay the loan.

- Bank's predominance over risk factor: means expanding the loan process without taking into account the risks that may arise, so that loans are granted to ineligible persons, or loans in amounts that exceed borrowers' needs and capacity to pay;

- The bank's failure to follow up on borrowers and periodically financed projects: if the bank does not have a good follow-up system, it will be surprised if it stumbles late and the loss is therefore significant;

- The decision to grant credit is made on the basis of the pressure exerted by the other parties: the decision to credit is sometimes taken contrary to the convictions of credit officials and employees as a result of the pressure exerted by the higher parties of the bank or the country's legislature;

- Banks may resort to a strict lending policy, thereby depriving borrowers of the opportunity to obtain further loans necessary to complete the financing of their projects or to operate them, thus putting them in trouble with inability to operate efficiently, thereby discontinuing their obligations to the bank.

-**Reasons related to the borrower**: The reasons for the emergence of non- performing loans can be traced back to the borrower, and these reasons can be listed according to the following (Hbal, 2018, pp. 271-272) (Ben Madani & Saudi, 2015, pp. 72-73) (Chico, 2008, p. 54):

- The borrower's management lacks technical expertise and competence;

- Failure to separate the client’s own funds from the funds of the project that he manages, and thus use part of the project’s funds to spend on his private and family needs, which leads to the consumption of part of the working capital of the project and its insolvency or the expansion of the client in lending in the name of the project to cover his own expenses;

-Non-compliance by the borrower with the bank’s instructions and directives: the borrower’s non-compliance with the terms agreed upon with the bank, his non-compliance

with the bank's instructions and directives, and the failure to provide follow-up data in the required form and at the required time will lead to a defect in the relationship with the bank, which will lead to the loan default;

- The client's lack of seriousness and negligence in managing the firm's funds, especially with the increase in the share of borrowed funds;

- Customers engage in activities of which they are not aware, without the knowledge of the Bank;

- Providing false data and information from the customer to the bank when requesting a loan;

-The recent experience of the client in the activity they are financing, especially for new projects;

- Weakness of scientific and technical competencies in managing the activity practiced by the client;

- Expand the client in lending, especially from non-bank sources;

- Poor and inefficient accounting system used in the facility and lack of accuracy.

-**Reasons related to the external environment**: Represented in (Batoura, 2015, p. 113):

- unstable economic conditions affecting the borrower's business;

- The compulsory pricing policy of the state;

- General economic conditions and economic cycles of boom and bust;

-Commodity dumping operations, which means that there is a product with competitive specifications and thus leads to the borrower's inability to be stable;

- The impact of tax problems on economic activity;

- Changing the competitive conditions in the market, entering a strong competitor that occupies a large proportion of its impact to create the type and shape of future expectations;

- The impact of macroeconomic variables represented in the inflation rate, exchange rates, and interest rate.

2.2.4 *The impact of non-performing loans on Bank Intermediation activity defaulting*

The continuation and rise of non-performing loan balances with creditor banking institutions (bank intermediation) have many negative effects that are reflected on the volume of credit

capacity available to banking institutions, and the size of their contribution to financing on the one hand, and on the volume of their business results, on the other hand, these effects can be summarized as follows For more details, see (Kharroubi & sadiqi, 2021, pp. 43-44) (Ben Madani S. , 2017, pp. 38-39) (Bouabdali, 2009-2010, p. 91) (iilifi, 2013-2014, pp. 83-84):

-Influencing credit decisions and adopting a conservative credit policy, or affecting the structure of money investment, which leads to an increase in the liquid balances of banking institutions;

- Non-performing loans lead to a decline in the total revenues of banking institutions, as a result of saving the interest calculated on bank loans, in addition to creating the necessary provisions for their interviews. Also, non-performing loans limit the ability of banking institutions to expand their credit activity and grant new facilities to new clients;

- The high rate of non-performing loans in banking institutions leads to the freezing of an important part of the funds of banking institutions as a result of the inability of non-performing clients to pay their obligations;

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- Non-performing loans contribute to an increase in provisions for doubtful debts, which deprives banking institutions of using a large number of financial resources and thus limits their ability to generate revenues;

- Banking institutions are forced to set aside a large part of their profits in the form of provisions and need to repay these loans, which leads to a decrease in surplus activity;

-The tendency of banking institutions toward more costly sources of financing their investments;

-The relationships of local banking institutions are affected: if non-performing loans rise by a large percentage, this will lead to banks' default, and the occurrence of the latter will negatively affect their relationship with the international banking institution, due to the banks' inability to repay debts. Domestic banking institutions to obtain international financing, or to obtain it under difficult and strict conditions imposed by international banking institutions, and correspondent banking institutions are reluctant to deal with local banking institutions for fear of their acquired reputation in the international banking market;

-The rise in non-performing loans causes the problem of banking default, which results in a decrease in the volume of financing provided to projects and companies that deal with them

in the first stage and its absence in a later stage, which means that their activities will stop, and if these projects are unable to deal with other banking institutions to obtain the necessary financing The problem of default will pass to it and become threatened with bankruptcy and liquidation, which will result in layoffs, the spread of unemployment and the deterioration of the standard of living for groups of workers.

-Confidence in banking institutions is shaken: this is due to the reluctance of customers and depositors to deposit and save in banking institutions for fear of not recovering their deposits, and consequently, a decrease in the sources of funds in banking institutions, which are considered an important resource for mobilizing loans and financing investments, and consequently lower returns in banking institutions;

- The shift of short-term cash flows: Short-term cash flows begin when indications of difficulties and problems appear in banking institutions due to the increase in non-performing loans by escaping towards places (countries) with more returns and stability, and the danger lies in their permanent stability in new areas, that is, the possibility of their return in case The improvement and stability of the situation becomes doubtful, and here there will be a great loss for the savings part at the level of banking institutions.

rise in non-performing loans can also affect other fields, which can be summarized as follows (iilifi, 2013-2014, pp. 83-84):

- Influencing credit decisions and adopting a conservative credit policy, or affecting the structure of money investment, which leads to an increase in the liquid balances of banking institutions;

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- The rise in non-performing loans in banking institutions leads to the freezing of an important part of the funds of banking institutions, as a result of the inability of non-performing clients to pay their obligations;

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-The tendency of banking institutions towards more costly sources of financing their investments;

-The local banking institutions' relationships are affected: if non-performing loans rise by a large percentage, it will lead the banks to default, and the occurrence of the latter would negatively affect their relationship with the International Banking Corporation,

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The rise in non-performing loans can also affect other fields, which can be summarized as follows (iilifi, 2013-2014, pp. 83-84):

- **Slowing economic growth**: Addressing the rise in non-performing loans is always followed by placing strict restrictions on the expansion of credit facilities and investments by the monetary authorities, which leads to a decline in financing and lending from banks for various investment projects, resulting in a decrease in the volume of production and a slowdown in economic growth;

-**Impact on monetary and fiscal policy**: The problem of high non-performing loans in banking institutions affects the achievement of monetary policy objectives, foremost among which is price stability. For example, if the central bank wants to fight inflation and use open market policy by introducing a seller of government bonds into the financial market, banking will refrain from purchasing because it is already in liquidity crisis, owing to higher non-performing loans. There is therefore no impact between reducing the size of the interest rate's cash mass and achieving the ultimate goal of price stability. The problem of high non-

performing loans also affects fiscal policy through reduced revenue in the form of taxes on banking profits;

-**The impact on the external world sector**: The high volume of non-performing loans in banking institutions affects the balance of payments balance, as it reduces the process of exporting products and services due to the difficulty in obtaining financing.

3. Measuring the impact of default shock on bank intermediation activity

The volume of revenues obtained by banking institutions is related to the volume of investment in loans granted by them to various economic institutions. The occurrence of default for one of these institutions may result in the inability of this institution to repay its debt and these loans become defaulted loans. in the levels of non-performing loans) would affect the volume of bank intermediation activity, and in order to find out, we will try to build a standard model that shows the nature of the relationship between the volume of non-performing loans and the volume of bank intermediation activity.

3.1 Estimating the relationship between non-performing loans and the volume of bank brokerage activity

Various economic measurement models make it possible to clarify the relationship between the dependent and independent variable within several steps that can be applied to a sample of Arab banks during the period (2014-2021) as follows:

3.1.1 The method and tools used

To test the hypotheses given in the introduction to the study, the method and tools used should be determined as follows:

3.1.1.1 Sample and study period

The study population consists of a total of 22 Arab countries, and we have tried to collect the largest possible number of Arab countries that provide us with statistics on indicators of banking intermediation as well as indicators of non-performing loans.

The method of data inventory and sample selection is to use the non-random sampling method by selecting certain countries to be included in the sample on the grounds that they represent the well-studied community, and the judgmental or intentional sample was extracted due to the availability of data for some Arab countries. This sample is represented by: Jordan, United Arab Emirates, Algeria, Sudan, Iraq, Oman, Qatar, Kuwait, Lebanon, Libya, Egypt, Morocco, Mauritania, for the period from 2014 to 2021.

3.1.1.2 Determining the study variables

study variables are determined based on the multiple regression method as a model for economic measurement on the one hand, and on what was stated in the empirical studies on the other hand within the following table:

Table 1. Standard study variables

symbol	Explanation	
dependent variable		
y	Amount of domestic credit granted to the private sector/GDP	This indicator measures the extent to which banking institutions contribute to granting loans and facilities to the private sector (Yahya & Talhawi, 2020, p. 239), Whereas, the more loans that the private sector benefits from in relation to the domestic product, the more it indicates the development of the volume of bank intermediation, because this indicator is considered one of the indicators of bank intermediation. (Dogga, Patra, & Kuruva, 2017, p. 144) (Habar, 2014, p. 49)
independent variables		
$\mathbf{X_1}$	non-performig loans	These are those loans in which customers stop paying their obligations on their due dates, despite the bank's demand to pay them, for many reasons. (Azhar, 2020, p. 122)
$\mathbf{X_2}$	The unemployment	The unemployment rate is one of the macroeconomic indicators of great significance in the formulation of economic policies. The high unemployment rate reduces the recourse of individuals to the demand for loans, and this leads to a decrease in the banking intermediation activity.
$\mathbf{X_3}$	GDP per capita	It expresses the indicators of economic growth, and it has a direct relationship with banking intermediation, and this is according to the hypothesis of following the demand that simultaneous economic growth with a fair distribution of income reduces the poverty rate and thus enhances the demand for financial services, which leads to the strengthening of banking intermediation activity

Source: Prepared by researchers

3.1.1.3 Data and tools of the study

The data for the study variables were collected from the Arab economies competitiveness report issued by the Arab Monetary Fund, as well as the adoption of World Bank data and their unloading within the program (stata.15), in order to build a standard model that shows the nature of the relationship between the variables of the multiple regression model for a sample of During the specified time period from 2014-2021, we resorted to using panel models .

3.1.2 Presentation and analysis of results

In this regard, based on the method and tools used in the empirical study, we seek to extract and analyze the results of the optimal panel model as shown below:

3.1.2.1 differences between the panel models

there are three models well used which are the aggregative model, the fixed model and the random model, so it is necessary to start building the panel model for each of the three types using the program (stata.15) as shown in the table 2.

Table 2. Estimation results of the panel model.

explanatory variables	**Pooled Regression Model (PME)**	**Fixed Effects Model (PEM)**	**Random Effects Model (REM)**
X_1	-1.169398 (0.009)	0. 1743576 (0.662)	0. 0334079 (0.931)
X_2	-1.635893 (0.017)	0. 3602531 (0.406)	0. 2467182 (0.562)
X_3	0.5874983 (0.020)	0. 5674405 (0.000)	0. 6080804 (0.000)
Constant (c)	71.26503 (0.000)	41.98244 (0.000)	43.67042 (0.000)
Number of obsevation	104	104	104
R-squared	0.3892	0.9503	-
Adjusted R-squared	.03709	.09418	-
Prob (F-Stat)	0.0000	0.0020	.00004

Source: Prepared by researchers based on the results of the program (stata.15), Appendix 1

In order to choose the appropriate panel model for our study (the differentiation between the three models), we conduct a set of the following necessary binary tests:

- Breusch and Pagan test: we use it to compare between the Pooled Regression Model and the random effects model. The hypothesis of this test is formulated as follows:

$$\begin{cases} H_0: \text{no randam effect (Pooled Regression Model)} \\ H_1: \text{There is a random effects model (REM)} \end{cases}$$

This test within the program (stata.15) leads to the calculation of both chibar2 (01) and Prob>chibar2, the results of which are summarized in the following table:

Table 3. Breusch and Pagan test results

chibar2(01)	265.72
Prob> chibar2	0.0000

Source: Prepared by researchers based on the results of the program (stata.15), see Appendix No2.

We note from the table that the value of Prob> chibar2 is statistically significant, i.e. less than 5%, so we accept the alternative hypothesis (H1) which indicates the presence of random effects, meaning that we choose the a random effects model.

- Hausman test: It is used to compare between the fixed effects model and the random effects model, within two hypotheses:

$$\begin{cases} H_0 : \text{Random Effects Model (REM)} \\ H_1 : \text{Fixed Effects Model (PEM)} \end{cases}$$

This test is based on a differentiation tool by calculating chi2(10) and Prob>chi2, which were results using the program (stata.15) in the table below:

Table 4. Hausman test results

chi2(3)	29.29
Prob>chi2	0.0000

Source: Prepared by researchers based on the results of the program (stata.15), Appendix No3.

It is evident from the value of Prob>chi2 in the above table that the probability value of the test is statistically significant at 5%, which leads us to accept the alternative hypothesis (H_1) and consider the fixed-effects model to be preferable compared to the random-effects model.

- Constrained Fisher test: It represents a test to compare between the Pooled Regression Model and the fixed effects model, by verifying the presence of individual effects within two hypotheses given as follows:

$$\begin{cases} H_0 : \text{No Fixed Effects Mode (Pooled Regression Model)} \\ H_1 : \text{There is a fixed effects model} \end{cases}$$

Table 4. Results of the restricted Fisher test.

F(12, 88)	82.77
Prob> F	0.0000

Source: Prepared by researchers based on the results of the program (stata.15).

It is clear from the results of this test that the value of F(12, 88) which is equal to 82.77 is significant at the level of significance 5% (because: Prob> F = 0.0000 < 0.05), So the constant fixed effects model is the best model compared to the Pooled Regression Model.

3.1.2.2 Examine the validity of the optimal model

Through the results of previous tests, the optimal model reflecting the relationship between the study variables is the fixed effects model, but before adopting its results, it should be

ensured that it is free of standard problems, both of the problems of self-association of errors and of the problem of heteroskedasticity:

- **Wooldridge test**: The autocorrelation of errors measures the degree of correlation between values for the same variable during a specified period of time where the results of this test were as follows:

```
xtserial y x1 x2 x3
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      12) =      5.765
           Prob > F =      0.0335
```

Source: Prepared by researchers based on the results of the program (stata.15)

The results of the test to detect the autocorrelation problem within the Wooldridge test showed that the probability value is less than 0.05, so we can reject the null hypothesis and accept the alternative hypothesis (the presence of an auto-correlation problem).

- **Modified Wald test**: It aims to find out the heterogeneity of the variance, by the command (xttest3) in the program (stata.15), as indicated the command results below:

```
xttest3
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)^2 = sigma^2 for all i
chi2 (13)  =    2.4e+05
Prob>chi2 =      0.0000
```

Source: Prepared by researchers based on the results of the program (stata.15)

We conclude from the results of the Modified Wald test that the random effect model has the problem of heterogeneity of variance, given that the statistical significance Prob> F is less than 5% (rejecting the null hypothesis and accepting the alternative hypothesis).

3.1.2.3 The estimated model and analysis of the results

Through the results of tests, we find that the fixed effects model suffers from standard problems (the problem of autocorrelation of errors and the problem of homogeneity), and to address these problems in the optimal model, we use the error correction method, or what is known as the method of correcting errors. (xtpcse) (Danie, 2007, p. 285), If the cross-sectional data chain is greater than the number of time periods, we turn to it.:

```
xtpcse y x1 x2 x3
Linear regression, correlated panels corrected standard errors (PCSEs)
Group variable:   ind                           Number of obs     =        104
Time variable:    YEAR                          Number of groups  =         13
Panels:           correlated (balanced)         Obs per group:
Autocorrelation:  no autocorrelation                          min =          8
                                                              avg =          8
                                                              max =          8
Estimated covariances      =        91          R-squared         =     0.3892
Estimated autocorrelations =         0          Wald chi2(3)      =     313.39
Estimated coefficients     =         4          Prob > chi2       =     0.0000

------------------------------------------------------------------------------
             |            Panel-corrected
           y |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          x1 |  -1.169398   .1435082    -8.15   0.000    -1.450669   -.8881275
          x2 |  -1.635893   .3324053    -4.92   0.000    -2.287395   -.9843903
          x3 |   .5874983   .1493077     3.93   0.000     .2948606     .880136
       _cons |   71.26503   5.849302    12.18   0.000      59.8006    82.72945
------------------------------------------------------------------------------
```

Source: Prepared by researchers based on the results of the program (stata.15)

On the basis of most of the previous statistical tests and after addressing the problems of errors autocorrelation and heterogeneity of variance the optimal model can be formulated as follows:

$$y = 71.26503 - 1.169398X_1 - 1.1635893X_2 + 0.5874983X_3 \dots\dots\dots\dots\dots\dots (01)$$

- It is clear from the regression equation that the first hypothesis is correct, as the increase in the volume of non-performing loans by one unit leads to a decrease in the volume of bank intermediation activity by 1.16 units, which is consistent with the study (Jamal Qassem, 2019).

- As it becomes clear to us from the regression equation that the second hypothesis is correct, where a decrease in unemployment rates by one unit leads to an increase in the volume of banking intermediation activity by 1.63 units and an increase in per capita GDP leads to an increase in banking intermediation activity by 0.58, and this is consistent with the demand hypothesis Affiliate that assumes a causal relationship, which is a vector of economic growth to the financial sector, where continuous economic expansion requires more services and financing. Tools, so that the financial system adapts to the financial needs of real sectors, as the study shows (Gurley & Shaw, 1955, pp. 515-538), (bn qabila, 2015-2016).

3.1 The impact of bad loan shocks on bank intermediation activity

The estimated equation of Model No. (01), which links the variables of the non-performing loans ratio and the volume of banking intermediation activity for a sample of Arab banks, allows us to perform stress tests of the levels of non-performing loans using pessimistic scenarios, where the average rate of non-performing loans (x1) during the study period for this sample is 8.46% If we assume an unexpected shock that leads to an increase in the

volume of non-performing loans by 2%, 4%, 8%, it will lead to a decrease in the volume of bank intermediation activity by 2.3387%, 4.67752, 09.55184% respectively, which means that even pressure on the levels of non-performing loans for a sample of Arab countries to high levels will result in an increasing decrease in the volume of banking brokerage activity for the studied sample.

4. *CONCLUSION*

It allowed us to study the impact of stress testing levels of non-performing loans on the volume of banking brokerage activity, especially in light of the developments in the banking arena, which opened wide magazines for banking institutions to invest and make profits, but despite these gains that these institutions obtained in light of these developments, several challenges emerged. Limiting the activity of banking institutions in financing operations, and one of the most important of these challenges is the exacerbation of the problem of non-performing loans, Coming up with a set of results:

-The rise in non-performing loans in banking institutions leads to a reduction in the limit of their activity for which they were established;

- The causal trend is summarized between economic growth and the volume of banking intermediation activity for a sample of Arab countries, according to the dependent demand hypothesis;

- The presence of high unemployment rates in the Arab countries leads to a decrease in the volume of banking intermediation;

- Banking institutions in the Arab countries enjoy a significant amount of non-performing loans, which indicates a weakness at the level of internal control, especially with regard to criteria for granting credit.

In view of the aforementioned results, and in order to strengthen the ability of banking institutions to perform their tasks, enhance their gains, achieve economic development, and reduce the volume of threats faced by Arab banks, represented by the exacerbation of non-performing loans, we offer the following set of recommendations:

- Banking institutions in the Arab countries must conform to global developments with regard to reforms aimed at enhancing the soundness and soundness of their banking institutions, thus greatly helping to reduce non-performing loans;

- Ensure the effective application of the regulatory rules for the credit policy of banking institutions, because the keenness to apply these rules helps the managements of banking institutions in achieving their goals, and making sound credit decisions that enable them to reduce the volume of non-performing loans;

- Banking institutions must accompany and follow up on the activities that the borrower wants to support by means of the loans granted by them;

- The need for continuous internal and external supervision in banking institutions with regard to the loans granted, in order to avoid the problem of non-payment of the loan;

- The use of financial analysis indicators and stress tests in the process of analyzing and estimating banking risks, in order to form the optimal volume of provisions directed to non-performing loans;

- Working to provide the best technical means and technology necessary to help the bank's credit department employees, in order to make the decision to grant credit or not, and this ultimately leads to reducing non-performing loans;

- Establishing credit bureaus specialized in dealing with troubled credit facilities, and following up on suspicious financing operations;

- Not to rely on guarantees alone when granting credit, but it must be based on the economic feasibility study of the project;

- The necessity of paying attention to the aspect of development and training of employees of banking institutions, in order to raise the level of their qualification, especially in the field of credit.

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6. *Appendices*

Appendix 1: Estimate of the three panel models

Pooled Regression Model

```
. reg y x1 x2 x3
```

```
      Source |       SS           df       MS      Number of obs   =       104
-------------+----------------------------------   F(3, 100)       =     21.24
       Model |  49607.9056         3  16535.9685   Prob > F        =    0.0000
    Residual |  77839.8371       100  778.398371   R-squared       =    0.3892
-------------+----------------------------------   Adj R-squared   =    0.3709
       Total |  127447.743       103  1237.35673   Root MSE        =      27.9

------------------------------------------------------------------------------
           y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          x1 |  -1.169398   .4372813    -2.67   0.009    -2.036952   -.3018447
          x2 |  -1.635893   .6763471    -2.42   0.017    -2.977746   -.2940394
          x3 |   .5874983   .2477407     2.37   0.020     .0959879    1.079009
       _cons |   71.26503   9.465099     7.53   0.000     52.48654    90.04351
------------------------------------------------------------------------------
```

Fixed Effects Model

```
xtreg y x1 x2 x3 , fe

Fixed-effects (within) regression               Number of obs      =       104
Group variable: ind                             Number of groups   =        13

R-sq:                                           Obs per group:
     within  = 0.1541                                         min =         8
     between = 0.1967                                         avg =       8.0
     overall = 0.1812                                         max =         8

                                                F(3,88)           =      5.34
corr(u_i, Xb)  = 0.2427                         Prob > F          =    0.0020

------------------------------------------------------------------------------
           y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          x1 |   .1743576   .3972764     0.44   0.662    -.6151459     .963861
          x2 |   .3602531   .4316376     0.83   0.406    -.4975359    1.218042
          x3 |   .5674405   .1452496     3.91   0.000     .2787875    .8560935
       _cons |   41.98244   4.904208     8.56   0.000     32.23636    51.72852
-------------+----------------------------------------------------------------
     sigma_u |  32.939045
     sigma_e |  8.4845955
         rho |  .93777849   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(12, 88) = 82.77                     Prob > F = 0.0000
. areg y x1 x2 x3 , absorb ( pay )

Linear regression, absorbing indicators         Number of obs      =       104
                                                F(   3,     88)    =      5.34
                                                Prob > F           =    0.0020
                                                R-squared          =    0.9503
                                                Adj R-squared      =    0.9418
                                                Root MSE           =    8.4846

------------------------------------------------------------------------------
           y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          x1 |   .1743576   .3972764     0.44   0.662    -.6151459     .963861
          x2 |   .3602531   .4316376     0.83   0.406    -.4975359    1.218042
          x3 |   .5674405   .1452496     3.91   0.000     .2787875    .8560935
       _cons |   41.98244   4.904208     8.56   0.000     32.23636    51.72852
-------------+----------------------------------------------------------------
         pay |         F(12, 88) =     82.774   0.000          (13 categories)
```

Random Effects Model

```
xtreg y x1 x2 x3 , re

Random-effects GLS regression                   Number of obs      =       104
Group variable: ind                             Number of groups   =        13

R-sq:                                           Obs per group:
     within  = 0.1509                                         min =         8
     between = 0.2690                                         avg =       8.0
     overall = 0.2469                                         max =         8

                                                Wald chi2(3)      =     18.30
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =    0.0004

------------------------------------------------------------------------------
           y |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          x1 |   .0334079   .3848074     0.09   0.931    -.7208007    .7876165
          x2 |   .2467182   .4249957     0.58   0.562     -.586258    1.079694
          x3 |   .6080804   .1430378     4.25   0.000     .3277314    .8884294
       _cons |   43.67042   9.781474     4.46   0.000     24.49908    62.84175
-------------+----------------------------------------------------------------
     sigma_u |  30.353327
     sigma_e |  8.4845955
         rho |    .927527   (fraction of variance due to u_i)
```

Appendix 2: Trade-off between a Pooled Regression Model and a Random Effects Model

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        y[ind,t] = Xb + u[ind] + e[ind,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                       y |   1237.357       35.17608
                       e |   71.98836       8.484596
                       u |   921.3244       30.35333

        Test:   Var(u) = 0
                                 chibar2(01) =   265.72
```

Appendix 3: Trade-off between a Fixed Effects Model and a Random Effects Model

```
hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
          x1 |    .1743576     .0334079        .1409497        .0987514
          x2 |    .3602531     .2467182        .1135349        .0754299
          x3 |    .5674405     .6080804       -.0406399         .025251
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       29.29
                Prob>chi2 =      0.0000
```