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RESEARCH ARTICLE

Factors Influencing Non-Performing Loans in Jordanian Banks: A Dual Macro-Micro Perspective

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ABSTRACT

This research aims to analyze the macroeconomic and microeconomic determinants of nonperforming loans by using a sample of 13 Jordanian commercial banks from 2000-2018. This research employed panel data analysis to improve the accuracy of the survey. Several macroeconomic factors were analyzed, i.e., real GDP growth, inflation, real interest rate, unemployment rate, and global financial crises. Also, various microeconomic factors were examined, i.e., return on assets, return on equity, loan-to-deposit ratio, and bank size. The research results indicated that among the macroeconomic variables, GDP significantly negatively impacted NPLs in Jordanian commercial banks throughout the research. In contrast, throughout the research, the inflation rate, real interest rate, and global financial crises have had a significant positive impact on NPLs in Jordanian commercial banks. On the other hand, the unemployment rate was found to have no significant effect on NPLs in Jordanian commercial banks. Regarding microeconomic variables, results showed that return on asset and bank size negatively impact NPLs in Jordanian commercial banks. In contrast, loans to total deposits significantly positively affect NPLs in Jordanian commercial banks. Contrary to what is expected, this research showed that return on equity does not substantially impact NPLs in Jordanian commercial banks.

INTRODUCTION

Financial institutions or banking institutions are corporations that provide services as intermediaries of the financial market. They are broadly distinguished according to ownership structure as cooperative and commercial banks (Wright, 2010). Members own and operate cooperative banks to provide financial services to small businessmen. In contrast, commercial banks are established for commercial purposes, and, therefore, the primary aim is to earn profit from the banking business.

Over the last three decades, the number of commercial banks has increased due to the high financial competition. This competition led to a noticeable improvement in the quality of credit portfolios, which, in turn, led to the improvement of operational efficiency and the allocation of capital via the dissemination of best practices (Garsiya & Fernandez, 2008; Mugableh, 2022; Mugableh, 2020a; Mugableh, 2020b). However, this competition also harms the quality of credit portfolios in that it reduces profit margins and encourages banks to take more significant risks to maintain their ability to generate profits, which, as a result, boosts the lending processes in terms of quantity and quality

(Berentsen & Menzio, 2011).

Risky lending can accumulate what is known as Non-Performing Loans (NPLs), negatively affecting the financial system and increasing banking crises (Reinhart & Rogoff, 2011). Generally, a loan is called non-performing if it has not fulfilled one or more of the terms or conditions under the loan agreement. According to the International Monetary Fund (IMF), "a loan is classified as nonperforming when interest and principal payments are past due by 90 days or more, when interest payments that are 90 days or more have been capitalized, refinanced, or delayed by agreement, or when payments are less than 90 days overdue." (IMF, 2005, p. 46).

Ozili (2019) argued that it is crucial for banks' risk management functions and national bank supervisors responsible for banking stability to understand the factors that influence the level of NPLs because they reflect the credit quality of banks' loan portfolios and, in other words, the credit quality of the loan portfolio on the country's banking system.

Several studies have been carried out by different scholars who examined in detail the determinates of NPLs within and across countries (e.g., Skarica, 2014; Louzis et al., 2012; Nkusu, 2011; Polat, 2018; Kumar & Kishore, 2019; Messai & Jouini, 2013; Touny & Shehab, 2015; Rajha, 2017). Most of these studies investigated either the macroeconomic or microeconomic determinates or both. The first is usually related to economic activity or business cycles, and the latter includes individual characteristics. For instance, Rajha (2017) employed the macroeconomic and bank-specific factors to identify the determinates of NPLs of Jordanian banks from 2007-2012 (during the global financial crisis). His study revealed that the lagged NPLs and the ratio of the loan's total assets were the most critical factors that affected NPLs positively. However, contrary to international evidence, the results of this study indicated that large banks are not necessarily more efficacious in screening customers' loans compared to smaller banks.

Lack of studies that examined the determinates of NPLs in the Jordanian banking system, the short period covered in literature, such as Rajha's (2017) study, which investigated the determinates of NPLs in the Jordanian bank system for only seven years (from the period of 2007-2012) that is during the global financial crises, and the economic and historical changes that the region experienced in the last ten years prompt the researcher to investigate the macro and micro determinants of non-performing loans in Jordanian banks in more prolonged period (2000-2018).

1. Research problem

It is evident to observers and economists as well that the percentage of non-performing loans to the total loans in Jordanian commercial banks has witnessed a fluctuant rebound rise in the size from the period of 2000-2018 in that NPLs recorded slightly the same ratio of 25.1 % from the period 2000-2002 (see Table 1). After that, the NPLs ratio dropped sharply to a record 15.50% in 2003 and reached 4.10 % in 2007. According to the Central Bank of Jordan, several factors played crucial roles in this sharp drop, to mention but a few: the improvement in Jordan's economic performance, which positively affected customers' ability to repay loans, and banks' higher efficiency in managing their assets and collecting their dues, besides adopting another significant financial step, namely, the banks' write-offs of nonperforming loans with total collateral. However, non-performing loans have increased since 2008 and reached 4.9% at the end of 2018. This rise and fall in NPLs level throughout 2000-2018 are worth researching. Therefore, one research question has been coined to address the phenomena under investigation: What are the macro and micro determinants of non-performing loans in the Jordanian bank sectors?

(Table 1): Total Assets, Credit Facilities and Total Deposits for Jordanian Licensed Banks *Source: CBJ Annual Report*

Year	Total assets (millions)	Total credit facilities (millions)	Total deposits (millions)
2000	12913.5	4546.5	8224.5
2001	14153.6	4948.9	8721.3
2002	15119.4	5130.0	9367.7
2003	15701.5	5262.4	9969.4
2004	17821.1	6189.2	11564.1
2005	21086.5	7744.3	13119.3
2006	24237.6	9761.9	14591.9
2007	26815.6	11295.6	5988.1
2008	29796.6	13044.3	18102.6
2009	31957.0	13317.2	20298.4
2010	34973.0	14451.4	22504.8
2011	37986.3	15851.2	24377.9
2012	39275.4	17829.8	24969.7
2013	42802.9	18939.7	25593.2
2014	44868.1	19274.5	30216.0
2015	47133.2	21103.5	32598.5
2016	48383.5	22905.8	32900.0
2017	49102.5	24736.8	33197.7
2018	50917.8	26111.8	33848.1

2. Research objectives

This research aims to determine the macro and micro determinates that impact non-performing loans in Jordanian commercial banks. This research was conducted to address the following objectives:

- To gain a theoretical understanding of non-performing loans in commercial banks in Jordan.
- To analyse macro and micro determinants of non-performing loans in commercial banks in Jordan.

3. LITERATURE REVIEW

The Banking Industry of Jordan

The Central Bank of Jordan carefully manages and efficiently organizes the Jordanian banking sector, which is considered the strongest division of its financial services industry. Its history dates back to 1948, when the Arab Bank moved its headquarters from Jerusalem to Amman. While the sector is characterized as saturated, it was able to tolerate the consequences of the global financial crisis, to what is called the "Arab spring" in some regions and economic slowdown, and was only marginally impacted, making it one of the largest economic sectors in the kingdom. Currently, the sector comprises 24 banks, 15 of which are listed on the Amman Stock Exchange (ASE). Despite the ongoing local volatility, low oil prices, and decelerated GDP growth within the kingdom, the banking sector remains flexible, stable, and attractive to investors (Al-Abedallat, 2016).

As the economy of the Jordanian banking sector has advanced (see Table 2), banks in Jordan registered a remarkable boost in total assets, credit facilities, and total deposits. Throughout the financial period 2000-2018, the value of Jordanian bank's total assets grew from JD12913.5 million in 2000 To JD 50917.8 million by the end of 2018; total credit facilities grew from JD 4546.5 million in 2000 To JD 26111.8 million in 2018. Finally, total deposits rose from JD 8224.5 million in 2000 To JD 33848.1 million in 2018.

(Table 2): Total Assets, Credit Facilities and Total Deposits for Jordanian Licensed Banks *Source: CBJ Annual Report*

Year	Total assets (millions)	Total credit facilities (millions)	Total deposits (millions)
2000	12913.5	4546.5	8224.5
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Non-Performing Loans to Total Loans for Banks in Jordan (2000-2018)

It is evident to observers and economists as well that the percentage of non-performing loans to the total loans in Jordanian commercial banks has witnessed a fluctuant rebound rise in the size from the period of 2000-2018 in that NPLs recorded slightly the same ratio of 25.1 % from the period 2000-2002 (see Table 3). After that, the NPLs ratio dropped sharply to a record 15.50% in 2003 and reached 4.10 % in 2007. According to the Central Bank of Jordan, several factors played crucial roles in this sharp drop, to mention but a few: the improvement in Jordan's economic performance, which positively affected customers' ability to repay loans, and banks' higher efficiency in managing their assets and collecting their dues, besides adopting another significant financial step, namely, the banks' write-offs of nonperforming loans with total collateral. However, non-performing loans have increased since 2008 and reached 4.9% at the end of 2018.

(Table 3): Nonperforming Loans to Total Loans for Banks in Jordan for the Period 2000-2018 *Source: CBJ Annual Report*

Year	Non-performing loans to total loans (%)
2000	21.3%
2001	23.6%
2002	25.1%
2003	15.50%
2004	10.30%
2005	6.60%
2006	4.30%
2007	4.10%
2008	4.20%

2009	6.70%
2010	8.20%
2011	8.50%
2012	7.70%
2013	%7.0
2014	%5.6
2015	%4.9
2016	%4.3
2017	%4.2
2018	4.9%

Previous studies from developed countries

Salvi et al. (2018) employed a multivariant regression with panel data to verify the impact of macroeconomic and microeconomic variables on European banks throughout 2011-2015. Regarding the bank-specific factors, the result of this study stated that better loan quality can be associated with a higher capital adequacy ratio and a higher return on average assets. While greater profitability, soundness, and bank sizes are associated with a lower rate of doubtful loans to assets in the balance sheet. On the other side of the analysis, results also showed a positive relationship between the unemployment rate and NPLs and a negative relationship between GDP.

Plahuta (2017) employed unbalanced panel data to assess macro and micro factors affecting the level of NPLs in 16 Italian banking systems from 2006-2016. Results revealed that GDP and unemployment rate positively correlate with the increase of NPLs for macroeconomic variables. On the other hand, concerning microeconomic variables, only size and solvency are significant among the micro-ones. This study concluded with major implications for financial policymakers in Italy, suggesting that regulators should give more economic attention to the biggest banks in the country. Moreover, labor and GDP growth policies should be fostered, given their importance in affecting the NPLs level.

Dimitrios et al. (2016) researched the main NPL determinants in 15 commercial banks in euro-area countries from 1990 to 2015. This research employed GMM estimations to analyze both macroeconomic variables (i.e., unemployment, income tax as % of GDP, government budget deficit/surplus and public debt as % of GDP, inflation, GDP growth, and output gap) and bank-specific variables (i.e., ROA, ROE and the ratio of loans). Results revealed that the macroeconomic variables such as growth and unemployment strongly influence NPLs. Also, future NPLs were shaped mainly by bank-specific factors related to management skills and risk preferences.

Chosh (2015) examined the microeconomic and specific bank determinants of NPLs of all commercial banks and saving institutions across 50 US states and the District of Columbia from 1984 to 2013 to examine the health of the regional real estate on NPLs. Employing fixed effects and dynamic GMM estimation statistical methods revealed that greater capitalization, poor credit quality, liquidity risks, more significant cost inefficiency, and banking industry size significantly increase NPLs. Furthermore, greater bank profitability lowers NPLs. Moreover, results also indicated that higher state real GDP accurate personal income growth rates and state housing price index changes reduce NPLs, while inflation, state unemployment rates, and US public debt significantly increase NPLs.

Messai and Jouini (2013) investigated the determinates of NPLs of 85 banks in three different European countries, i.e., Italy, Greece, and Spain, for 2004-2008. These three countries were chosen since they are a representative sample of countries with problems after the 2008 crisis and worsening public finance. The macroeconomic variables and specific variables were employed in this research. In this research, NPLs were described by three macroeconomic variables: unemployment rate, the growth rate of GDP, and genuine interest rate, and three variables specific to the banks concerning the profitability of assets, the change of the loans, and the loan losses reserve. Moreover, this study utilized panel data statistical analysis to identify variables that can impact and influence

doubtful accounts at credit institutions within a sample of European banks. The results indicate that GDP growth and return on assets negatively affect non-performing loans (NPLs). Conversely, unemployment and actual interest rates have a positively affect impaired loans. Additionally, the findings reveal that banks' provisions increase in response to rising NPLs.

Skarica (2014) analyzed and measured the impact of macroeconomic and financial variables, i.e., unemployment rate, real GDP growth, the harmonized index of consumer prices (HICP), nominal effective exchange rate (NEER), share prices index, and the 3-month money market interest rate on the ratio of NPLs to total (gross) loans for seven Central and Eastern European (CEE) countries between the third quarter of 2007 to the third quarter of 2012. This study employed panel data techniques. The results of this study found that both unemployment and inflation rates increase the growth of NPLs, while real GDP growth has a negative effect.

Klein (2013) investigated NPLs in 16 Central, Eastern, and South-Eastern European nations from 1998 to 2011. This study employed panel data of individual banks' balance sheets from Bank space and macroeconomic indicators from the Haver and World Economic Outlook (WEO) datasets. Results revealed that macroeconomic and bank-specific variables can significantly influence the level of NPLs. In other words, the level of NPLs tends to increase when the exchange rate depreciates, unemployment rises, and inflation is high. Results also indicated that NPLs are sensitive to bank-level factors, such as higher bank management quality, leading to lower NPLs. In contrast, moral hazard incentives, such as low equity, tend to worsen NPLs.

Park (2010), in his comparable research, has examined two financial periods (before the onset of economic crises 2002-2006 and during the economic crisis 2007-2010) in the U.S. banking system to offer factual proof of various key macroeconomic and bank-specific determinants' effects on NPLs. Results revealed that the GDP growth rate, unemployment rate, and ROE negatively affected NPL ratios in U.S. banks before the crises. The same results were also found during the crisis period.

Previous studies from developing countries

Kumar and Kishore (2019) employed a random effect model and panel data methodology to identify bank-specific determinants and macroeconomic determinates of NPLs in UAE conventional banks from 2008 to 2015. Results of the study implied that all macroeconomic determinants, i.e., gross domestic product, growth, inflation, domestic credit to the private sector, unemployment, and government debt, seemed insignificant in determining the level of NPLs. On the other hand, strong evidence was found of the link between NPLs and the bank-specific variables. The researchers further suggested that the crisis in the selected banks is more intrinsic to internal issues rather than macroeconomic factors.

Zainol et al. (2018) investigated the macroeconomic factors that determine the NPLs of the banking institutions in Malaysia by employing time series data from the 1st quarter of 2006 to the 4th quarter of 2015. The auto-regressive distributed lag (ARDL) method was employed to identify significant relationships between the long-run and short-run variables, capturing their elastic dynamics within the model. Cross Domestic Product (GDP), Base Lending Rate (BLR), inflation, and Household Income Distribution (ID) were the chosen macroeconomic variables under investigation. Results indicated that GDP is a significant variable and affects NPLs negatively, while BLR and ID are positively related to NPLs. Furthermore, results revealed that INF has unexpectedly an insignificant relationship with NPLs.

Wood and Skinner (2018) investigated the determinants of NPLs in commercial banks in Barbados by employing a multiple regression model that includes several macroeconomic variables (i.e., GDP growth, inflation rate, unemployment rate, and interest rate) and bank-specific variables (i.e., ROE, ROA, capital adequacy ratio and loan to deposit ratio). Results indicated that GDP, interest rate, and inflation rate affect NPLs negatively, while unemployment affects NPLs positively. Moreover, results

showed that all bank-specific variables were statistically significant in that the ROE, ROA, and CAR negatively impact the level of NPLs. However, the LTD has a significant positive effect on NPLs.

Rajha (2017) employed a panel data regression model to investigate the determinants of NPLs in the Jordanian banking system from 2007 to 2012. This research utilized macroeconomic and microeconomic factors to identify the determinants of non-performing loans (NPLs) in Jordanian banks. Concerning the microeconomic variables, results revealed that the lagged NPLs and the ratio of loans to total assets affect NPLs positively. However, contrary to international evidence, the findings of this research indicate that larger banks are not necessarily more effective than their smaller counterparts in screening customer's loans. Concerning the macroeconomic variables, results showed that economic growth and inflation rates significantly adversely affect NPLs. In contrast, the effect of the loans-to-asset ratio and the dummy variable representing the global financial crisis was positive and highly significant. Moreover, results also indicated that the global economic crisis played an essential role in the Jordanian banking system, leading to higher NPLs.

Ouhibi and Hammami (2015) identified the macroeconomic variables that can affect the NPLs for countries of the southern Mediterranean, i.e., Tunisia, Morocco, Egypt, Lebanon, Jordan, and Turkey, from 2000 through 2012. This study has employed descriptive statistics to describe the different macroeconomic variables quantitatively. This research showed that the consumer prices index, the exchange rate, and gross capital formation are significant with NPLs. In contrast, GDP, FDI, exports, the unemployment rate, and surplus/deficit treasure are insignificant.

Ahmad & Bashir (2013a) investigated the bank-specific determinants of NPLs of 30 banks in Pakistan from 2006 to 2011. The researcher employed bank-specific variables, co-integration analysis, cross-country regression analysis, and dynamic panel methods. Results revealed that the loan-to-deposit ratio, return on assets, credit growth, and reserve ratio substantially influenced NPLs in Pakistan for the selected period.

In another study by Ahmad and Bashir (2013b), researchers analyzed the impact of macroeconomic variables on NPLs in Pakistan from 1990-2011. The researcher employed time series data of the NPLs ratio and nine macroeconomic variables (i.e., annual GDP growth, unemployment rate, real interest rate, inflation rate, consumer price index, real exchange rate, exports, industrial production, and FDI). Furthermore, OLS was used to test the explanatory power of macroeconomic variables as determinates of NPLs. The results of this study indicated a negative relationship between NPLs and GDP, interest rate, inflation, exchange rate, exports, industrial production, and FDI. On the other hand, results indicated a positive relationship between NPLs and the unemployment rate and CPI.

Kastrati (2011) employed a dynamic panel data model to examine the determinates of NPLs in 15 transition economies (i.e., Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Bulgaria, Croatia, Macedonia, Moldova, Montenegro, Kosovo, Romania, Serbia, Ukraine) for the time series spanning from 1994to 2009. The results revealed that non-performing loans (NPLs) from the previous year tend to persist into the current year, suggesting that banks should adopt more restrictive lending policies. On the other hand, actual growth rates, inflation rates, and competition suggest that external factors beyond the banks' control may also influence the NPL ratio. Finally, an essential finding of this research is that the variable considering the year 2009 significantly increased the NPLs. This aligns with the events that defined 2009, particularly in the first half of the year, given the aftermath of the 2008–2009 financial crisis and the subsequent recessions.

Abid et al. (2013) employed a dynamic panel data method to examine the potential effect of macroeconomic and bank-specific variables on loan quality from 2003-2012 on around 16 Tunisian banks. Analysis revealed that macroeconomic variables, i.e., real GDP growth rate, inflation rate, and the actual lending rate (RLR), affect NPLs negatively. Moreover, by examining the bank-specific determiners, the empirical evidence of the research supports the flawed management hypothesis

that Tunisian banks yield credits with bad qualities and do not employ sophisticated evaluation methods to detect advanced insolvent creditors.

The above researchers left no stone unturned concerning investigating the determinants of NPLs in several developed and developing countries. Most of these studies covered the micro and macro-economic determinates of NPLs with notable differences in the chosen variables under investigation, period of investigation, and analysis methods. For example, in developing countries in general and the Jordanian context in particular, Rajha (2017) employed a panel data regression model to investigate the determinates of NPLs in the Jordanian banking system from 2007 to 2012. Rajha's (2017) study addressed several macroeconomic variables: economic growth, inflation rate, global financial crises, and micro-economic variables, namely lagged NPLs, total assets of loans, and bank size.

The current study adds something new to the literature regarding the investigated variables and the period and data analysis method. It examines the macro and micro determinants of non-performing loans in the Jordanian banking sector during the period (2000-2018) by employing panel data as a data analysis method. Moreover, the current study extends the previous work by including different macroeconomic variables, namely, actual interest rate and employment rate, and also adds different microeconomic variables, namely, return on asset, return on equity, and loan deposit ratio. These new variables were adapted based on their use in studies in other developing economies and their perceived importance in a Jordanian context.

Research Hypothesis

Based on the studies found in the literature and the objectives of the current research, the following hypotheses were formulated:

- H1: Return on assets has a significant impact on non-performing loans in Jordanian commercial banks.
- H2: Return on equity has a significant impact on non-performing loans in Jordanian commercial banks.
- H3: Bank size has a significant impact on non-performing loans in Jordanian commercial banks.
- H4: The loan-to-deposit ratio has a significant impact on non-performing loans in Jordanian commercial banks.
- H5: Gross domestic product (GDP) has a significant impact on non-performing loans in Jordanian commercial banks.
- H6: The 2008 global financial crisis has a significant impact on non-performing loans in Jordanian commercial banks.
- H7: Real interest rates have a significant impact on non-performing loans in Jordanian commercial banks.
- H8: The inflation rate has a significant impact on non-performing loans in Jordanian commercial banks.
- H9: The unemployment rate has a significant impact on non-performing loans in Jordanian commercial banks

METHODOLOGY

Data Sources

The research data is collected from secondary sources, which include bank annual reports, the Central Bank of Jordan's and the World Bank database, previous literature, books and references, and studies that investigated this issue to cover the literature review and the theoretical framework.

The Research Population and Sample

The study population comprises all banks in the Jordanian banking sector and under the Central Bank of Jordan. The total number of all banks in Jordan is (24) banks, (8) of which are foreign banks, so they are excluded since they are considered branches. Moreover, (3) out of (24) banks are Islamic in banking philosophy and policies, so they are excluded because of the nature of the financial operation nature in these banks compared to the commercial banks in Jordan. Thus, this study covered only (13) Jordanian commercial banks. Table (4) below clarifies the study population and sample.

Table (4): The Study Population and Sample *Source: CBJ Annual Report*

The research population and sample	Number of banks	The percentage (%)
The research population	24	100
Excluded banks	11	46
Sample banks	13	54

Statistical Techniques

This study has employed a panel data approach to analyze and quantify the impact of macroeconomic variables (i.e., real GDP growth, inflation, real interest rate, unemployment rate, and global financial crises) and the impact of microeconomic variables (i.e., return on asset, return on equity, loan to deposit ratio and bank size) on non-performing loans in 13 Jordanian commercial banks. Other researchers have widely used the panel data approach in the same field of study and scope of investigation, e.g., Rajha (2017) and Messai and Jouini (2013). Furthermore, this study employed descriptive statistics techniques such as mean, standard deviation, and minimum and maximum values to ensure accurate results and credibility.

Statistical Tests

Several tests were employed in the scope of this research, i.e., the Multicollinearity Test, Heteroscedasticity Test, Breusch-Pagan Lagrange Multiplier (LM) Test, and Hausman Test.

The Measurement of Study Variables

The study variables are divided into two categories: the dependent variable and the independent variable. The following provides more explanations for both variables.

The measurement of the study Dependent variable:

According to the IMF, a loan is considered nonperforming when interest and principal payments are past due by 90 days or more, when interest payments have been capitalized, refinanced, or delayed by agreement for 90 days or more, or when payments are less than 90 days overdue but there are other valid concerns—such as a debtor filing for bankruptcy—that raise doubts about the likelihood of full repayment. Once a loan is classified as nonperforming, it should retain that classification until it is written off or until interest or principal payments are received. NPLs are measured as follows:

Non-performing loans ratio = Non-performing loans / total loans…. Eq. (1)

The Measurement of Study Independent Variables

- ***Macro Variables***

Many researchers have studied macroeconomic determinates through the past two decades, which are the primary source of systematic risk reflected in the growth or decline of loan default. This study proposes various macroeconomic factors as essential determinants of NPLs: GDP, inflation, real interest rate, unemployment rate, and global financial crises.

- Gross domestic product (GDP) measures a country's economic size and growth rate. This factor is measured by the gross domestic product per capita (Zainol et al., 2018).

- Inflation: This factor is defined as the continuous rise in the general level of prices over a certain period or a continuous fall in the value of money. (Labont, 2011) and it is measured as the annual inflation rate reported by the World Bank (Rajha, 2017)
- Real interest rate: This is the lending rate adjusted for inflation. It is measured as the annual interest rate disclosed by the World Bank (Messai & Jouini, 2013).
- Unemployment rate: This refers to individuals who do not have a job (Bofondi & Ropele, 2011), and it is measured as the annual unemployment rate listed by the World Bank (Dimitrios et al., 2016).
- Global Financial Crises: This is the most financial crisis since the Great Depression of the 1930s. Rajha (2017) stated that the dummy variable should equal 1 for the crisis period; otherwise, it should be zero.

- ***Micro Variables***

Bank-specific determinants are internal factors raised within banks that managerial decisions can control. This study proposes the microeconomic factors as essential determinants of NPLs: return on asset, return on equity, loan-to-deposit ratio, and bank size.

- Return on asset (ROA): This factor measures the profitability of banks and is considered an essential indicator of the performance of banks. It is calculated as the following formula (Ahmad & Bashir, 2013)
- *ROA= Net income/ total asset…. Eq (2)*
- Return on equity (ROE): It measures banks' profitability and shows how efficiently a bank handles the money that shareholders have contributed. This factor is calculated as follows: (Ahmad & Bashir, 2013)
- *ROE= Net income/ shareholder equity … Eq (3)*
- Loan to deposit ratio: This is one of the bank liquidity measurements. It is measured as the following formula: (wood and skinner, 2018)
- *LTD= total loans / total deposits…. Eq (4)*
- Bank size: The logarithm total asset measures a bank's size in terms of its asset position. Rajha's study (2017) stated that total assets are used as a proxy for bank size.
- *Bank size= Log (Total asset) … Eq (5)*

Therefore, the following model will be used in the study:

$$NPLsi,t = \beta + \beta 1GDPt + \beta 2UEMt + \beta 3RIRt + \beta 4INFt + \beta 5FC2008t + \beta 6ROAi,t + \beta 7ROEi,t + \beta 8LTDi,t + \beta 9BZi,t + \varepsilon \quad \ldots. \text{(Eq 4-6)}$$

Where:

NPLst : non-performing loans at time t.

GDPt: gross domestic product at time t.

UEMt: unemployment rate at time t.

RIRt: real interest rate at time t.

INFt: inflation rate at time t.

FC2008t: global financial crisis at time t.

ROAi,t: return on asset for bank i at time t.

ROEi,t: return on asset for bank I at time t.

LTDi,t: loans to deposits ratio for bank I at time t.

BZi,t: a total asset for a bank I at time t.

β = Slope.

εi,t= Error term.

i= Bank.

t= the period 2000-2018.

DATA ANALYSIS, HYPOTHESIS TESTING AND RESULTS

Descriptive Statistics

This section presents the most crucial descriptive information for all the study variables for 13 Jordanian commercial banks from 2000 to 2018. It provides the study variables' mean, standard deviations, maximum, and minimum values. Table 5 below summarises the results.

Table (5): Descriptive Statistics of Dependent and Explanatory Variables

Variable	Mean	Std. Dev.	Min	Max
Non-Performing Loans	0.121	0.153	0.003	1.301
Return on Assets.	1.221	2.537	-5.475	4.97
Return on Equity	9.628	6.292	-25.460	39.842
Loans to Total Deposits	0.603	0.169	0.004	1.059
Real Interest Rate	4.630	4.698	-9.965	12.257
Unemployment Rate	13.987	1.886	11.9	18.7
Inflation Rate	3.387	3.231	-0.877	13.971
Global Financial Crisis	0.579	0.495	0.000	1.000
Size	1318933806	63966112	5338521	25859492650
Log Size	9.120	0.528	7.727	10.413
Gross Domestic Product.	8557.521	182.9385	7220.428	9664.268
Log Gross Domestic Product.	3.932	0.035	3.859	3.985

- As can be seen in Table (5), the dependent variable, non-performing loans (NPL), has a mean of (0.121) and a standard deviation of (0.153). The minimum value is (0.003), and the maximum is (1.301).
- As for the independent variables, the return on assets, the mean was (1.221) with a standard deviation (of 6.292) while the minimum value (-5.475) at commercial banks in (2002) and the maximum value (4.97) at investment banks in (2005).
- The next mean value related to return on equity is (9.628) with a standard deviation of (59.911). In contrast, the minimum value reached (-25.460) at Society General de Banque-Jordanian in (2000) and the maximum value reached (39.842) at Invest Bank (2005).
- The next mean value is related to loans to total deposits as shown in Table (5), which is (0.603), with a standard deviation (0.169), while the minimum value (0.004) and the maximum value (1.059).
- The next mean value is related to the real interest rate as shown in Table (5), which is (4.630), with a standard deviation (4.698), while the minimum value was (-9.965) in (2008) and maximum value (12.257).

- The unemployment rate can be seen from Table (5), which has a mean of (13.987), with a standard deviation of (1.886), while the minimum value (11.9) and the maximum value (18.7).
- The following variable is the inflation rate, with a mean of (3.387) and a standard deviation of (3.231). The minimum value is (-0.877), and the maximum is (13.971). The global financial crisis variable has a mean of (0.579), a standard deviation of (0.495), a minimum value of (0.000), and a maximum value of (1.000).
- The next mean value is related to size, as shown in Table (5): (1,318,933,806), with a standard deviation (63,966,112). The minimum value was (5,338,521), and the maximum was (25,859,492,650). As the result shows, this variable was transformed into a natural logarithm form to decrease the normality and standard deviation problems.
- The next mean value is related to log size as shown in Table (5), which is (9.120), with a standard deviation (0.528), while the minimum value is (7.727) and the maximum value is (10.413).
- The next mean value is related to the gross domestic product as shown in Table (5), which is (8557.521), with a standard deviation (of 182.9385), while the minimum value was (7220.428) and a maximum value (9664.268). As the result shows, this variable was transformed into a natural logarithm form to decrease the normality and standard deviation problems.
- The final mean value is related to the log of gross domestic product, as shown in Table (5), which is (3.932), with a standard deviation (0.035). The minimum value was (3.859), and the maximum was (3.985).

Statistical Problems and Test Method

The following tests were carried out to ensure the accuracy of the analysis results.

Multicollinearity Test

Table (6) shows the variance inflation factor (VIF) and tolerance (1/VIF) test. All VIF values were less than 10%, and all 1/VIF values were more than 10%. This implies that multicollinearity is not a problem in the regression model.

Table (6): Variance inflation factor (VIF) and tolerance (1/VIF) test

Variables	**VIF**	**1/VIF**
Real Interest Rate	8.880	0.113
Inflation Rate	5.260	0.190
Gross Domestic Product.	3.120	0.320
Unemployment Rate	1.430	0.700
Global Financial Crisis	1.360	0.736
Log Size	1.350	0.739
Loans to Total Deposits	1.200	0.835
Return on Assets.	1.050	0.955
Return on Equity	1.040	0.964
Mean VIF	2.740	

Heteroscedasticity Test

Table (7) shows the result of this test. It was found that there was no problem with data homogeneity; the null hypothesis was accepted, and the alternative hypothesis was rejected.

Table (7): Test of Heteroscedasticity

chi2(1)	Prob. > chi2
294.13	0 0.2857

Breusch-Pagan Lagrange Multiplier (LM) Test

The results indicate that the variance across entities is not zero, as the probability is smaller than 0.05. The alternative hypothesis was accepted, which suggests that the panel data analysis is appropriate for this model.

Tables (8): LM Test Results

NPL Model	
chibar2(01)	**Prob. > chibar2**
103.48	0.000***

Hausman Test

The results are summarized in Table (9):

Table (9): Hausman Test Result

NPL Model	
chi2(9)	**Prob. >chi2**
0.63	0.9999

The results indicate that the Random Effect Model is appropriate for the model, the null hypothesis was accepted, and the alternative was rejected.

Results of Data Analysis

The Table below (10) presents the analysis of the model. Using a random effect model.

Table (10): Test of Regressions

Independent Variables	Coef.	P>|z|
ROA	-0.011	0.002***
ROE	0.000	0.55
LTD	0.022	0.018**
RIR	0.003	0.008***
UR	-0.007	0.148
INF.R	0.003	0.014**
GFC	0.041	0.059*
Log Size	-0.079	0.028**
GDP	-1.013	0.012**
Cons.	4.881	0.001***
R2	24.21%	
Sig	0.000	
F	75.58	

***Significant at 1%

**Significant at 5%

* Significant at 10%

Table (10) suggests that the panel data analysis is better than the pooled data analysis for estimating macro and micro determinants with R2= 24.21%; in addition, the F-value is (75.58) and Sig value of (0.000), which indicates the acceptance of the statistical model**.**

Also, Table (10) shows a negative significant impact of ROA on NPL where the value of (t = -3.15, Sig = 0.002) is at the 1% level. This result indicates that when the ROA increases, the NPL decreases. Furthermore, the sub-hypothesis is accepted, stating, "There is a significant impact of ROA on NPLS in the Jordanian Banks Sector." This current research provides the same result as previous studies, e.g., Dimitrios et al. (2016), Messi (2014), Wood and Skinner (2018), and Beaton et al. (2016). However, it contradicted the results of other studies conducted by Ahmad and Bashir (2013a), who indicated that ROA has a significant but positive impact on NPLs, and Kumar and Kishore (2019), who argued that ROA has a negative effect on NPLs, but the variable is not significant.

According to Wood and Skinner (2018) and Dimitrios et al. (2016), this result can be explained by the fact that good asset management leads to a high level of performance, prevents risker activity, and lowers NPLs. Moreover, according to Beaton et al. (2016), higher profitability measured by ROA decreases the ratio of NPLs.

Results also indicate that ROE has no significant impact on NPL where the value of (t = 0.60, Sig = 0.550) is at the 5% level. This result indicates the rejection of the sub-hypothesis, which states, "There is a significant impact of ROE on NPLS in the Jordanian Banks Sector." This result contracted with most of the studies in the literature of developed and developing countries, which found ROE's negative and significant impact on NPLs**.** However, it agrees with Ahmad and Bashir (2013a), who found that ROE is insignificant but negatively impacts the NPLs.

Moreover, the loan significantly impacts the total deposit on NPL, where the value of (t = 2.39, Sig = 0.018) is at the 5% level. This result indicates that the NPL will increase when the loan to total deposit increases. Furthermore, acceptance of the sub-hypothesis, which states, "There is a significant impact of loan to total deposit on NPLs in Jordanian Banks Sector." This result is consistent with Wood and Skinner (2018) and Ahmad and Bashir (2013a), who provided a reasonable explanation for this result in that increasing in loans compared to deposits indicates that the banks are granting excessive loans and such behaviors result in lending loans to low-quality borrowers with the expectation that borrowers will not repay these loans in the future which in return causing an increase in the level of NPLs.

There is a positive significant impact of real interest rate on NPL, where the value of (t = 2.67, Sig = 0.008) at the 1% level. This result indicates that the NPL will increase when the real interest rate increases. Furthermore, the sub-hypothesis is accepted, which states, "There is a significant impact of real interest rate on NPL$_S$ in Jordanian Banks Sector." This result aligns with Messai and Jouini's (2013) study and disagrees with Ahmad and Bashir's (2013b) analysis. This result can be interpreted according to Messai and Jouini (2013) that when the real interest rate increases, this will, in return, affect banks with floating rates, and the ability of borrowers to repay the loans will decrease, so the level of NPLs, in general, will increase.

The unemployment rate has no significant impact on NPL, where the value of (t = -1.45, Sig = 0.148) is at the 5% level. This result rejects the sub-hypothesis, which states, "There is a significant impact of unemployment rate on NPL$_S$ in Jordanian Banks Sector." This result is consistent with several studies found in the literature, e.g., Kumar and Kishore (2019); Ouhibi and Hammami (2015) and inconsistent with others e.g. Salvi (Bussoli); Conca and Gigante (2018); Plahuta (2017); Dimitrios et al. (2016), Chosh (2015); Messai and Jouini (2013); Sharica (2014); Klein (2013); Park (2010); Beaton et al. (2016); and Ahmad and Bashir (2013b).

According to Kumar and Kishore (2019), the working class in UAE is primarily foreigners, and if they lose their jobs, they will leave the country. However, this result may be explained differently in Jordan

since the country's working class comprises Jordanians. In Jordan, when banks grant loans, they assess the creditworthiness of potential borrowers. This system evaluates five critical characteristics of the borrowers and the loan conditions to gauge the likelihood of default and the risk of financial loss for the lender. These five C's include character, capacity, capital, collateral, and conditions, and this action led to a lower level of NPLs.

The inflation rate significantly impacts NPL, where the value of (t = 2.47, Sig = 0.014) is 5%. This result indicates that the NPL will increase when the inflation rate increases. Furthermore, the sub-hypothesis is accepted, which states, "There is a significant impact of inflation rate on NPL_S in Jordanian Banks Sector." This result is contradicted by many studies, e.g., Kumar and Kishore (2019); Zainol et al. (2018) who argued that the inflation rate has an insignificant impact on NPLs, and Wood and Skinner (2018); Rajha (2017); Ahmad and Bashir (2013b) who argued that Inflation rate significantly impact NPLs but in a negative way.

According to Nkusu (2011), a high inflation rate reduces borrowers' real incomes, weakening their capacity to meet their obligations. This means that the level of NPLs will increase.

The global financial crisis has significantly impacted NPL, where the value of (t = 1.89, Sig = 0.059) is 10%. This result indicates that the NPL will increase when the global financial crisis increases. Acceptance of the sub-hypothesis is "There is a significant impact of the global financial crisis on NPLS in the Jordanian Banks Sector." This result is in harmony with Beaton, Myrovoda, Thompson (2016), and Rajha (2017). The Global Financial Crisis led to a rollback in the economy, where borrowers cannot repay their loans, and the level of NPLs will increase.

There is a negative significant impact of bank size on NPL, where the value of (t = -2.20, Sig = 0.028) is at the 5% level. This result indicates that the NPL will decrease when the bank size increases. Furthermore, the sub-hypothesis is accepted, which states, "There is a significant impact of bank size on NPLS in the Jordanian Banks Sector." The result of this research is in harmony with Salvi et al. (2018), who studied the relationship between bank size and NPLs and found that bank size has a significant relationship in that it negatively impacts NPLs. On the other hand, the results of this current research disagree with Plahuta (2017) and Chosh (2015), who found that this relationship is significant and positively impacts NPLs. Other studies, e.g., Rajha (2017), found this relationship insignificant but positively affected the NPLs ratio.

The results of this study agree with the diversification hypothesis, i.e., there is a negative impact between bank size and NPLs. In other words, the bigger the bank's size, the more diversification opportunities exist, reducing the level of NPLs (Salas & Surarina, 2006).

There is a negative significant impact of GDP on NPL where the value of (t = -2.51, Sig = 0.012) is at the 5% level. This result indicates that when the GDP increases, the NPL decreases. Furthermore, the sub-hypothesis is accepted, which states, "There is a significant impact of GDP on NPLS in the Jordanian Banks Sector." This result is in harmony with several researchers, e.g., Zainol et al. (2018); Salvi et al. (2018); Dimitrios et al. (2016); Chosh (2015); Skaria (2014); Messai and Jouini (2013); Wood and Skinner (2018); Rajha (2017) and disagree with Kumar and Kishore (2019) who argued that the impact of GDP on NPLs is insignificant and the study of (Plahuta, 2017) who indicated that the impact is significant but the effect is positive.

It should be noted that the rate of GDP in any country radically affects the level of NPLs (Wood & Skinner, 2018). If the economy in any country flourishes, household income flow will increase, and then the borrowers can repay their loans. Therefore, the level of NPLs in commercial banks will reduce effectively.

Testing Hypotheses

Table (11): Summarize of Testing Hypotheses

No.	Statement	Regression findings	Expected sig
$H_{.1-1}$	There is a significant impact of ROA on NPLS in the Jordanian bank sector	Accepted	Effect
$H_{.1-2}$	There is a significant impact of ROE on NPLS in the Jordanian bank sector	Rejected	No Effect
$H_{.1-3}$	There is a significant impact of loan to total deposit on NPLS in the Jordanian Banks Sector	Accepted	Effect
$H_{.1-4}$	There is a significant impact of real interest rates on NPLS in the Jordanian bank sector	Accepted	Effect
$H_{.1-5}$	There is a significant impact of the unemployment rate on NPLS in the Jordanian bank sector	Rejected	No Effect
$H_{.1-6}$	There is a significant impact of the inflation rate on NPLS in the Jordanian bank sector	Accepted	Effect
$H_{.1-7}$	There is a significant impact of the global financial crisis on NPLS in the Jordanian bank sector	Accepted	Effect
$H_{.1-8}$	There is a significant impact of bank size on NPLS in the Jordanian bank sector	Accepted	Effect
$H_{.1-9}$	There is a significant impact of GDP on NPLS in the Jordanian bank sector	Accepted	Effect

Recommendations

Based on the findings of this research, several recommendations for bank management, policymakers, and other researchers in the field can be given as follows. First, Jordanian commercials should carefully consider several factors when providing loans to minimize the size of NPLs. Second, Jordanian banks should implement effective strategies to strengthen their loan portfolios and mitigate credit risk, ensuring financial stability. Third, given that loans are likely to be higher during a drop or reduction in the economy, Jordanian banks should consider the real economy's performance when extending loans. Additionally, banks in Jordan should limit their loan portfolio by reducing credit extensions to higher-risk customers. Fourth, when assessing the stability and soundness of the banking system, the Central Bank of Jordan should expand its monitoring framework to include other efficient macroeconomic variables such as GDP and inflation rate. Finally, based on the findings of this research and previous studies in the literature, none specifically examine the interactions and relationships between non-performing loans and different types of borrowers, such as individuals, small and medium enterprises, and corporate borrowers. Therefore, further investigations are needed in this scope for future research.

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