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Determinants of Banks' Credit Risk: Evidence from Jordanian Banks Listed on Amman Stock Exchange

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Abstract

This paper aims to identify the determinants of credit risk in Jordanian banks. The sample consist of all banks listed on Amman Stock Exchange (ASE); which include 13 conventional banks and 2 Islamic banks, with the data covering the period from 2012 - 2019. Credit risk is represented by the percentage of non-performing loans over total loans given by the bank. Both bank-specific variables and macroeconomic variables that are likely to influence credit risk are examined. Based on the multiple regression analysis, the results indicate that the level of credit risk faced by Jordanian banks is negatively related to each of the banks' profitability, interest income earned by the bank, the size of the bank, and the type of the bank. The results also show that there is a significant positive relationship between the banks' loans quality and the unemployment rate in Jordan with the level of credit risk. The results, however, indicate that there is no a significant relationship between liquidity, inflation, and gross domestic products with credit risk faced by Jordanian banks.

Keywords: Credit risk, Banks, Bank specific factors, Macroeconomic factors, Jordan

1. Introduction

Banks are exposed to different types of risk including liquidity risk, market risk, operational risk, credit risk, interest rate risk, and other types of risks. Credit risk is the most obvious one in terms of potential losses as it relates to their core activity. In simple words, credit risk is defined as the potential that borrowers or counterparties will fail to meet their obligations in accordance with the

agreed terms (Basel Committee, 1999). Banks' credit risk is triggered by loans given, acceptances, interbank transactions, trade finance, foreign exchange transactions, financial futures, swaps, bonds, stocks, options and extended commitments and guarantees, as well as settlement of transactions (Huan et al., 2020).

It is essential for banks to be able to evaluate and manage credit risk. Credit losses can have severe consequences for banks that fail to effectively identify and manage their exposure to credit risk. Because most of a bank's income comes from financing activities, the ability of the bank to evaluate and monitor credit risk is necessary for its survival (Al Zaidanin and Al Zaidanin, 2021). In addition, banks can enhance their profitability and the stability of their businesses by reducing their credit losses through the effective management of credit risk.

An overexposure to credit risk can have serious consequences for the bank and the economy as a whole. Since a great portion of banks' assets represent loans given to customers, customers default could lead to banks' failure. In fact, credit risk was the major cause for the failure of many banks during the financial crisis of 2008. As some studies indicate (e.g., Gropp et al., 2010), excessive credit expansion, poor lending quality and improper credit risk management are the main reasons for the financial crisis of 2008.

Knowledge of the determinant of credit risk is, however, essential for an effective management of credit risk. Therefore, the objective of this paper is to identify factors that may be associated with credit risk in Jordanian banks. We examine bank bank-specific factors, as well as, macroeconomic factors that may affect credit risk in Jordanian banks. Bank specific variables are profitability, measured by the banks' return on assets ratio; liquidity, measured by the quick ratio; loans quality, measured as the banks' loan loss provision ratio; interest income earned by the bank, measured as the ratio of interest income to total loans; the size of the bank; and the type of the bank, which refers to whether the bank is a conventional bank or an Islamic bank. Finally, macroeconomic factors include gross domestic product, inflation, and unemployment.

Although several studies have investigated the relationship between these factors and credit risk, our research is motivated by the conflicting results found in these studies. For example, Maharmah and Saadeh (2015) suggest a negative relationship between liquidity and credit risk in Jordanian banks, whereas Kharabsheh (2019) results indicate that credit risk is not significantly related to liquidity in Jordanian banks. Also Kasana and Naveed (2016) and Kharabsheh (2019) found that the size of the bank has a significant negative impact on the level of credit risk in the commercial banks of Pakistan and Jordan, respectively, while Al-Abedallat and AL- Shubiri (2013) suggests that there is no significant influence for the size of the bank on credit risk in Jordan.

Our sample consists of 15 banks listed on Amman Stock Exchange (ASE), two of which are Islamic banks. Islamic banking is considered as an alternative to conventional banking. It focuses on profit/loss and risk sharing rather than interest based deposit/lending followed in conventional banking. Credit operations in Islamic banks are different from that in conventional banks due to the Islamic Sharia requirements which prohibit interests. *Murabaha, salam* and *istisna* are Islamic financing contracts which generate debts in the books of the Islamic bank similar to loans in conventional banks. Risk management in Islamic banks poses tough challenges today because of their unique characteristics arising from the composition of their assets and liabilities, and their obligations to meet shariah principles under which they operate. By operating side by side with conventional banks, Islamic banks are not spared, and are equally vulnerable to credit risks. Both market risk and credit risk in Islamic banks are strongly bundled together at different stages of the contract (Tajuddin et al., 2009). Thus, we include the type of the bank in our analysis to examine whether Islamic banks exhibit different level of credit risk than conventional banks.

The current study adds to existing research that examines the determinants of credit risk in the banking industry. It is expected to confirm, and identify further, determinants of credit risk in Jordanian banks. It also provides evidence on the association between Islamic banking and the level of credit risk exposure. Thus, the results of this study may be of interest for banks as they will contribute to better understanding of the determinants of credit risk, and help them implement

better risk management procedures. In addition, by understanding the determinant of credit risks faced by banks, regulators will be able to set proper regulations to ensure the stability of the economy.

This paper is organized as follows. The next section reviews prior research on the determinants of credit risk. We describe the method used to conduct this research in section 3. Then, section 4 presents the main results. Finally, section 5 concludes, identifies some research limitations, and provides suggestions for future research.

2. Literature Review

Credit risk is defined as the potential loss of all or part of the original loan, the interest owed, or both together (Ramadan et al., 2011). Several studies have examined the determinants of banks' credit risk in different countries. Bank specific factors as well as macroeconomic factors are examined in these studies.

Al-Abedallat and AL- Shubiri (2013) indicate that the credit risk of Jordanian banks is significantly affected by management efficiency, loan loss provision, leverage, and loan to deposit ratio, while no significant influence of the growth rate and the size of the bank on credit risk. Likewise, using a sample of 14 commercial banks listed on Amman Stock Exchange during the period 2006 - 2010, Maharmah and Saadeh (2015) examine several determinants of credit risk. The study shows that credit risk, measured as the ratio of non-performing loans to total loans, is negatively related to management efficiency, loan-loss provision, funding cost, and liquidity. The results also indicate that there is a positive relationship between leverage and the ratio of non-performing loans. In addition, Rajha (2016) indicates that lagged non-performing loans and the loans to total assets ratio have the greatest effect on credit risk of Jordanian banks during the period 2008-2012. The study also shows that the size of the bank is not related to credit risk. Thus, large banks are not necessarily more efficient in screening customers than small banks. The study, however, indicates that the economic growth and the inflation rate are positively related to credit risk. Furthermore, Al-Abedallat (2016) indicates that credit risk is negatively related to the efficiency of the individuals in the bank's credit facilities department, the central bank instructions, and the credit policy of Jordanian commercial banks.

Kharabsheh (2019) investigates both macro-economic and firm-specific credit risk determinants in Jordanian banks for the period 2000-2017. The results suggest that credit risk is positively related to the following factors: the bank capital ratio, operational inefficiency, the growth rate in credit, unemployment rate, and the effect of the 2008 financial crises. However, contrary to Rajha (2016), the results indicate that credit risk is negatively related to the size of the bank. It is also negatively related to the bank profitability. Yet, no effect was documented for the bank liquidity on credit risk.

Garr (2013) examines credit risk determinants in Ghana. The results show that credit risk has a negative relationship with government borrowing and the level of the financial sector development, while it has a positive relationship with management inefficiency and GDP in Ghana. In addition, Makri and Papadatos (2014) examine the determinants of credit risk, measured as the aggregate loan loss provisions in the Greek's banks. The results indicate that loan loss provision is positively related to the unemployment rate, public debt, and previous quarter loan loss provisions. Credit risk in this study was also found to be negatively related to the capital adequacy ratio. In Ethiopia and using a panel data set for the period 2006 - 2012, Asfaw and Veni (2015) shows that that the credit risk of the large Ethiopian private commercial banks is negatively related to the credit growth rate and the return on equity ratio.

Examining the determinants of credit risk in Vietnamese commercial banks, Duong and Huong (2017) show that the size of the bank and its market share are negatively related to the level of credit risk faced by the bank. They refer this to the adverse effect on the readiness to accept risk in business activities. A negative relationship was also found for GDP growth with credit risks. The study further shows that future credit risk is positively related to the rapid expansion of credit, the ineffective use

of capital, and the ineffective credit controls and management. No effect, however, was found for the effectiveness of the general management and the real lending interest rates on credit risk in the Vietnamese banks.

Riyazahmed and Baranwal (2021) study the relationship between credit risk and managerial effectiveness in Indian public and private banks. They use return on assets as a proxy for managerial effectiveness, and gross non-performing loans to total advances as a measure for credit risk. Their analysis shows that there is a negative relationship between managerial effectiveness and credit risk. In Kosovo, Morina (2020) examines the determinants of credit risk in Kosovo commercial banks for the period 2012 - 2018 on a quarterly basis. Using non-performing loans as a measure for credit risk, the results show that credit risk is mostly influenced by the interest rates on loans and the profitability of banks as measured by the return on assets ratio. Kasana and Naveed (2016) also examine macro-economic and firm-specific determinants of credit risk in Pakistani banks. The results indicate that credit risk has a significant positive relationship with the bank's capital adequacy ratio and the loan loss provision. It also has a positive relationship with operational inefficiency, growth in GDP, and growth in advances. Furthermore, credit risk has been found to be negatively and significantly related to the bank's return on asset ratio and the size of the commercial banks of Pakistan.

Despite numerous literatures on the determinants of banks' credit risk, limited number of studies has examined the determinants of credit risk in Islamic banks. Using website data covering 25 banks over the period 2006 - 2010, Al-Wesabi and Ahmad (2013) examined factors affecting credit risk of Islamic banks in the Gulf Cooperation Council countries. They find that credit risk has a significant negative relationship with the bank's net income. The study also shows that credit risk is influenced by other bank-specific variables such as leverage and liquidity. Inflation and interest rates have been found to be irrelevant factors for credit risk determination.

Likewise, Tajuddin et al. (2009) examine determinants of credit risk in Malaysian Islamic banks for the period 1999 - 2007. The study revealed that the ratio of total financing to total assets is significantly and positively related to credit risk in Malaysian Islamic banks, while the size of the bank is negatively related to credit risk. Waemustafa and Sukri (2015) also analyze macroeconomic and bank-specific determinants of credit risk in Malaysian Islamic and conventional banks over the period 2000 - 2010. The study shows that credit risk in Islamic banks is significantly influenced by bank-specific factors such as risky sector financing, regulatory capital, and Islamic contracts, while the credit risk in the conventional banks is significantly related to factors such as loan loss provision, debt-to-total asset ratio, regulatory capital, bank size, earning management, and liquidity. In addition, Inflation is significant to credit risk for both Islamic and Conventional banks.

Misman et al. (2015) further investigate the determinants of credit risk in the Islamic banks of Malaysia. The results indicate that credit risk has a negative and significant relationship with both the financing quality and the bank's capital adequacy ratio. When ownership structure is introduced to the analysis, the results show that credit risk is differently influenced by local and foreign ownership composition of Islamic banks. Foreign ownership is associated with lower credit risk than local ownership.

Farika et al. (2018) examine the effect of macro-economic factors and bank-specific factors on credit/financing risk in Indonesian banks. For macro-economic factors, Bank Indonesia Certificates/Sharia and money supply has the greatest influence on credit risk, while for bank-specific factors, the loan to deposit ratio has the greatest effect. However, for financing risk, the greatest effect was for Bank Indonesia Certificates Sharia as a macro-economic factor and the operational efficiency ratio as a bank-specific factor. Also in Indonesia, Imaduddin (2008) analyzes the determinants of Islamic banking credit default compared with conventional banking. Credit risk in this study was measured as the ratio of non-performing financing in Islamic banks, and as non-performing loan in conventional bank. The findings indicates that credit risk in Islamic banking is significantly related to total asset, amount of third party funds, two-month lagged non-performing financing, one-month lagged total financing, and GDP growth rate. Meanwhile, the results indicate

that total asset, three-month lagged non-performing loan, two and three-month lagged total loans, inter-bank money market, and GDP growth rate, significantly influence the ratio of non-performing financing in conventional banking.

3. Methodology

3.1 Sample Selection

Our sample consists of all banks listed on Amman Stock Exchange during the period 2012-2019 that have all the required data for the analysis. It includes 15 banks; 13 of them are conventional banks, and 2 are Islamic banks. Thus, the sample includes 120 bank-year observations. The data required for the analysis is collected from the banks' annual reports, the Securities Depository Center website, and Amman Stock Exchange website.

3.2 Variables

3.2.1 The Dependent Variable

3.2.1.1 Credit Risk

Following Alzoubi and Obeidat (2020), Waqas et al. (2017), Ben Ameur (2016), Kasana and Naveed (2016), Al-Abedallat and AL- Shubiri (2013), and Ahmad and Ahmad (2004), we measure credit risk by the ratio of non-performing loans to total loans for conventional banks, and as the ratio of non-performing financing to total financing for Islamic banks. Non-performing loans (or non-performing financing in Islamic banking) are loans that appear in the bank's statement of financial position but ceased to produce the return contracted on with the client (De Backer et al., 2015). Total loans in conventional banks are determined as the Direct Credit Facilities in the bank's balance sheet, while total financing in Islamic banks is measures as the sum of Finance Investment Assets, Qard Hassan Loan, and deferred sales receivables and other receivables.

3.3 Independent variables

3.3.1 Bank-Specific Variables

3.3.1.1 Profitability

We measure the profitability of the bank by the return on assets ratio, which captures the overall effectiveness of the management in generating profits with its available assets (Wiyono and Rahmayuni, 2012). Return on assets is calculated by dividing net income on total assets. A bank's non-performing loans negatively affect its profitability. Thus, a negative sign is expected on this variable.

3.3.1.2 Liquidity

Liquidity is an indication of the bank's ability to meet its short-term obligations. We measure liquidity as the ratio of liquid assets to total deposits and short-term funding (Chamberlain, et al., 2020). The relationship between liquidity and credit risk is expected to be positive (Chamberlain, et al., 2020), that is, excess liquidity may encourage the bank risk-taking (Altunbas et al. 2010) which, as a result, may increase credit risk.

3.3.1.3 Loans quality

We measure the quality of the loans given by the bank by the loan loss provision ratio calculated by dividing total loan loss provision on total loans given (Zheng et al., 2019; Kasana and Naveed, 2016; and Al-Abedallat and AL- Shubiri, 2013). Higher loan loss provision ratio suggests bad loan quality. We include it in our analysis following Zheng et al. (2019), Kasana and Naveed (2016), and Al-Abedallat and AL- Shubiri (2013).

3.3.1.4 Interest Income

Interest income is measured as the ratio of interest income charged by the bank on their lending over total loans. Higher interest income charged by the bank is expected to be associated with higher non-performing loans and, thus, higher credit risk (Jabir et al. 2020).

3.3.1.5 Bank Size

Bank size has been examined as a determinant of credit risk by Mukhtarov et al. (2018), Waqas et al. (2017), Kasana and Naveed (2016), Rajha (2016), Al-Wesabi and Ahmad (2013), Al-Abedallat and AL-Shubiri (2013), and Zribi and Boujelbène (2011). It is tempting to think that large banks are associated with lower credit risk as they have more capabilities to hold more diversifiable portfolios. They may also have better risk management strategies that can turn into more superior loan portfolios. Therefore, an increase in the size of the bank is expected to counter the level of risk faced by the bank (Mukhtarov et al., 2018). On the other hand, Waqas et al. (2017) show that size is not significantly related to credit risk. They suggest that size cannot fully capture diversification and may induce the bank to further risk-taking behavior. However, in this study, we measure the bank size as the natural logarithm of total assets, and expect it to be negatively related to credit risk.

3.3.1.6 Bank Type

We use this variable to indicate whether the bank is a conventional bank or an Islamic bank. This variable is given 1 if the bank is an Islamic bank or 0 otherwise. The main difference between conventional banks and Islamic banks is that Islamic banks promote profit-loss sharing because of the prohibition of interest (Riba) based on the Islamic Sharia principles, rather than the interest-bearing loans in conventional banks. Despite that, both Islamic and conventional banking systems still have some shared principles.

3.3.2 Macroeconomic Variables

3.3.2.1 Inflation

Inflation refers to the speed at which the general level of prices of goods and services is on the rise in a country. This variable is determined by the inflation rate measured as the Consumer Price Index (CPI) on an annual basis. The inflation rate has been widely examined in the literature as a determinant of credit risk (e.g., Madbouly, 2020; Mukhtarov et al., 2018; Waqas et al., 2017; Makri and Papadatos, 2014; Al-Wesabi and Ahmad, 2013; Zribi and Boujelbène, 2011). It is expected that as the inflation rate increases, credit risk will increase.

3.3.2.2 Gross Domestic Product

Gross Domestic Product is an indicator of the economic conditions of the area in which the profession is exercised (Kani, 2017). An increase in GDP usually leads to greater flow of household

income and a rise in profitability (Messai and Jouini, 2013) which improves the debt servicing capacity of borrowers, and results in lower credit risk for banks (Madbouly, 2020; Mukhtarov et al., 2018; Waqas et al., 2017; Kasana and Naveed, 2016; Zribi and Boujelbène, 2011; Makri and Papadatos, 2014; Al-Abedallat and AL- Shubiri, 2013; Imaduddin, 2008). Thus, a negative relationship is expected between GDP and credit risk.

3.3.2.3 Unemployment

Unemployment refers to the unemployed, ready for work, individuals in a country as a percentage of the total labor force in that country. Unemployment rate is examined as a determinant of credit risk following Mukhtarov et al. (2018), Waqas et al. (2017), Makri and Papadatos (2014), and Messai and Jouini (2013). A higher unemployment rate is expected to increase the probability of borrowers having trouble repaying their loans. The relationship between unemployment and the credit risk is expected to be positive (De Backer et al., 2015).

3.4 Empirical Model

To examine the association between credit risk and each of the previous independent variables, the following regression model has been developed:

$$CR_{i,t} = \beta_0 + \beta_1 ROA_{i,t} + \beta_2 Liq_{i,t} + \beta_3 LLP_{i,t} + \beta_4 IIR_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 Type_i$$
$$+ \beta_7 INF_t + \beta_8 GDP_t + \beta_9 l$$

Where:

$CR_{i,t}$:	Credit risk ratio for bank i in year t
$ROA_{i,t}$:	Return on assets ratio for bank i in year t
$Liq_{i,t}$:	Liquidity of bank i in year t
$LLP_{i,t}$:	Loan loss provisions ratio for bank i in year t
$IIR_{i,t}$:	Interest income ratio for bank i in year t
$SIZE_{i,t}$:	Size of bank i in year t
$Type_i$:	Type of bank i whether conventional or Islamic
INF_t:	Inflation rate in year t
GDP_t:	Gross domestic product in year t
UN_t:	Unemployment rate in year t
ε:	Error term

4. Empirical Analysis

4.1 Descriptive Statistics

Table 1 presents descriptive statistics for the variables included in the analysis. For the dependent variable (CR), the mean credit risk for the sample banks was 0.072 and the standard deviation was 0.035. This indicates that, on average, 7.2% of total loans given by the banks are non-performing loans. The minimum value for this variable was 1.5% and the maximum value was 17.9%.

Regarding the independent variables, as table 1 shows, the mean return on assets (ROA) was 1.144. This indicates that the banks included in the sample earned an annual return of 114.4% of their total assets. The minimum return earned by individual banks was 5.4% and the maximum return was 204.5%. As for the liquidity ratio, *Liq*, as the table shows, on average 28.6% of the bank's total assets during the study period was liquid assets. The liquidity ratio for the sample banks ranged from 12% to 50%. In terms of *LLP*, the mean value for the loan loss provision was 0.049 which mean that 4.9% of

total loans given by the banks are expected uncollectible. Regarding *IIR*, the average annual interest rate charged by the banks on their lending was 12.4%. Table 1 also shows that the average bank size, measured as the logarithm of total assets, was 9.369 with a 0.383 standard deviation, and that Islamic banks constitute only 13% of the total sample size.

Regarding the macroeconomic factors, the average inflation rate, *INF*, during the study period was 2.47%, and the average annual gross domestic product, *GDP*, was 2.372, while unemployment rate, *UN*, averaged 15.1%.

Table 1: Descriptive Statistics

Variable	Mean	S.Dev	Min	Max
CR	0.072	0.035	0.015	0.179
ROA	1.144	0.468	0.054	2.045
Liq	0.286	0.077	0.120	0.500
LLP	0.049	0.026	0.012	0.161
IIR	0.124	0.049	0.087	0.309
SIZE	9.369	0.383	8.677	10.420
Type	0.13	0.343	0	1
INF	0.0247	0.024	-0.009	0.055
GDP	2.372	0.420	1.900	3.100
UN	0.151	0.029	0.119	0.191

5. Results and Discussions

To examine the association between credit risk and each of the independent variables, the data has been analyzed using the multiple regression technique. A summary of the results is presented in table 2. The Variance Inflation Factor (VIF) in the last column of the table indicates that there is no multicollinearity problem in the regression model. The VIF for all variables is less than 10 which suggests that multicollinearity does not exist in our independent variables (Gujarati, 2003). In addition, the F-statistic, which statistically significant at the 1% level (p = 000), confirm the validity of the regression model for the analysis. Finally, the R-square value indicates that the independent variables examined collectively explain 82.1% of the variation in the dependent variable; credit risk.

Table 2: Results of Ordinary Least Square (OLS)

Variables	Coefficient	t	p-value	Tolerance	VIF
ROA	-0.012	-3.608**	0.000	.822	1.216
Liq	-0.26	-1.128	0.262	.637	1.570
LLP	1.166	15.427**	0.000	.530	1.885
IIR	-0.114	-2.023*	0.046	.270	3.710
SIZE	-0.016	-2.950**	0.004	.444	2.251
Type	-0.016	-2.016*	0.046	.288	3.474
INF	0.088	1.137	0.258	.608	1.645
GDP	-0.006	-0.655	0.514	.160	6.240
UN	0.273	2.301*	0.023	.171	5.844

F: 55.702; Sig. = 000; R² = 0.821; Adjusted R² = 0.807; * The result is significant at 0.05 level (p ≤ 0.05); ** The result is significant at 0.01 level (p ≤ 0.01)

The results regarding the relationship between credit risk and the bank-specific variables indicate that profitability, loans quality, interest income, bank size, and bank type, are associated with the level of credit risk faced by banks. With respect to profitability, the estimated coefficient on *ROA* is negative and statistically significant at a 1% level of significance (p = 0.000), which indicates that banks with higher *ROA* (profitability) are exposed to lower credit risk, which is consistent with the findings in Goswami (2021), Kharabsheh (2019), Zheng et al. (2018), and Ghosh (2015). Because high ROA is associated with an efficient management, it may also indicate a good risk management strategy, such as cautious lending and careful screening and monitoring of borrowers, which, as a result, reduces credit risk.

The coefficient on *Liq* is not statistically significant. This suggests that the liquidity of Jordanian banks had no effect on their exposure to credit risk. This result is consistent with Kharabsheh (2019) who find that the coefficients of liquidity variable under the three estimation methods used were insignificant.

The coefficient on *LLP* is positive and statistically significant at the 1% level, which is consistent with Omobolade et al. (2020), Serwadda (2018), Sohaib & Qazi (2016), and Gizaw et al. (2015). Since *LLP* measures the quality of loans given by the bank, an increase in *LLP* indicates an increase in bad debts, or alternatively, a decrease in loan quality. As a result, a decrease in loan quality will lead to an increase in credit risk.

The coefficient on *IIR* is negative and statistically significant at the 5% level. This means that credit risk decreases as interest income charged by the bank increases. This result contradicts our prediction that higher interest will lead to higher default rate. However, this result can be attributed to a good credit assessment of customers that resulted in a reduction in the default rate. Our result is, however, consistent with Poudel, (2018) and Mukhtarov et al. (2018), but is inconsistent with Jabir et al. (2020).

The coefficient on *SIZE* is negative and statistically significant at the 5% level. Although this result is not consistent with the findings in Rajha (2016) and Khemraj and Pasha (2009), it is consistent with the findings in Kharabsheh (2019) and Tehulu & Olana (2014). A possible explanation for this result is that, compared with smaller banks, large banks can be more effective in sifting customers. That is, larger banks may have greater ability to manage risk than small banks which result in lower credit risk.

The coefficient on *Type* is negative and statistically significant at the 5% level, which means that Islamic banks are associated with less credit risk than conventional banks. This result may be attributed to the nature of the banking system in Islamic banks which is based on sharing profits and losses between the bank and the client. Our finding is consistent with Akram and Rahman (2018) and Abdel Megeid (2017). Our result, however, is inconsistent with Farika et al. (2018) and Imaduddin (2008) who find that Islamic banks are less stable in managing credit risk than conventional banks.

Regarding the macroeconomic variables, the results indicate that there is a positive relationship between unemployment and credit risk; the coefficient on *UN* is positive and statistically significant at the 5% level. This can be explained in that, as the *UN* increases, the borrowers' ability to repay their debt will decrease because of insufficient income for disposable. This result is consistent with the findings of Kharabsheh (2019) and Waqas et al. (2017). Regarding to both inflation and gross domestic products, our findings suggest that these two variables are not significantly related to credit risk in Jordanian banks. These results are consistent with the findings of Kharabsheh (2019) who showed that there was insignificant relationship between gross domestic products and inflation with credit risk. Our results are inconsistent with Goswami (2021), Chaibi and Ftiti (2015), Makri et al. (2014), and Khemraj and Pasha (2009) who indicate that there is a lower probability of credit risk in period of inflation due to the adjustments made by central bank in policy rate in their attempts to control inflation that result in a reduction of real value of outstanding loans which make it easier for the borrowers to serve their debts. Our result is also inconsistent with Alhassan et al. (2014), Klein (2013), and Baboucek and Jancar (2005) who find that as inflation increases, credit risk increases, which is explained in that, an increase in inflation rate will reduce the borrowers real income which

increases the risk of default of loans and thus reduce the debt serving capacity.

In relation to gross domestic products, our result differs from Yap (2018) who finds a significant and negative relationship between GDP and credit risk, which means that as GDP increase, the credit risk faced by the bank will decrease. Our results also differ from Omobolade et al. (2020) and Alexandri and Santoso (2015) who indicate that there is a positive and significant relationship between GDP and credit risk.

6. Conclusion, Limitations and Recommendations

This study aimed to determine the factors that affect credit risk in Jordanian banks (both conventional and Islamic) listed on Amman Stock Exchange. Using banks' specific data and macroeconomic data for the period 2012-2019, the results indicate that a significant negative relationship between each of the banks' return on assets ratio, interest income ratio, size, and type with the level of credit risk faced by Jordanian banks. The results also show that there is a significant positive relationship between the banks' loan loss provisions and the unemployment rate in Jordan with the level of credit risk. However, the results suggest that there is no significant relationship between liquidity, inflation, and gross domestic products with credit risk.

Our results have implications for both regulators and banks. By understanding the determinant of credit risks faced by banks, regulators will be able to set proper regulations to ensure the stability of the economy. Also the results of this study may be of interest for banks as they will contribute to better understanding of the determinants of credit risk and help them implement better risk management procedures. Of particular importance is the result regrading loan loss provision which has been used as a proxy for loan quality (*i.e.*, high loan loss provision indicates bad loans quality). As expected, the results indicate that credit risk is positively related to loan loss provision, and therefore, it is negatively related to loans quality. Thus, by implementing a good risk management strategy, such as cautious lending and careful screening and monitoring of borrowers, banks are able to reduce credit risk. This can be achieved by requiring borrowers to have guarantees, the value of which is equal or exceed the value of their loans. Finally, our results suggest that being an Islamic bank is negatively associated with credit risk than conventional banks; therefore, conventional banks are encouraged to implement credit policies consistent with that applied in Islamic banks in order to reduce their exposure to credit risk.

This study is limited in one aspect related to the unavailability of data for some banks listed on ASE, and therefore, excluded from the sample. For example, there are four Islamic banks in Jordan, but only two of them have the required data. Accordingly, it was inappropriate to make a comparative analysis between the credit risk determinants in conventional versus Islamic banks.

This study recommends the following for future research. First, future research can be conducted after obtaining all the necessary data for all Islamic banks, in order to obtain more accurate and reliable results. Second, other variables can be introduced to the study, which are expected to have an impact on the credit risks in banks in the Jordanian environment. Third, a comparative analysis could be made between Jordanian banks and banks in other countries to determine whether country specific factors affect the level of credit risk faced by banks.

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