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Article

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Cogent Economics & Finance

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Taylor & Francis Group

Suggested Citation: Saleh, Isam; Abu Afifa, Malik (2020) : The effect of credit risk, liquidity risk and bank capital on bank profitability: Evidence from an emerging market, Cogent Economics & Finance, ISSN 2332-2039, Taylor & Francis, Abingdon, Vol. 8, Iss. 1, pp. 1-13, <https://doi.org/10.1080/23322039.2020.1814509>

This Version is available at:

<https://hdl.handle.net/10419/269969>

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To cite this article: Isam Saleh & Malik Abu Afifa | (2020) The effect of credit risk, liquidity risk and bank capital on bank profitability: Evidence from an emerging market, Cogent Economics & Finance, 8:1, 1814509, DOI: [10.1080/23322039.2020.1814509](https://doi.org/10.1080/23322039.2020.1814509)

To link to this article: <https://doi.org/10.1080/23322039.2020.1814509>



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Received: 23 March 2020
Accepted: 20 August 2020

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Reviewing editor:
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FINANCIAL ECONOMICS | RESEARCH ARTICLE

The effect of credit risk, liquidity risk and bank capital on bank profitability: Evidence from an emerging market

Isam Saleh^{1*} and Malik Abu Afifa¹

Abstract: This paper aims to investigate the effect of credit risk, liquidity risk and bank capital on bank profitability over a nine-year period (2010–2018) by examining empirical evidence from an emerging market. This study is grounded on econometric panel data using GMM methods. The results indicate that credit risk, liquidity risk, and bank capital variables have an impact on bank profitability. Understanding the Basel requirements and their importance by local and foreign bank managers is significant as enforcing them can improve the efficiency of the bank and increases profitability while barricading it from risk.

Subjects: Economics; Finance; Business, Management and Accounting

Keywords: credit risk; liquidity risk; bank capital; bank profitability; emerging market

1. Introduction

A truly important role is played by the banking sector in every country's economic development (Batten & Vo, 2019). Investors tend to use upcoming projects and increase consumer confidence, which leads a country to economically grow (Luo et al., 2016). However, very often when these institutions in the banking sector extend credit to investors, no payment is expected on the loan from the borrower(s). This can ultimately put a strain on financial profitability which could lead to the failure of the bank. Hence why, after the financial crisis, risk management in the majority of banks around the world is mostly focused on credit risk (Chou & Buchdadi, 2016; Ezike & Oke, 2013; Lassoued et al., 2016; Leung et al., 2015; Ng & Roychowdhury, 2014).

Moreover, besides guidelines on credit risk, the Basel III framework advises financial organizations to keep and uphold a higher proportion of liquid and capital assets. This could shield them

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PUBLIC INTEREST STATEMENT

In this study, we aim to increase the body of the literature of banking and empirical findings for the post crisis period. This study investigates the effect of credit risk, liquidity risk, and bank capital on bank profitability for the post crisis period. This is shown by the global financial crisis where banks are grand players in the financial sector. Additionally, it provides some empirical evidences from an emerging market. The results offer supplementary perceptions of causality between bank-specific variables (credit risk, liquidity risk and bank capital) and profitability.

from bank ruin since these organizations deal with high costs due to slower economic activities and lower profitability. Additionally, the reason the banks failed in the global financial crisis (2008–09) was inefficient liquidity management. Also, the banks depended heavily on short-term money markets in order to gain and finance asset operations. This is what caused these banks to suffer a shortage of liquidity (Chen et al., 2018; Saunders & Cornett, 2005).

This research paper examines the profitability of commercial banks in Jordan and how it is affected by credit risk, liquidity risk, and higher capital requirements. The majority of financial institutions aim for profitability and profit maximization (Kargi, 2011). This happens when banks earn funds at lower rates and let investors and consumers borrow at a higher profitability rate (Khieu et al., 2012). According to Kargi (2011), banks can increase their profit thus fulfilling their goal by extending large amounts of credit. However, when the loans fail to be collected, profitability will drop. The empirical literature shows that liquidity and profitability are inversely related, that is, when one increases, the other decreases. On the other hand, higher risk yields higher profit and the two are directly proportional to each other; when risk is high, profit is also high (Brunnermeier et al., 2013; Haneef et al., 2012; Pracoyo & Imani, 2018; Ruziqa, 2013; Shen et al., 2009).

As mentioned earlier, this paper also explores the effect of a bank's capital on the profitability of commercial banks in Jordan. Greater capital produced by the bank provides stronger incentives to examine its debtors. The monitoring would lead to the access of non-bank funding sources by borrowers (Pasaribu & Sari, 2011). Conversely, there could be an overall decrease in profit since an increase in a bank's capital would lead to an initial increase to the bank's return while the trade-off levels increase. Eventually, this would cause the aforementioned decrease in profit (Siamat et al., 2005). A return is the change in price on an asset, investment, or project over time, which may be represented in terms of price change or percentage change, and at the same time a positive return represents a profit while a negative return marks a loss.

This paper aims to examine the consequence of bank-specific variables, such as credit risk, liquidity risk and a bank's capital on the profit levels of commercial banks in an emerging market like Jordan particularly in the period after the financial crisis (2010–2018). The observed analysis supports and adds to the existing literature in different ways. Firstly, there has been no prior attempt at examining the combined effects of credit risk, liquidity risk and bank capital on the profitability of banks in Jordan. Secondly, this study uses a sample of Jordanian commercial banks after the recent financial crisis (2008–2009) while Jordan is in the MENA region that still ranks far behind the industrialized countries and is mostly unexamined (Bitar et al., 2016). Furthermore, this paper uses dynamic panel techniques models (GMM) following Chowdhury et al. (2017) who stated that, despite numerous studies on bank profitability, only a limited number examine the determinants of banks' profitability using dynamic panel techniques models. Finally, this study presents some concluding remarks on the strengthening of banking regulation and supervision, which is of utmost importance. This could be achieved by complying with the international Basel standards with emphasis on the credit and liquidity risk and capital requirements.

The rest of this paper is organized as follows: the second section reviews the related literature and develops three main hypotheses of the study. The third section presents the sample selection, the measurements of variables, and the methodology that were employed for the analysis. The next section discusses and analyzes the results. The last section details the conclusions.

2. Literature review and hypotheses development

2.1. Credit risk and performance

Credit is normally the process of borrowing and lending money. Commercial banks regularly complete investment banking activities by allowing their customers to acquire new debt (Gande, 2008). There are several possible risk sources, such as credit risk, liquidity risk, market risk and

political risk. Unfortunately, credit risk is the highest risk that banks face (Chen & Pan, 2012). In the banks' case, credit risk and the problems associated with it can be cause for greater alarm due to the higher level of how the risks are perceived. This is due to some of the characteristics of the clients and the business conditions they end up in, which in most cases need comprehensive empirical examination. Moreover, while banks are likely to take the losses from normal earnings, unexpected losses may be present which cannot be absorbed by normal earnings (Olaekan & Adeyinka, 2013).

Credit risk is the risk associated with a loan given by a bank, which will not be repaid—either partially or fully—on time (Campbell, 2007). In other words, credit risk is the loss the bank encounters when the borrower fails to honour the debt obligation by the given due date or on loan maturity and may cause bankruptcy, if not appropriately managed (Coyle, 2000). The persistent occurrence of non-performing loan is one of the main reasons of failure in the banking system. The nature of the banking business is highly delicate due to the fact that more than 85% of banks' liability consists of deposits from depositors. Even though banks use lending as their main basis of income, they are simultaneously vulnerable to several risks which could threaten the organization if not properly analyzed and managed. While the survival of most banks depends highly on their efficient risk management tactics, some bank managers ignore this aspect of their job in favour of their own selfish agendas. This can be counteracted by applying risk management strategies, where banks can partly or completely avoid the negative effects posed by the credit risk. It requires a comprehensive and extensive framework of managing credit risk and is crucial for banks' survival and better performance (Basel Committee on Banking Supervision, 2000).

The effect of credit risk on banks' profitability varies greatly in the banking industry. Ruziqa (2013) explored the effect of credit risk on financial performance the by studying Indonesian Conventional Bank from 2007 to 2011. The results of regression analysis determined that credit risk has a significant negative effect on ROA and ROE. Kargi (2011) established that profitability is inversely subject to the levels of loans and found that credit risk has a negative impact on the value of that bank. Ozili (2017) recognized that, when the quality of lending is not good in a given market, high loan loss provisions could occur, which could lead to higher non-performing loans, eventually leading towards lower bank profitability. Dietrich and Wanzenried (2011), Ongore and Kusa (2013), and Islam and Nishiyama (2016) also agreed that credit risk has a negative impact on bank profitability. Based on the aforementioned arguments, the first hypothesis was formulated:

H1: *Credit risk negatively influences bank profitability.*

2.2. Liquidity risk and performance

Banks are significantly susceptible to liquidity risk (Arif & Anees, 2012). High liquidity risk takes place in the banking industry because clients withdraw excessive funds from the banks. This antagonistically affects banking performance by holding off potential clients and manageable buyers from the bank. As a result, the bank's utility decreases drastically and critically reduces benefits (Ejoh et al., 2014). In other words, liquidity risk originates from the absence of necessary liquidity to cover a bank's short-term obligations and unexpected outflow of funds (Diamond & Rajan, 2005). Cash excess and shortage are huge factors in increasing and decreasing the liquidity risk of a banking organization. Hence, liquidity is an outcome of the inharmoniousness between long-term assets and short-term liabilities, as banks try to decrease their liquidity risk by increasing their cash balance through issuing long-term debts (Matz & Neu, 2007).

Bourke (1989) examined bank profitability and its causes and found that banks with higher liquidity receive higher profits. Kosmidou (2008) remarked that banks usually have high profitability if they have high liquidity. Moreover, Rahman et al. (2015) observed a sample of 25 Bangladesh banks over the period 2003–2006. The results revealed a positive relationship between

liquidity risk and bank performance, reflecting that banks must increase their liquidity to be more effective. Islam and Nishiyama (2016) established that liquidity has a positive impact on—but does not substantially affect—the profitability of banks. Chen et al. (2018) observed the aspects impelling liquidity risk and the link between liquidity risk and bank profitability by using the panel data from 12 developed economies between 1994 and 2006. The results established that liquidity risk, as projected through the financing gap, is fundamentally and contrarily connected with ROAA and ROAE. A higher financing gap (higher liquidity) reduces bank profitability as estimated by ROAA and ROAE. Based on the above, this study posits the following hypothesis:

H2: *Liquidity risk significantly affects bank profitability.*

2.3. Bank capital and performance

Based on Abdullahi (2013), capital is a commencement that happens when reorganizing the current capital structure of banks so the banking industry can be protected against widespread distress. Additionally, capital provides the opportunity to set a higher standard in any business establishment. It branches business effort and creates great performance. Hence, capital supports recapitalization where it appears to meet the need of individual banks in the form of increasing the minimum paid-up capital, allowing banks to operate more effectively and efficiently with their customers.

Various researchers have formulated theories that forecast the effect of bank capital on profitability as either positive or negative. The argument above previously proposed that greater bank capital helps in maintaining financial stability. Also, it reduces financial distress on the banks (Berger & Bouwman, 2009). Furthermore, Islam and Nishiyama (2016) examined a sample of 230 banks from four Southeast Asian countries, which prompted them to discover that equity capital has a positive influence on profitability. Lee and Hsieh (2013) considered the effect of bank capital on profitability by examining a sample of 48 Asian countries and found that banks that are Middle Eastern owned had the highest positive effect on performance. Iannotta et al. (2007) found a positive and important relationship between capital and bank profitability. The authors suggested two explanations for their results; the first one being that higher bank capitalization could reflect higher management quality, hence higher income and lower cost, which in turn creates more bank profits. The second reason they presented was that capitalized banks will most probably have a lower bankruptcy cost, leading to lower funding costs, which also creates higher income.

At the same time, other studies, such as Boyd and Runkle (1993), concluded there is a negative relationship between bank capital and performance. Naceur (2003) and Francis (2013) observed that capital has a negative effect on the profitability of banks. Berger and Bouwman (2013) found that the relationship between bank capital and profitability is not clear. Consequently, the following hypothesis emerged:

H3: *Bank capital positively influences bank profitability.*

3. Research methodology

3.1. Sample selection

The data of the banks used to investigate the above hypotheses, were accumulated from the Amman Stock exchange. The majority of studies placed emphasis on the effect of the financial crisis on the banks. However, there was insufficient evidence for the period following the crisis therefore the data were obtained for 13 commercial banks after the financial crisis, between 2010 and 2018. This period was chosen because it followed the changes in the Basel regulations

gathered in Basel III which occurred in 2010. Thus, a total of 117 bank-year observations were included in the sample, where $N = 117$.

3.2. Measurements

The main concepts measured in this study were return on average assets (ROAA), return on average equities (ROAE), and interest income to earning assets (NIM), as proxies for bank performance. ROAA mirrors the capability of a bank's management to create profits from the bank's assets. ROAE shows the return of equity to shareholders. Average assets and equities are tools that help highlight any differences that take place in assets and equities during the fiscal year. Chiamonte and Casu (2017), Chen et al. (2018), and Sahyouni and Wang (2019) used these proxies in their studies. The difference between what the bank pays the people saving their money in interest, and what it receives from customers who have borrowed money, is measured using the net interest margin (NIM); meaning that NIM can be a very useful pointer to determine the core earning ability of banks. Hence, NIM emphasizes the customary borrowing and lending operations of the bank. Olson and Zoubi (2011), Naceur and Omran (2011), and Batten and Vo (2019) used these proxies in their studies.

The loan loss provisions to loans ratio is used to proxy credit risk. Based on Cooper et al. (2003), fluctuations in credit risk can mirror changes in the health of the bank's loan portfolio, which can distress bank performance. The more the financial institutions are exposed to high-risk loans, the higher the buildup of unpaid loans will be, thus reducing the banks' profitability. At the same time, riskier loans could produce higher interest incomes (Miller & Noulas, 1997). The current study used the ratio of liquid assets to total assets to proxy liquidity risk based on the work of Abbas et al. (2019) and Kim and Sohn (2017). When a higher financial gap ratio is present, banks use their cash, and simultaneously sell their liquid assets and retain more external funding in order to fund the gap. Consequently, this will reduce their profitability and increase their funding costs (Chen et al., 2018). However, Demirgüç et al. (2003) showed that banks with more liquid assets in cash, whilst also having government securities, will receive less interest income than banks that only have liquid assets.

There are other factors besides liquidity risk that affect bank performance, such as the ratio of equity to assets that can act as a proxy for bank capital. It is safer for a bank with high capital-asset ratios in case of liquidation of negative profits. Berger (1995) determined that an increase in capital could increase expected earnings by reducing the expected costs of financial distress. Therefore, there is less need for external funding when a bank has a higher equity to assets ratio, thus yielding higher profitability. The controlled variables for the profitability of the bank include bank size, loan growth, and efficiency. Table 1 below presents the variables employed in this study and the corresponding specific measurements.

3.3. Methodology

Based on the study objectives, we investigated the effect of credit risk, liquidity risk and bank capital on bank profitability in the context of Jordanian commercial banks. In line with previous literature, we utilized standard estimation techniques for panel data in the analysis, using fixed effect and random effect regression models. Based on the results of the Hausman test, this study accepted the use of the fixed effect model. The estimates equation yields a standard regression model as follows:

$$y_{i,t} = \alpha + \beta_1 X_{i,t} + \beta_2 Z_{i,t} + \varepsilon_{i,t}$$

where $y_{i,t}$ denotes the dependent variable i (profit of bank) at time t . $X_{i,t}$ represents the explanatory variables—credit risk, liquidity risk and bank capital— i at time t . $Z_{i,t}$ represents control variables, such as bank size, loan growth and efficiency. α is a constant term, while β_1 and β_2 represent coefficients, and $\varepsilon_{i,t}$ is the error term.

Table 1. Description of the use variables

Categories	Variables	Formula
Profitability	ROAA	Net Income to Average Total Assets
	ROAE	Net Income to Average Total Equity
	NIM	Net Interest Income to Earning Assets
Credit risk	Crisk	Loans Loss Provisions to Loans
Liquidity risk	Lrisk	Liquid Assets to Total Assets Ratio
Bank capital	B-Cap	Equity to Total Assets Ratio
Bank size	Size	Logarithm of the Total Assets
Loan growth	Growth	$\frac{\text{Loant}-\text{Loant-1}}{\text{Loant-1}}$
Efficiency	Cost	Cost to Income Ratio

However, following Berger et al. (2000), Dietrich and Wanzenried (2011), and Luo et al. (2016), the researchers employed a dynamic model to provide robustness to the test and to take into account the heteroscedasticity, endogeneity, serial correlation, and the tendency of persistence over time of bank profitability. More specifically, the researchers used the generalized methods of moments (GMM) estimator suggested by Arellano and Bond (1991) for more robust results as it ensures efficiency and consistency. The standard form of the linear regression model:

$$y_{i,t} = \alpha + \beta_3 y_{i,t-1} + \beta_1 X_{i,t} + \beta_2 Z_{i,t} + \varepsilon_{i,t}$$

where $y_{i,t}$ denotes the dependent variable (profit of bank) i at time t . $y_{i,t-1}$ represents lagged variables of the dependent variable. $X_{i,t}$ represents the explanatory variables; credit risk, liquidity risk, and bank capital, i , at time t . $Z_{i,t}$ represents the control variables; bank size, loan growth, and efficiency. α is a constant; β_3 , β_1 , and β_2 represent the coefficients, and $\varepsilon_{i,t}$ is the error term.

3.4. Data analysis and results

Table 2 presents the descriptive statistics of the variables employed in the article. The mean values of ROAE, ROAA, and NIM and the average of the standard deviation (Std Dev) were acceptable in developing market. However, the mean C-risk value was 0.8361, which indicates that these Jordanian banks were faced with high levels of credit risk, where the level of risk was based on the credit policy adopted by these banks. In addition, the mean values for L-risk were low since these banks had good liquidity in order to face any environmental conditions that affect their business activities. The mean value of B-Cap was 0.0973 with Std Dev 0.0411, meaning that these Jordanian banks used about 10% of their internal resources to finance their assets. Finally, the mean size of the banks in the sample was 21.9665 with Std Dev 1.3472, where there are three

Table 2. Description of the variables

	ROAA	ROAE	NIM	Crisk	Lrisk	B-Cap	Size	Growth	Cost
Obs	117	117	117	117	117	117	117	117	117
Mean	0.0238	0.1026	0.0401	0.8361	0.0382	0.0973	21.9665	0.6152	0.4326
Std Dev	0.0051	0.0762	0.0237	0.0433	0.0252	0.0411	1.3472	0.3413	0.1533
Min	0.0002	0.0021	-0.0039	0.7735	0.0001	0.0290	19.8652	0.0011	0.1467
Max	0.0361	0.3586	0.1103	0.9372	0.0196	0.3537	24.2759	0.8437	0.9372

Table 3. Correlation matrix among variables

	ROAA	ROAE	NIM	Crisk	Lrisk	B-Cap	Size	Growth	Cost
ROAA	1.000								
ROAE	0.586	1.000							
NIM	0.381	0.035	1.000						
Crisk	0.340	−0.052	0.040	1.000					
Lrisk	0.289	0.193	−0.115	0.082	1.000				
B-Cap	0.314	0.252	0.144	0.063	0.476	1.000			
Size	0.369	−0.353	−0.214	0.064	−0.396	−0.662	1.000		
Growth	−0.052	0.141	−0.080	0.006	0.055	−0.533	0.134	1.000	
Cost	−0.483	0.595	−0.046	0.082	−0.063	0.095	−0.087	−0.159	1.000

main sizes for the banks in Jordan, namely large, medium and small. Regarding growth, the mean value showed that Jordanian banks focused on increasing their loan portfolio during the period analyzed in order to achieve their financial targets and thus improve their performance. The mean cost indicated that 0.4326 of their income went to paying their expenses related to business activities.

Table 3 presents information on the dependent and explanatory variables and their correlation to each other. This table offers some initial overview of the correlation between variables of interest. Moreover, most of the correlation values are relatively small, which suggests there is no significant concern of multicollinearity.

Tables 4–6 present the estimates yielded by the panel data estimation methods. Each table contains the results of the regression describing the relationship between bank profitability and the explanatory variables, where the dependent variables are ROAA, ROAE and NIM respectively.

Table 4. Regression results—The dependent variable is ROAA

	Coeff.	P-value	Coeff.	P-value
Constant	0.0758	0.0000		
ROAA −1			0.3651	0.0001
Crisk	−0.0020***	0.0000	−0.0145**	0.0110
Lrisk	−0.00415**	0.0376	−0.1155*	0.0553
B-Cap	0.0312***	0.0030	0.0052**	0.0414
Size	−0.0023***	0.0001	−.0013**	0.0221
Growth	0.0124*	0.0872	0.0481*	0.0797
Cost	−0.0332**	0.0020	−0.0411**	0.0021
R-squared	0.8197			
Adj R-squared	0.7856			
F-stat	25.4021			
Prob F-stat	0.0000			
Sargan test	24.6165			
Prob Sargan test	0.2269			
No. Observations	117			

*, **, *** = p-value <.10,.05,.01

Table 5. Regression results—The dependent variable is ROAE

	Coeff.	P-value	Coeff.	P-value
Constant	0.0884	0.0726		
ROAE -1			0.0652	0.3724
Crisk	-0.1349	0.2463	-0.0739	0.3790
Lrisk	-0.0527**	0.0245	0.0325**	0.0149
B-Cap	0.0282***	0.0001	0.0198*	0.0363
Size	-0.0014**	0.0022	0.0264	0.2077
Growth	0.0533***	0.0000	0.0377**	0.0325
Cost	-0.4228*	0.0738	-0.2935	0.5058
R-squared	0.7458			
Adj R-squared	0.6846			
F-stat	15.3162			
Prob F-stat	0.0000			
Sargan test	23.4649			
Prob Sargan test	0.2682			
No. Observations	117			

*, **, *** = p-value < .10,.05,.01

Table 6. Regression results—The dependent variable is NIM

	Coeff.	P-value	Coeff.	P-value
Constant	0.0658	0.0957		
NIM-1			-0.0027	0.7378
Crisk	-0.0318**	0.0325	-0.019*	0.0772
Lrisk	-0.1589*	0.0804	-0.0073	0.6987
B-Cap	0.0446***	0.0013	0.0688**	0.0346
Size	-0.0034***	0.0002	-0.0013***	-0.0001
Growth	-0.0752	0.4335	-0.0682	0.6485
Cost	-0.1368***	0.0000	-0.1714**	0.0019
R-squared	0.8037			
Adj R-squared	0.7743			
F-stat	19.3640			
Prob F-stat	0.0000			
Sargan test	18.1285			
Prob Sargan test	0.5986			
No. Observations	117			

*, **, *** = p-value < .10,.05,.01

The results in Tables 4 and 6 suggest that bank size has a negative impact on ROAA and NIM, while Table 5 indicates that bank size has no impact on ROAE. A reasonable explanation for this is that the majority of Jordanian banks are small compared to the bigger international banks that think they are too large to fail and hence have better reasons to add to their risk-taking and hold more loans. In other words, the greater the bank size is, the lower the profitability (ROAA and NIM) is. However, small banks tend to raise their solvency standards when there is a chance of higher profitability, cost and risk. On the same note, the growth of the loan positively affects ROAA and

ROAE (see Tables 4 and 5) respectively. In addition, the growth of loans has no impact on NIM (see Table 6). On the other hand, the coefficients for the growth of the loan are negative, however, not significant. Furthermore, Tables 4 and 6 show that cost (efficiency) has a negative impact on bank profitability when using ROAA and NIM as explanatory variables. This means that a higher cost to income ratio leads to a decrease in the ROAA and NIM.

Credit risk is a major concern for many stakeholders and many previous studies have acknowledged the importance of risk-taking by banks. According to Olszak and Pipień (2016), the higher the risk the bank takes, the more the expected profit. However, the level of risk the bank is willing to take on could be set by earning management. Lassoued et al. (2016) indicated that the high levels of risk are deemed to be the reason of the financial crisis. Hence, continuous risk taking can be destructive to the financial system and the economy as a whole. Based on recent articles by Ekinci and Poyraz (2019) and Kargi (2014), there is a negative correlation between credit risk and profitability. This paper's results indicate that credit risk has a negative effect on ROAA and NIM, while, at the same time, credit risk has no effect on ROEA. Therefore, H1 is partially supported. This can explain why banks with high-risk-taking behaviour have a large number of non-performing loans, leading to a negative impact on the profitability of the bank.

An important factor that affects a bank's profitability is liquidity risk (Chen et al., 2018). This study found that liquidity risk has a negative effect on bank profitability, when using ROAA and ROAE (see Tables 4 and 5) respectively. The coefficient for liquidity risk was negative but not significant where net interest margin acted as the dependent variable (see Table 6). Hence, H2 is partially supported. The results showed that the banks with a larger financial gap tend to be missing stable and cheap funds and will hence turn to using their liquid assets or more external funding to compensate and meet funding demands. These results mirror the conclusions in Chen et al. (2018) and Arif and Anees (2012) regarding the negative correlation between the profitability of the bank and liquidity risk.

The results suggest that bank capital has a relatively positive influence on profitability as shown in Tables 4–6. The coefficient of bank capital is significant at 5% when ROAA and NIM are dependent variables. Additionally, the capital's coefficient is most significant at the 10% level when ROAE acts as the dependent variable. Therefore, H3 is supported. These results suggest that better ROAA and ROAE, whilst increasing NIM, would result in a higher profitability.

4. Conclusion

This study aimed to investigate the effect of credit risk, liquidity risk, and bank capital on profitability proxied by ROAA, ROEA and NIM, using empirical evidence from an emerging market. The current study covered the panel data from commercial banks in an emerging market (Jordan) in the years after the last global financial crisis (2008–09), that is, between 2010 and 2018. The model was estimated through a fixed effects regression model. Additionally, GMMs were used as the dynamic panel data estimators for the system. The results offered supplementary perceptions of causality between the aforementioned bank-specific variables (credit risk, liquidity risk and bank capital) and profitability. Credit risk, liquidity risk, and bank capital were shown to affect bank profitability in either a positive or negative way. Therefore, this study proposes that banks need to change their credit policies which aim to reduce credit risk that affect profitability to make sure they are covered against credit; whereas, good credit policies lead to reduced bad credit in banks and thus, improved profitability. In addition, the banks should have more liquidity and higher capital in order to face any future situations that might have an effect on their profitability. Conversely, the findings reveal some differences in the effect of bank-specific variables and profitability measurements. These results have important consequences for different banks, managers and stakeholders as they can assist them in creating and maintaining an efficient financial system and market.

4.1. Implications

The data derived from this study highlight the importance of banks sticking to a prudent and regulatory guideline, which, on one hand, ensures corporate management and can protect them in terms of credit and liquidity risk, and, on the other, can impact the profitability of the banks in a negative way. In addition to this, financial firms must adopt and forecast the deterministic and practical scenarios in terms of the credit risk to make sure that the banks confront the risks they face across business activities and on an aggregate basis. Such preparations are made within the context of a bank's appetite for risk, hence avoiding incompetence and poor financial performance that will affect the returns in a negative way.

When it comes to supervision and regulation, this study proposes that there is a trade-off between the cost of keeping liquid assets with low yield and the resilience of liquidity shocks, which policymakers should take into account. Policymakers need to adopt capital regulation, official supervision, and limit bank activities to allow the performance of the banking sector to improve. This study paves the way for more thorough studies into monitoring the liquidity risk and extending the current empirical model to incorporate other things that could form a liquidity risk. Meanwhile, to ensure efficient decisions are being, executives need to comprehend the interaction of the risk factors, both internal and external context, content, process and forces. All these elements need to be considered in relation to the financial performance.

The data and results show that banks could find a way through regulations on capital and emphasize the important role of joint regulation of capital ratios in relation to a bank's risk-taking behavior and its role on the bank's profitability. Hence, policymakers need to endorse the idea of applying the Basel III regulations which would improve the bank's effectiveness, efficiency, and profitability while protecting the bank from risk.

Going forward, the results of this study will help local and international bank managers in giving them a broader comprehension of such risks. This will help in with providing insight and understanding into initiatives of adapting the Basel guidelines and implementing them. Further research could have a wider view of the determinants of profitability, and could take into account the economic factors in different areas, such as the MENA region.

Funding

The authors received no direct funding for this research.

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Citation information

Cite this article as: The effect of credit risk, liquidity risk and bank capital on bank profitability: Evidence from an emerging market, Isam Saleh & Malik Abu Afifa, *Cogent Economics & Finance* (2020), 8: 1814509.

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