







“Exploring the effect of market risks on bank profitability: Evidence from Jordan”

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EXPLORING THE EFFECT OF MARKET RISKS ON BANK PROFITABILITY: EVIDENCE FROM JORDAN

Abstract

This paper observes the dynamic impact of market risks on the profitability of banks listed on the Amman Stock Exchange (ASE) from 2010 to 2018 in Jordan. To identify the link, the relevant data were retrieved from the annual statements of Jordanian banks and one-step Generalized Method of Moments (GMM) approach was employed to diagnose the error regarding endogeneity. The results of the applied methodology showed that market risks impacted the profitability of Jordanian banks. Furthermore, the study also presented factors that affected the banks' profitability, such as capitalization and bank size. The previous year profitability has a positive effect on the next year profitability. Moreover, stock market returns (SMRs) directly affect ROA and ROE because when SMRs enhances, bank profitability will increase. Bank managers should ponder the volatility of the market risk while enhancing the profitability of a bank. This relationship of the variables regarding Jordanian banks listed on the ASE was not considered before in the financial economics literature. Recommendations were also provided for Jordanian bank managers to mitigate market risks.

Keywords

market risks, profitability, Amman Stock Exchange, GMM, bank size, capitalization

JEL Classification

G14, G32, G21

INTRODUCTION

Banks are seen as financial mediators that are essential to ensure the secure and proper flow of markets, including assisting with financial difficulties such as making credit and liquidity availability. Hence, a financial system, particularly the security and strength of a banking system, is decisive for the preservation of an economy. Furthermore, financial stability can be ensured and economic resilience to negative macroeconomic shocks can be increased with a profitable and sound banking system. A well-developed banking system in an economy enriches the economy of an individual by providing easy accessibility of loans, which collectively makes a strong economy. Additionally, the stability regarding banking industry profit is vastly maneuvered by the steadiness of the complete economy. In this contemporary era, most of the dynamic factors may influence a bank's profitability positively and negatively. Thus, this study aims to identify new factors of bank profitability, which has garnered the interest of academic researchers, bank management, supervisors, and financial service participants. Moreover, Bird and Skinner (2005), Tafri et al. (2009) Al-Rdaydeh et al. (2017) have asserted that profitability is vital for any financial institution and is determined by risk assimilation. Thus, understanding the implications of financial risks regarding bank profitability is an essential for financial institutions in risk management.

Banks earn through physical (loan and various financing schemes) and virtual activities (purchasing of securities). The valuations of banks, especially those listed on the stock exchange, depend on market conditions such as financial risks. The common financial risks in businesses involve liquidity risk, loan risk, marketplace risk, as well as non-financial risks. However, market risk is a systematic risk that cannot be eradicated by investors with a diversified portfolio, thus it is very important amongst other financial risks. However, the strategies regarding hedging can be implemented to decline market risk. Such risk is a probable cost, which is tackled by financiers and stockholders due to global influences on the financial market. Common market risks include stock numbers volatility, foreign exchange unpredictability, interest rate volatility, and commodity price risk denoting to malign variations in the exchange rate unpredictability, interest rate volatility, and stock number volatility (Koch & MacDonald, 2006).

In Jordan, the banking sector falls under the primary economic industries. The Jordanian banking industry has matured with an average GDP of 23.4% as reported by the International Monetary Fund (2003) in the last five years. However, the Jordanian banking sector's performance has declined in recent years due to several issues such as the Arab uprisings, the global financial crisis, and economic slowdown (Al-Rdaydeh et al., 2017). The competition and effective risk management in the banking industry have increased due to the deregulation and globalization of financial activities. Consequently, these situations have directly or indirectly impacted the global banking areas, including the Jordanian banking sector. Regarding Jordanian perspective, numerous tactics were executed to appraise and cut an inverse impact of these circumstances by the Jordanian banking regulatory authorities. These measures were focused mainly on circumstances in the Jordanian banking industry, particularly on the financial crisis (Al-Jarrah, 2012). The data were recouped from the ASE throughout 2010 to 2018 over the sample of 16 listed Jordanian banks. The two-step system GMM methodology was employed to diagnose the endogeneity error. The findings reveal that the market risk significantly influenced bank profitability. Moreover, the study has theoretical, empirical, and physical significance. Managers should consider the sensitivity of the market risk while taking decisions. Moreover, this study has empirically checked the link between market risk and bank profitability and significantly contributed to the literature.

1. LITERATURE REVIEW

The market risk greatly influences financial risk. Koch and MacDonald (2014) listed several market risks, e.g., exchange rate volatility, interest rate unpredictability, commodity price volatility, and stock numbers volatility, focusing on aspersions variations in the exchange rate, interest rate, and stock prices. Worzala (1995) asserted that banks require assets against issuance of loans, are stimulated by unpredictable market prices, which may summons such market risks. Additionally, commercial banks can acquire their best to enhance the financial performance by understanding an adverse impact of their financial risk. Among others, different market risk factors were used, such as bank-specific variables and macroeconomic indicators, including different samples, namely, groups of countries or a single country (Elyasiani & Mansur, 2005; Nimalathasan & Puwanenthiren, 2012; Ngalawa & Ngare, 2013; Shair et al., 2019; Muriithi et al., 2016; Okpara, 2011). Notably,

Muriithi et al. (2016) investigated financial performance of 43 commercial banks from 2005 to 2014 in Kenya to understand market risk influences on financial performance. Three indicators of market risk were chosen, i.e., the degree of financial leverage (DFL), foreign exchange exposure risk, and net interest margin. A negative impact was identified between the indicators and the return on equity (ROE). Similarly, Nimalathasan and Pratheepkanth (2012) examined numerous Sri Lankan financial institutions from 2006 to 2010 to understand un-controllable risk management influence on the financial institutions' profitability. For this study, the degree of financial leverage (DFL) and the degree of operating leverage (DOL) were employed to enumerate un-controllable risk management. A positive liaison was recognized between un-controllable risk management with bank profitability and was heightened by DFL and DOL.

Correspondingly, a study of 52 Japanese banks from 1986 to 1996 evaluated market volatility,

interest rate unpredictability, and exchange rate volatility (Elyasiani & Mansur, 2005). The study adopted a multi-factor model. The result found that the accounting variables, namely, bank market volatility and foreign exchange unpredictability, were under the market beta model. Additionally, excluding interest income and foreign exchange denominated assets inspired the exchange rate volatility in an optimistic and adverse direction, respectively. Focusing on the banking industry in China, Tan (2016) studied the influence of risk and rivalry on various Chinese banks, namely, state-owned, joint-stock, and city commercial banks' profitability from 2004 to 2012 using a GMM estimator. Interestingly, risk and competition did not influence bank profitability. However, factors such as taxation, overhead cost, labor productivity, including inflation changed the banks' profitability. A similar study was conducted on the Pakistani banking industry from 2007 to 2017. The study used three measures of risk indicators, namely, credit risk, liquidity risk, and insolvency risk. The results of the study revealed that liquidity risk was positively associated with Pakistani banks' profitability, while negative impacts were found with credit risk, insolvency risk, and competition. Additionally, a positive impact was found in other factors such as capitalization, size, taxation, and GDP growth rate. Contrastingly, a negative influence on bank profitability was found in the banking sector development and infrastructure.

In the Asian context, a study investigated the association of bank accounting indicators with market measures of risk on 46 banks in Asia from 1998 to 2003 (Agusman et al., 2008). The study found that the standard deviation of ROA and the ratio of loan loss reserve to gross loans significantly correlated with total risk. Meanwhile, particular risk factors were associated with gross loans to total assets ratio and loan loss reserve to gross loans ratio. In the Nigerian banking industry, Okpara (2011) assessed the performance of Nigerian banks, in particular the effect of macroeconomic factors and intra-banking characteristics on the risk management of banks from 2003 to 2009. The outcomes disclose that banking volatility administration was encouraged by both macroeconomic factors and intra-banking factors. In terms of macroeconomic factors, the study found that economic growth positively affected the capital ratio, while

the inflation rate negatively affected the capital ratio in banks. Correspondingly, liquidity ratio, bank size, and market risk positively impacted the capital ratio for intra-banking indicators. In contrast, an adverse effect of credit risk was found on capital ratios. A recent similar study was conducted on 20 ASEAN banks to investigate the macroeconomic factors' influence and credit risk on bank profitability (De Leon, 2020). It was found that credit risk and GDP growth negatively affected ROE, while the inflation rate increased ROE.

With a similar focus on macroeconomic factors, Zeitun (2012) studied the influence of macroeconomic factors on 38 conventional banks' performance in the GCC countries from 2002 to 2009. The study found that GDP positively influenced ROA and ROE ratios. In contrast, a negative association was found with inflation. In the same context, Nekhili (2020) developed a framework based on Filtered Historical Simulation to measure systemic risks with the banking sectors in GCC. The study adopted a nonparametric estimation of the conditional covariance matrix. This framework was based on the interconnectedness between these banking systems. The study revealed that shocks from the Saudi Arabian banking systems might negatively affect banking systems of most GCC countries. However, the study found that the Omani banking system was the only banking system that could overcome negative impacts faced by significant GCC banking systems because of its sufficient robustness.

Correspondingly, Lehar (2005) studied data collected from 149 largest international banks in Austria to measure the systematic risk from the year 1988 until 2002. The GMM approach was employed to estimate the regression, and high volatility in expected deficit was noticed due to un-controllable volatility in the banking sector. Moreover, the correlation scrutiny also unveils high variations in anticipated deficit. Additionally, Lehar (2005) used the stock market information and found the joint dynamics of a bank's asset portfolio to a sample of international banks. Furthermore, Bühler and Prokopczuk (2009) compared the U.S. banking sector with 11 other industry sectors in the U.S. using stock market data from the year 1990 to 2008 to determine the banking industry's systemic risk levels. The study

adopted a copula-based measure and found that the banking sector had higher levels of systemic risk than the other sectors when compared to the non-banking financial sectors, particularly during market downturns. Focusing on Kenya, Maniagi (2018) studied 44 commercial banks from the year 2006 to 2015 to understand financial risk. Maniagi (2018) found that various trade cycles' credit risk negatively impacted performance. In contrast, a significant positive relationship was found between market risk and interest with performance. Similarly, Chepkemoi et al. (2019) investigated the impact of market risk on the financial performance of non-bank financial institutions (NBFIs) listed on the Nairobi Stock Exchange (NSE) from 2012 to 2017. In this study, the degree of financial leverage (DFL) indicators was used to measure market risk. Financial leverage was found to be positively associated with NBFI performance. Correspondingly, interest risk was found to have the most substantial influence on Kenya's NBFIs financial performance.

Following interest risk, Ahmed et al. (2018) assessed annual data of seven years from 2007 to 2014 to understand the impact of interest rate fluctuations on bank profitability in Pakistan. The study found that bank profitability reduced because of deposits with other banks and interest rates. Meanwhile, advances, loans, and investment increased bank profitability. A study was also conducted focusing on the Casablanca Stock Exchange (CSE) from 2000 to 2016. The study explored 31 non-financial companies to understand market risk effects on the financial performance of banks (Kassi et al., 2019). Three market risk indicators were used, namely, DFL, book-to-market ratio, and gearing ratio. Based on the study, significant negative relationships were established with different measures of market risk on the companies' financial performance.

In Jordan, several studies were conducted on market risks, solely or with other risk types (e.g., Khrawish, 2011; Al-Jarrah, 2012) using different measures for market risk. For instance, Khrawish (2011) examined the macroeconomic factors as indicators of risks that might influence the Jordanian commercial banks' performance from the year 2000 to 2010. A negative relationship was established between inflation and GDP

with ROA and ROE. Another study was conducted on 16 listed banks operating in Jordan from 2001 to 2008 to assess the systematic, non-systematic, and total risk of bank-specific variables (Al-Jarrah, 2012).

There are some studies done recently on the same theme. Abubakar (2020) Zulfiqar and Din (2015), Musah et al. (2018), Owusu-Antwi et al. (2017), and Kalsoom and Khurshid (2016) have worked on the same theme and found a significant relationship between market risk and firm profitability. This study measured total risk by the annualized standard deviation (ASDB) of banks' daily stock returns, while banks' stock returns beta measured market systematic risk. Non-systematic risk was measured by the ASDB of residual errors from the market model. The study results indicated that the standard deviation of returns before taxes on assets, book value of equity to total assets were significant, related to market measures of systematic and total risk. The study concluded that only the book value of equity to total asset ratio was significantly related to non-systematic measures of risk. Hence, this paper will understand the effect of market risks on the profitability of banks listed on the ASE from 2010 to 2018.

2. METHODS

The study focused on banks listed on the ASE, known as one of the Middle East's most significant stock exchanges. A sample of 16 listed Jordanian banks from 2010 to 2018 was chosen and data were regained from the data stream of ASE. The banks were included in the study sample complied with the Jordanian Company Law (Law No. 12, enacted in 1964) and its Commercial Law, enacted in 1966 that stipulates their data availability and access. Additionally, Jordan was chosen due to its strategic and vital location in the Middle East, along with Jordan's economic channel to large markets with more than one billion consumers (Matar et al., 2018; Al-Rdaydeh et al., 2019). Despite Jordan's importance and role as an emerging economy, Jordan's business sector still experienced downturns that implicated its performance over the years (Matar et al., 2020; Al-Rdaydeh et al., 2018; Alabdullah et al., 2014).

2.1. Variables and measures

The explained variable in this study was the profitability of banks with ROA and ROE as indicators derived from the previous literature (De Leon, 2020; Hamouri et al., 2018; Al-Rdaydeh et al., 2017). ROA was enumerated with the correspondence of net income over total assets, while ROE was the net income divided by total equity. For the explanatory variable, un-controllable risk was taken, which comprises of the aggregate risk of banks triggered by other factors that affected the banks' profitability and cannot be lessened. Common factors of systematic risk include political and economic volatility, business rotations, inflation, and unemployment. This study used three market risk indicators, namely, interest rate volatility, exchange rate unpredictability, and stock numbers volatility risk, to measure the correlation with banks' financial profitability. Additionally, the interest rate volatility was enumerated as the natural logarithm of the net interest margin. In contrast, exchange rate volatility was enumerated as the natural logarithm of foreign exchange gains/loss (Muriithi et al., 2016). These measures would explain the banking sectors' ability to reduce systematic risk through efficient risk management strategies. The final indicator, stock price risk, is the natural logarithm of the industry market value. Particularly, stock number volatility was enumerated by the natural logarithm of the number of shares outstanding in the industry multiplied by the shares market value at the end of the period (Abdellahi et al., 2017). Correspondingly, two control variables were used in this study, which may affect bank profitability and were derived from previous studies (Al-Rdaydeh et al., 2017; Al-Khoury, 2011; Tafri et al., 2009). The first control variable was bank size, measured using the natural log of total assets of a bank. The second control variable was bank capital, measured by a bank's ratio of equity to total assets.

2.2. Data analysis technique

Based on the empirical literature, various methods were used to determine the effect of risks on bank profitability. Al-Rdaydeh et al. (2017) used fixed effects to inspect the impact of liquidity and credit volatility on bank profitability in Jordan. Additionally, Tan (2016) investigated the factors

affecting the profitability of banks in China employing the GMM system estimators (one-step). Thus, the GMM approach was adopted because of estimation issues in the factors of bank profitability, including endogeneity, unobserved heterogeneity, autocorrelation, and profit persistence that fixed effects were not able to address. To further support this, a comparison was made between the one-step GMM estimator and the two-step GMM estimator. Bond (2002) stated that the unit root property issue and levels of results precision could be addressed using the one-step GMM estimator. Furthermore, the one-step GMM approach highlighted a smaller unfairness and estimation with a lower standard deviation (Judson & Owen, 1999). The following models demonstrate the mathematical explanations used to examine the relationship between market risks and bank profitability in this study. The following econometric models help to understand the mathematical relationship of independent and dependent variables.

$$\begin{aligned} ROA_{it} = & \beta_0 + \beta_1 ROA_{t-1} + \beta_2 EXR_{it} + \\ & + \beta_3 INR_{it} + \beta_4 SMR_{it} + \beta_5 SIZE_{it} + \\ & + \beta_6 BCAP_{it} + \mu_{it} + \varepsilon_{it}, \end{aligned} \quad (1)$$

$$\begin{aligned} ROE_{it} = & \beta_0 + \beta_1 ROE_{t-1} + \beta_2 EXR_{it} + \\ & + \beta_3 INR_{it} + \beta_4 SMR_{it} + \beta_5 SIZE_{it} + \\ & + \beta_6 BCAP_{it} + \mu_{it} + \varepsilon_{it}, \end{aligned} \quad (2)$$

where *ROA* represents return on assets for “*i*” at time *t*, *ROE* represents return on equity. *EXR* – exchange rate risk, *INR* – interest rate risk of banks, and *SMR* denotes stock return risk of banks. *BSIZE* – the log of total assets of bank and *BCAP* indicates bank capitalization. μ_{it} and ε_{it} show the unnoticed bank-specific effect, including the idiosyncratic error, respectively.

3. EMPIRICAL RESULTS

Descriptive statistics disclose Mean, Median, Standard deviation, Maximum, Minimum, and Probability of the variables. The descriptive statistics for the dependent variable were presented, including explanatory variables in Table 1. The dependent variable, ROE, had the optimum average of 1.5 percent compared to ROA, and a maxi-

imum of 4.4 percent. In contrast, ROA had an average of 1.1 percent and varied from -1.2 percent to 2.5 percent. Correspondingly, for the explanatory variables, SMR had an average of 24.2 percent and ranged from 6.5 percent to 87.1 percent. Meanwhile, EXR had an average of 6.39 percent, with a maximum of 7.6 percent. Lastly, the INR variable had an average of 84.0 percent, with a maximum of 86.0 percent.

Table 1. Descriptive statistics

Source: Authors' own calculation.

Variables	Mean	Max	Min	Std. dev
ROA	0.011	0.025	-0.012	0.005
ROE	0.015	0.044	-0.021	0.009
SMR	24.264	87.100	6.557	21.697
EXR	6.392	7.640	5.394	0.474
INR	0.840	0.863	0.708	0.022
BSIZE	9.307	10.41	8.428	0.403
BCAP	0.135	0.412	0.064	0.044

Note: SMR = Stock market return, EXR = Exchange rate risk, INR = Interest rate risk, BSIZE = Bank size, and BCAP = Bank capitalization.

Table 2 presents the GMM results of the liaison between the dependent variable and the explanatory variables. Based on the results, the variables were rejected at different significance levels of 1.0 percent and 5.0 percent. Additionally, both specification test results were valid, namely, AR (2) determined the serial correlation, while the Hansen test is for instrument validity. p-values for both tests were higher than 0.10, which indicated significant statistical analysis. Hence, all models were valid and free from autocorrelation issues.

Table 2. Regression analysis

Variables	ROA (1)		ROE (2)	
	Coefficient	Std. error	Coefficient	Std. error
LROA	0.223*	0.119	-	-
LROE	-	-	0.453***	0.131
SMR	0.000***	0.000	0.000**	0.000
EXR	0.000	0.001	-0.006**	0.003
INR	0.109***	0.031	-0.130**	0.062
BSIZE	-0.005*	0.003	-0.009	0.007
BCAP	-0.001	0.039	-0.069*	0.037
Number of instruments	20		20	
Number of observations	128		128	
Number of groups	16		16	
Sargan/ Hansen Test p-value	0.657		0.843	
AR (1)-p value	0.022		0.017	
AR (2)-p value	0.134		0.274	

Note: *** denotes significance at 10%, ** at 5%, and * at 1% significance levels.

Table 2 reports the statistics of GMM analysis for models 1 and 2. The statistics regarding the first model are fitted to the variable, which depends upon its lag value acquired by a GMM estimator, which affirmed that the former year's bank profitability directly affected the forthcoming year's profit. The first independent variable, SMR, which represented the stock price risk, was found to have a significant positive liaison with ROA and ROE at levels of 1.0 percent and 5.0 percent, respectively. Therefore, when market risk increases, the profitability of banks may increase. In other words, a positive change in market return will influence a positive relationship between beta and return, and vice versa. This result is consistent with Fahrul and Rusliati (2016) and Maniagi (2018). For the second independent variable, EXR, the results failed to reveal a relationship with ROA, but a negative association with ROE was found at a level of 5.0 percent. Resultantly, an increase in EXR will decrease the ROE of banks; however, it will not affect the ROA of banks. The EXR outcome echoes research from Muriithi et al. (2016) that showed the different directions in foreign exchange rate changes with bank performance.

The results of the final indicator of market risk, INR were found to be mixed. For instance, study indicated that INR had a significant positive relationship with ROA at a 5.0 percent level; however, INR had a negative association with ROE. Consequently, when INR increases, ROA of banks increases and ROE decreases. Furthermore, the mixed results were consistent with previous literature. Studies

from Muriithi et al. (2016) and Supro (2018) showed a negative relationship, while Maniagi's (2018) research showed a positive relationship, and others found positive and negative relationships with banks' profitability indicators (e.g., Elyasiani & Mansur, 2005). Thus, the coefficient and the p-value of the variables in models 1 and 2 partially supported the significance of the models.

Lastly, for control variables, a significant negative relationship was found for ROA with the size of the bank. However, no relationship was found for ROE. Meanwhile, bank capital failed to indicate any relationship with ROA but found a significant negative correlation with ROE.

4. DISCUSSION

This study investigated the impact of market risk on the profitability of Jordanian banks listed on the ASE. Based on the empirical results, market risk indicators such as interest volatility, exchange rate unpredictability, and stock numbers volatility were found to affect the profitability of banks. Nonetheless, stock price risk or SMR was found to be statistically sig-

nificant, indicating that higher SMR may result in higher profitability of banks. This is an expected outcome, since variation in market payback is positive; there will be a positive liaison between volatility and return, and vice versa. This result is consistent with Fahrul and Rusliati (2016) and Maniagi (2018). For exchange rate risk EXR, the results of this variable showed that it has no liaison with ROA, but it has an inverse liaison with ROE. Such findings are similar with Muriithi et al. (2016), and it was projected since variations in exchange rate move in different directions with bank profitability. The results of the last indicator of market risk in this study is INR, which represents interest rate risks found to be statistically significant, indicating that higher INR result in higher ROA and lower ROE. Such mixed results are consistent with the previous literature, where some found negative relationship (e.g., Muriithi et al, 2016; Supro, 2018), some found positive relationship (e.g., Maniagi, 2018), and other found positive and negative relationship with bank profitability indicators (e.g., Elyasiani & Mansur, 2005). In brief, ROA and ROE of Jordanian banks were influenced by market volatility. Bank profitability factors were also affected by preceding year profitability, bank capital, and bank size.

CONCLUSION

This study focused on banks registered on the ASE, recognized as one of the Middle East's most dynamic stock exchanges. The data were gathered during 2010 to 2018 from the data stream of the ASE under the sample of 16 listed Jordanian banks. The GMM approach was used to run the regression, which is presented in Table 2. The statistics regarding the first model are fitted to variables that depend upon its lag value during GMM estimators. It is argued that the erstwhile year bank profitability directly affects the forthcoming year's profit. The first explanatory variable, SMR, which revealed the stock price risk, was observed to have a significant positive affiliation with ROA and ROE. When market risk rises, the profitability of banks may improve. A positive turn in market return will affect a direct link between beta and return, and vice versa. For the second explanatory variable, EXR, the outcomes failed to disclose a connection with ROA, but an adverse connection with ROE was found. In brief, the market risk significantly effects profitability of the banks. Based on the contribution to market risks from this study, managers of Jordanian banks are recommended to find ways to mitigate market risks. For instance, strategies such as reducing the accepted number of financial instruments as collateral and focusing more on real assets would reduce banks' exposure to market price volatility. In turn, this strategy may help to reduce the interest rate of banks and external currency risk exposure. In terms of studying profitability, several extensions would be useful. Currently, research adopting a similar mathematical model for an expanded sample from other countries would be helpful, including extending the study period. Additionally, the usage of quarterly data may be useful to provide a better understanding of bank profitability movements. Thus, it is advocated that future research should comprise a broader cross-section, extended and different periods, and include a more extensive range of variables. Further studies should also explore other industries apart from the banking industry.

AUTHOR CONTRIBUTIONS

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