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EFFECT OF CONVENTIONAL AND ISLAMIC BANKS IN JORDAN: BEFORE AND AFTER ARAB SPRING

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Abstract: This study utilizes Data Envelopment Analysis (DEA) to measure the efficiency of conventional and Islamic banks in Jordan at the first stage. The data covers the period from 2008 and 2019, and a total of 13 conventional and 3 Islamic banks. In the second stage, the data were then analyzed by different parametric and non-parametric tests (e.g., T-test, Mann–Whitney and Kolmogorov–Smirnov tests). The findings reveal that, overall, Islamic banks have higher level of efficiency compared to conventional banks. However, when we have taken the Arab Spring (AS), we observed that Islamic banks have better level of efficiency before AS (2008-2010) but conventional banks outperformed after the AS (2011-2019). Furthermore, we also did not find any significant differences in efficiency between young and old banks. In contrast, there were significant differences in efficiency between small and large banks and the latter outperformed the former. The findings shed light on the relative efficiency levels of these two types of banks, providing insights for policymakers, regulators, and bank management.

Keywords: Efficiency measurement, data envelopment analysis, conventional banks, Islamic banks, Jordan.

Paper type: Empirical article

Introduction

Jordan's banking sector has undergone significant changes over the years, including financial market liberalization, the introduction of Islamic banking, and the adoption of modern banking technology. These changes have aided in increasing competition in the banking sector and improving access to financial services for individuals and businesses (Abdel-ghane Ayat, 2017). Although Jordan has a well-developed banking sector that includes both Islamic and conventional, banks, the first Islamic bank in Jordan was established in 1978. one hand, Islamic banks in Jordan follow

Islamic principles such as profit and loss sharing, risk sharing, and the avoidance of interest-based transactions. The Central Bank of Jordan regulates Islamic banks in Jordan and has put in place a comprehensive regulatory framework to ensure that Islamic principles are thoroughly followed. On the other hand, Conventional banks in Jordan, operate on interest-based transactions and do not adhere to Islamic principles. These financial institutions provide a variety of services, including loans, deposits, and other financial products.

There are many external events that have shaken the banking sector in Jordan. Among them, the Arab Spring, which began in late 2010, had a significant impact on the Middle East and North Africa (MENA) banking sector (Esmaeil et al., 2020; Hamed Ibrahim, 2022) . Jordan's banking sector was not immune to the economic and political turmoil that followed the protests, but the country's relatively stable political environment and economic policies helped to mitigate the effects. Both Islamic and conventional banks faced a range of challenges before and after the Arab Spring. The need to adapt to a changing regulatory environment was one of the major challenges faced by banks in the region following the Arab Spring. Governments throughout the region were enacting new regulations to address corruption and financial stability issues, which had a significant impact on banks. Before the Arab Spring, both Islamic and conventional banks in Jordan were operating in a relatively stable environment.

However, due to the emphasis on ethical and socially responsible investments, Islamic banks were able to weather the storm better than conventional banks in some cases. Islamic banks were also able to capitalize on a growing consumer demand for Shariah-compliant banking products (Julia & Kassim, 2020). During and after the Arab Spring, Jordan's Central Bank implemented several measures to strengthen and improve the banking system's efficiency, which aided both Islamic and conventional banks. But After Arab Spring Jordan's banking sector has continued to face challenges, including political insecurity, regional conflicts, and low economic growth (Arayssi et al., 2019). As more consumers become interested in Shariah-compliant banking products, Jordanian Islamic banks have been able to grow and gain market share. However, in terms of assets and profitability, traditional banks continue to dominate the sector. In contrast, Islamic banks had a smaller market share than conventional banks, which was due in part to the fact that Islamic banking was a relatively new concept in Jordan and yet to get widespread consumer acceptance. However, Jordan's banking sector has experienced significant growth and development in recent years, with Islamic banking emerging as a prominent player alongside conventional banking.

In recent years, Jordan's government has implemented regulatory reforms to promote the growth of Islamic finance, which could improve the efficiency of the country's Islamic banks. Therefore, it is important to examine the efficiency of these two types of banks in Jordan after the Arab Spring. In recent years, the efficiency gap between conventional and Islamic banks has been studied. There are ample of studies that have investigated the similarity and difference of conventional and Islamic banks in the past few years (Majeed & Zainab, 2021; Salman & Nawaz, 2018).

However, the findings of these studies have been contradictory (Chaffai & Hassan, 2019), that there is a significant difference between conventional and Islamic banking (Salman & Nawaz, 2018) ,whereas cost efficiency was positively impacted by Arab Spring in some studies (Chaffai & Hassan, 2019); some studies in the Arab region showed a negative effect (El-Chaarani & Ragab, 2018), and some studies showing that there is no difference in bank efficiency between Islamic and conventional banks (Alexakis et al., 2019). Indeed, there are studies that have investigated various types of efficiency of Jordanian banks by using different sample period and methodologies. For

example, Bdour & Al-khoury (2008) investigated the relative efficiency pattern of Jordanian banks between 1998 and 2004. Using deterministic Data Envelopment Analysis (DEA), the study found an overall increase in bank efficiency during the period, except for a decrease in efficiency between 2003 and 2004 for a few banks in the sample. The analysis also revealed the impact of liberalization on efficiency gains, with most banks showing consistent increases in efficiency, except for a few banks that responded differently.

Furthermore, Zeitun (2013) measured and evaluated the relative efficiency of Jordanian banks from 2005 to 2010 using DEA and found that only a few Jordanian banks demonstrated efficiency in managing financial resources and generating profit. Saleh (2006) examined the financial performance of Islamic banks in Jordan, specifically focusing on Jordan Islamic Bank for Finance and Investment (JIBFI) and Islamic International Arab Bank (IIAB). The study evaluated the efficiency and ability of these banks, highlighting their role in financing projects in Jordan. The findings demonstrated the increased efficiency and expansion of the Islamic banks, particularly in short-term investments. In another study by Alzghoul (2015) evaluated Islamic and conventional banks in Jordan. The study used the CAMEL rating and analyzed a sample of two Islamic banks and three conventional banks. The findings indicated that Islamic banks performed well in management efficiency, liquidity management, and return on assets (ROA), while conventional banks exhibited better capital adequacy, asset quality, and return on equity (ROE). While Milhem (2015) found that Islamic banks being less profitable, more liquid, less risky, and less efficient compared to conventional banks (13 conventional and 3 Islamic).

The purpose of this study is to examine the complexities of Jordan's banking system, with an emphasis on the effectiveness of conventional and Islamic banks. Our objective is to thoroughly examine the effectiveness of these institutions both before to and following the Arab Spring. The assessment goes beyond simple numerical calculations in an effort to unearth complex perspectives on how these banking establishments handled the difficulties brought forth by the Arab Spring.

In conclusion, previous studies on the efficiency of Islamic and conventional banks in Jordan have provided insights into their performance and growing. To the best of our knowledge, no prior study has directly compared the efficiency of Islamic and conventional banks in Jordan before and after the Arab Spring. This research aims to fill this gap and provide valuable insights into the comparative efficiency of these two types of banks in the Jordanian context during the specified study period. Therefore, the first objective of this study is to investigate the efficiency of Islamic and conventional banks before and after Arab spring in Jordan. Second, since efficiency of banks can be affected by many internal and external factors, we have also tried to understand how different organizational factors could affect the efficiency of Islamic and conventional banks.

Considering the paucity of existing literature, this study's findings can contribute several ways to the existing literature. By providing empirical evidence on the efficiency of these systems in Jordan before and after the Arab Spring, this study adds to the existing academic literature on Islamic and conventional banking systems. This study will add to the few that have compared the efficiency of Islamic and conventional banks in the context of the Arab Spring, as well as provide insights into how these banks have dealt with such external shocks. Moreover, the research could assist policymakers in developing effective policies that promote greater efficiency and stability in both systems, resulting in a stronger and more resilient banking sector in the country. Having said that, the practitioners may find the study’s findings useful to understand the differences and similarities between Islamic and conventional banking systems, allowing them to make more informed decisions when investing in these systems.

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Literature Review

Efficiency is a critical aspect of the banking industry and understanding the comparative efficiency between Islamic and conventional banks is essential for policymakers and stakeholders. This literature review aims to explore previous studies that have examined the efficiency measurement in Islamic and conventional banking in recent years.

Overview of the Islamic banking system and its principles

The Islamic banking system is a unique financial system based on Islamic law, also known as Shariah. The system has its origins in early Islamic civilization and has grown significantly in recent decades. Based on a review of relevant literature, this section provides an overview of the Islamic banking system and its principles to better understand the differences with the conventional one. The prohibition of interest-based transactions, also known as *Riba*, is a key principle of the Islamic banking system. This principle is based on the Islamic belief that money should not be used to generate more money without exerting any effort or taking any risks. Instead, profit and loss sharing (PLS) agreements, such as *Mudarabah* and *Musharakah*, are used in Islamic banking, where the bank shares the risk and reward with the borrower. This ensures that the bank is invested in the borrower's success and contributes to the equitable distribution of wealth (Biancone, Saiti, Petricean, & Chmet, 2020; Rosman, Wahab, & Zainol, 2014). Another Islamic banking system principle is the prohibition of investing in businesses that are deemed harmful to society, such as gambling, alcohol, and tobacco. This is known as the ethical investing principle, and it ensures that the banking system is in line with the values and ethics of the community it serves (Al-Hares & Saleem, 2017; Mansoor Khan & Ishaq Bhatti, 2008).

Furthermore, the Islamic banking system emphasizes social responsibility and encourages banks to invest in projects that have a positive social impact. This is known as the social financing principle, and it ensures that the banking system contributes to the betterment of society as a whole (Aggarwal & Yousef, 2000; Al-Khasawneh, Bassedat, Aktan, & Darshini Pun Thapa, 2012; Al Rahahleh, Ishaq Bhatti, & Najuna Misman, 2019). Overall, the Islamic banking system is based on principles of justice, fairness, and equality, and promotes ethical, social, and moral values. It offers an alternative to the conventional banking system and provides a unique perspective on how financial institutions can operate in a socially responsible and sustainable manner (Sufian & Kamarudin, 2015).

Review on Efficiency Measurement in Islamic and Conventional Banking

Efficiency measurement is a fundamental aspect of assessing a bank's performance and competitiveness. Various methodologies and techniques have been employed to assess the efficiency of both Islamic and conventional banks in recent years. These methods include Data Envelopment Analysis (DEA), Stochastic Frontier Analysis (SFA), and financial ratio analysis, whereby each offering unique insights into bank efficiency. Several studies have utilized DEA to measure the efficiency of Islamic and conventional banks. One study by Saeed, Ali, & Baber Adeeb (2013) applied DEA to assess the efficiency of Islamic and conventional banks in Pakistan, revealing that Islamic banks exhibited higher efficiency levels compared to their conventional counterparts. A notable study by Majeed & Zanib (2016) used DEA to examine the efficiency of full-fledged Islamic banks, Islamic branches of conventional banks, and conventional banks in Pakistan. The study calculated three efficiency measures: total technical efficiency, pure technical efficiency, and scale efficiency. Overall, full-fledged Islamic banks were found to be less efficient in terms of total

technical efficiency and pure technical efficiency when compared to conventional banks, according to the findings. However, when compared to their counterparts, Islamic branches of conventional banks demonstrated high scale efficiency.

Mobarek & Kalonov (2014) investigated the performance of Islamic and conventional banks in 18 OIC (Organisation of Islamic Cooperation) countries, focusing on the recent financial crisis. The study utilized DEA and SFA to measure efficiency and estimated the soundness score of the banks using the Z-score. The findings indicated that conventional banks were more efficient than Islamic banks in terms of total technical efficiency and pure technical efficiency. However, Islamic banks exhibited greater financial stability compared to conventional banks. Another study by Ismail, Shabri Abd. Majid, & Rahim (2013) examined the cost efficiencies of selected Islamic and conventional banks in Malaysia. The study employed DEA to investigate cost efficiency and Tobit regression analysis to determine the factors influencing efficiency. The DEA results showed that technical efficiency contributed significantly to cost efficiency for conventional banks, while allocative efficiency played a crucial role for Islamic banks. Additionally, the study found that capitalization and bank size were positively associated with efficiency, while loan quality had a negative impact (Ismail et al., 2013).

Then, Aghimien (2016) exclusively focused on Gulf Cooperation Council (GCC) banks and their efficiency levels. The study employed DEA with variable returns to scale to measure technical efficiency, pure technical efficiency, and scale efficiency. The findings indicated that many GCC banks operated within an optimal scale of efficiency. However, managerial inefficiency in resource utilization was observed. Moreover, larger banks tended to operate at constant returns to scale or decreasing returns to scale, while smaller banks exhibited varying efficiency levels. Hassan (2009) conducted a cross-country analysis of conventional and Islamic banks, evaluating mean cost, revenue, and profit efficiency scores. The study utilized DEA to analyze data from 40 banks from 11 OIC countries. The findings suggested no significant differences between the overall efficiency of conventional and Islamic banks. However, both banking systems had room for improvement in cost minimization and revenue and profit maximization. Size and age did not significantly influence efficiency scores in both banking streams.

Review on Banking Efficiency in Different Geographies

Mezzi (2018) examined the efficiency of Islamic banks in the MENA region and Southeast Asia, and the role of governance in improving performance. The study used DEA to measure efficiency and panel estimation to examine the determinants of efficiency, specifically focusing on the impact of governance structure. The results show that Islamic banks have improved in cost efficiency, with technical efficiency largely explained by scale efficiency. The study also finds that the board of directors, through its size and independence and the presence of a central Sharia board, has a significant impact on the efficiency of Islamic banks. However, ownership structure and the size of the Sharia board do not have an effect on banking efficiency. Overall, the study highlights the importance of governance in the performance of Islamic banks.

Shokr (2018) examined the relevance of the bank lending channel of monetary policy and the bank efficiency in Egypt using panel data over the period from 1996 to 2014. The study used the generalized method of the moments model to examine the effectiveness of the bank lending channel and the stochastic frontier approach to measure bank efficiency.

The findings suggest that the bank lending channel is relevant and that banks with low inflation and high GDP tend to perform more efficiently. The study suggests that the Central Bank of Egypt should adjust interest rates to stabilize the bank loan supply.

Mirzaei (2019) examined the relationship between bank efficiency and the growth and market structure of 23 manufacturing sectors in a two-dimensional panel framework. The study used cost and profit efficiency scores from 5850 banks and finds that industries that rely heavily on external finance grow faster and have more new enterprise creation in countries with efficient banking systems. The research also suggests that the positive effects on growth and market structure primarily come from cost efficiency during the financial crisis period. Kallel (2019) examined the efficiency of Tunisian and Moroccan banks using the SFA from 2005 to 2014. The study uses a sample of Tunisian and Moroccan banks, and the results indicate that Tunisian banks are more efficient than Moroccan banks. The study found that the Moroccan banks tend to be more efficient than the Tunisian counterparts (i.e., 79 percent vs 66 percent).

Alsharif (2021) investigated the relationship between risk, efficiency and capital in the GCC dual banking system for 60 listed commercial banks over a period from 2005 through 2018. The study employs six measures of risk to extensively investigate this relationship while focusing on how the business model affects the relationship. Although GCC Islamic banks are more capitalized and liquid, they are riskier and less efficient than GCC conventional banks.

Naushad (2021) examined the efficiency of four fully Sharia-compliant banks in Saudi Arabia using the CAMEL framework, which stands for Capital adequacy, Asset quality, Management quality, Earnings ability, and Liquidity. The study uses publicly available audited data for a ten-year period to evaluate the financial performance of these banks. The results show that all four banks performed well on the CAMEL framework, with AlRajhi Bank being rated the best among them. However, the study suggests that a comparison of Sharia-compliant banks with conventional commercial banks would be beneficial and recommends that more banks should offer Sharia-based products.

In conclusion, studies on efficiency measurement in Islamic and conventional banking have utilized various methodologies such as DEA, SFA, and financial ratio analysis. The findings have shown differences in efficiency levels between Islamic and conventional banks, with some studies reporting higher efficiency for conventional banks while others highlighting the financial stability of Islamic banks. Factors such as capitalization, bank size, loan quality, and resource allocation have been identified as key determinants of efficiency. By evaluating the efficiency of Islamic and conventional banks in Jordan during the specified study period, this research aims to contribute to the existing literature and provide insights into their relative performance.

Methodology

Data Envelopment Analysis

DEA is a non-parametric technique, Multiple DMUs' relative efficiency can be evaluated using DEA. It evaluates how well a DMU uses its inputs to generate outputs. It is especially helpful in scenarios when defining a functional form for the production or transformation process is difficult.

Efficiency in DEA is determined by comparing each DMU's actual performance to a "best-practice" frontier defined by the DMUs with the highest efficiency. The CCR (Charnes, Cooper, and Rhodes) model and the BCC (Banker, Charnes, and Cooper) model are the two main models used to quantify DEA efficiency. Using Data Envelopment Analysis (DEA) to analyze the efficiency of conventional and Islamic banks in Jordan before and after the Arab Spring presents both advantages and disadvantages compared to alternative methodologies. This is especially important for multifaceted decision-making units like banks. Additionally, DEA specifies a relative efficiency measure, facilitating benchmarking against peer institutions and offering insights into areas for enhancement. A comprehensive examination of bank performance that considers both financial and non-financial factors is also made possible by its ability to support various evaluation criteria. If banks behave significantly differently from the expected optimal scale, the results may be biased by the DEA's assumption of continuous returns to scale. In emerging markets or for specialized institutions such as Islamic banks, the data requirements for DEA can be quite stringent, and the subjective nature of input and output selection can lead to bias. Since the DEA is a relative measure and does not specifically consider outside factors affecting bank performance, it can be difficult to interpret. Therefore, while choosing DEA as the methodology for study, researchers should carefully evaluate its limits and inherent biases, even though DEA delivers insightful information about banking efficiency.

Data and sources of data

The data in this study were extracted from the Annual Reports of each Banks and the financial statement (Income and Balance sheet), the central bank database of Jordan. Jordanian banking system is one of the world's oldest banking (Abdel-ghane Ayat, 2017; Alomari et al., 2020). In general, the profitability of Jordanian banking has been growing on a year-to-year basis, with Jordanian banking in the lead in term of total assets. According to the annual report IFN (2016), the geopolitical instability and the spillover of the Arab Spring have affected the Jordanian economy significantly; however, the Kingdom is making a real recovery. According to the Arab World Competitiveness Report (2018), Jordan experienced a 3.1 real GDP growth in 2014 and continued to grow in 2015 (3.5%) and 2016 (3.9%). On the back of improving the economy and the government focus on banking financial institutions, new avenues and growth opportunities are anticipated for the country. The Data Envelopment Analysis (DEA) method was utilized in this study to assess Jordanian banks' efficiency. The two primary DEA models for measuring efficiency that we used were the well-known CCR (Charnes, Cooper, and Rhodes) model and the BCC (Banker, Charnes, and Cooper) model. These variables comprised total assets, liabilities, and equity, among others. Conversely, the outputs included important financial performance indicators including returns on assets and earnings. This research sought to offer a thorough assessment of the efficiency of Islamic and conventional banks in Jordan prior to and following the Arab Spring by utilizing both the CCR and BCC models and taking a variety of inputs and outputs into account. Using this approach, we were able to evaluate how successfully these banks made use of their resources in order to produce the intended financial results and deal with the difficulties brought about by outside events affecting the banking industry.

Result and Discussion

In this section, we provide the results of our research objectives discussed above. In so doing, first we provide the overview of overall banking efficiency in the Jordan.

Then, the efficiency between Islamic and conventional banks, during the Arab Spring period is presented. In doing so, we use several mean tests, such as, T-test, Mann–Whitney test and Kolmogorov–Smirnov test. as previously adopted by researchers (Alsharif et al., 2019; Khoirunnisa & Aliludin, 2021). While Hamed Ibrahim (2022) explored the stability case of Jordan regarding Arab Spring and the pandemic, empirical evidence can further add insights into the investigation. Given the inconsistent results in prior studies and the broad focus on various Arab regions (Chaffai & Hassan, 2019), an empirical investigation of focusing on a single country, Jordan, can provide meaningful implications for the country's banking system. Altarawneh and Shafie (2018) evaluated bank performance of Jordon considering Arab Spring; however, the study considered a small sample size and did not differentiate between Islamic and Conventional banks. Therefore, the present study compared the efficiency of Islamic and conventional banks.

Overall Efficiency of Banks in Jordan

The figure below depicts that out of the sixteen banks, Arab Bank, Arab Banking Corporation and Jordan Islamic Bank showed high efficiency and stability before and after the Arab Spring with an efficiency of 1 throughout the period. Arab Jordan Investment Bank had poor efficiency in 2009 which remained low till 2010 with an increase to above 0.3 in 2011. After the Arab Spring, Arab Jordan Investment Bank observed a growth in its bank efficiency with a major increase to 1.0 in 2013. Similar trends were observed for Bank Aletihad where bank efficiency was low till Arab Spring period after which bank efficiency improved with an all-time high in 2013. However, after 2015, there has been a gradual decline in efficiency in Bank Aletihad. Bank of Jordan has lower efficiency compared to other banks, with efficiency above 0.6 from 2012 to 2014. Invest Bank, Jordan Kuwait Bank and Jordan Ahli Bank PLC also witnessed lower efficiency from 2009 to 2011 with an increase in efficiency from 2012. On the contrary, Societe Generale de Banque Jordan had high efficiency of 1.0 from 2008 to 2010 with a drop during the Arab Spring. However, the bank efficiency improved after the Arab Spring with a decline in efficiency to 0.5 in 2019. Additionally, Salwa Islamic Bank experienced a decline in efficiency after 2009 where efficiency score dropped from 1 to 0.2 and efficiency remained low during and after the Arab Spring with largest decline in 2014 and 2015. Similar to this, Islamic International Bank also suffered a decline in efficiency in 2014 and 2015. The efficiency of Jordan Commercial Bank was low from 2008 to 2012, indicating that the bank struggled with maintaining output with the limited resources during the Arab Spring.

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Figure 4.1: Overall efficiency of Banks (2008-2019). (Source: Authors)

Comparison of efficiency of Islamic and Conventional Banks

Table 4.1 shows the results for the efficiency of Islamic and conventional banks, before and after the Arab Spring for Jordan. The table displays three tests as previously mentioned where firstly the t-test is presented followed by Mann-Whitney test and Kolmogorov-Smirnov test. The results indicate that efficiency of conventional and Islamic banks is not similar, with overall efficiency of 1.607 from 2008 to 2019 from t-test at a 10% significance level. Efficiency score was 3.202 with a significance level of 1% while Kolmogorov-Smirnov test statistic was 0.449 at a 1 % significance level. Before Arab Spring, Islamic banks showed better efficiency compared to conventional banks. Islamic banks are found to have better capital (Majeed & Zainab, 2021). With a t-statistic of 4.505 at a 1% significance level, the t-test confirmed that Islamic and conventional banks do not have the same mean. After Arab Spring (2011-2019), conventional banks have better efficiency compared to Islamic banks. Similarly, a few studies have discussed that conventional banks have better performance and efficiency in the Arab region compared to Islamic banks (Chaffai & Hassan, 2019; Etab & El-Moslemany, 2020). In the case of Jordon, Abdo (2020) discussed that Islamic banks can enhance their financial structure in order to improve their financial efficiency.

Table 4.1 Efficiency comparison of Islamic and conventional banks, before and after the Arab Spring.

Test Name	*t*-Test	Mann–Whitney test	Kolmogorov–Smirnov test
Test Statistics	*t (Prob > t)*	*z (Prob > z)*	*D (Prob > D)*
2008-2019			
Efficiency	1.607^{*} (0.056)	3.202^{***} (0.001)	0.449^{***} (0.000)
2008-2010 (before Arab Spring)			
Efficiency	4.505^{***} (0.000)	3.526^{***} (0.000)	0.7692^{***} (0.000)
2011-2019 (After Arab Spring)			
Efficiency	-1.3464^{*} (0.090)	0.914 (0.361)	0.379^{**} (0.004)

Note: t-test tests the null hypothesis that conventional and Islamic banks have the same mean; Mann–

Whitney test and Kolmogorov–Smirnov test are non-parametric tests that test the null hypothesis that the two samples are drawn from the same distribution. ***, ** and * indicate the statistical difference at 1%, 5%and 10% significance levels, respectively.

In Table 4.2, the results for the impact of Arab Spring on efficiency of the banks, both Islamic and Conventional, are displayed. According to the table values, overall efficiency of the banks in Jordan in the period from 2008 to 2010 was 0.376 while the post-Arab Spring period increased the efficiency to 0.761. The results are statistically significant at a 1% significance level for the t-test, MW test and KS Test. Secondly, in order to compare the efficiency of Islamic and conventional banks by considering the case of Arab Spring. The findings showed that Islamic banks had a higher efficiency before the Arab Spring with 0.910 efficiency score while after the Arab Spring, the efficiency of banks in Jordan declined to 0.699; however, the result only significant at a 1% significance level based on the t-test. In terms of the conventional banks in Jordan, it was observed that efficiency before the Arab Spring was lower as compared to 2011-2019 period. Thus, improvement in efficiency was observed in the post-Arab Spring period. The results are statistically significant at a 1% significance level for all the three tests used in the analysis. Ghosh (2016) showed that efficiency of banks declined due to the Arab Spring while similar to the present study's findings, Chaffai and Hassan (2019) found that efficiency of banks increased due to Arab Spring.

Table 4.2 Influence of Arab Spring on efficiency of Islamic and Conventional Banks

Period	Efficiency
All Banks	
2008-2010	0.376
2011-2019	0.761
Difference	-0.383
P-value (t-test)	0.000***
P-value (MW-test)	0.001***
P-value (KS-test)	0.000***
Islamic Banks	
2008-2010	0.910
2011-2019	0.699
Difference	0.210
P-value (t-test)	0.075*
P-value (MW-test)	0.112
P-value (KS-test)	0.594
Conventional Banks	
2008-2010	0.255
2011-2019	0.775
Difference	-0.521
P-value (t-test)	0.000***
P-value (MW-test)	0.000***
P-value (KS-test)	0.000***

Note: The table presents the results from the parametric (t-test) and non-parametric (Mann–Whitney and Kolmogorov–Smirnov) tests. These tests are used to test the null hypothesis that there is no significant change in Jordanian banks efficiency between the two periods of before and after the

Arab Spring. ***, ** and * indicate the statistical difference at 1%, 5%and 10% significance levels, respectively.

Differences in efficiency by age and size of Banks.

Prior research considered the role of firm age and size when evaluating the performance of banks (Altarawneh & Shafie, 2018; Duho et al., 2020; Zhou et al., 2021). Thus, given the importance of factors such as age and size, the present study evaluated whether banks' age and size impacted the efficiency in the case of Jordan. Table 4.3 and 4.4 present the results of the analysis where Table 4.3 deals with the efficiency comparison in terms of firm age. The findings show that younger banks had an efficiency coefficient of 0.653 while old banks were found to have an efficiency score of 0.677 for the period 2008 to 2019. However, the results confirmed that that there are no significant differences in efficiency between old and young Jordanian banks as the p-value for t-test, MW test and KS test were greater than 0.05. Therefore, no evidence was found to reject the null hypothesis. In contrast, Altarawneh and Shafie (2018) found that firm age was positively and significantly impacting bank performance in the country. Similarly, (Duho et al., 2020) showed that firm age is significantly associated with the performance of the bank. However, Ajili and Bouri (2018) also found that bank age does not significantly relate to bank performance in the case of Islamic banks. Moreover, Siddique et al. (2020) incorporated bank age as the control variable but did not find a significant association between age and performance in the case of Asian banks., which is in line with the findings of the present study.

Table 4.3 Efficiency comparison by age

Test Name	*Efficiency*
All Banks (2008-2019)	
Young Banks	*0.653*
Old Banks	0.677
Difference	-0.024
P-value (t-test)	0.645
P-value (MW-test)	0.718
P-value (KS-test)	0.342

Note: Note: The table presents the results from the parametric (t-test) and non-parametric (Mann–Whitney and Kolmogorov–Smirnov) tests. These tests are used to test the null hypothesis that there is no significant change in Jordanian banks efficiency between the small and large banks. The categorization is done based on the median value of the bank age. ***, ** and * indicate the statistical difference at 1%, 5%and 10% significance levels, respectively.

Table 4.4 displays the results for the efficiency comparison by considering the role of bank size. As per the null hypothesis, there is no significant difference in banks efficiency in Jordan between the small and large banks and with statistically significant results at a 1% significance level for t-test, MW test and KS-test, the result from below table shows that there are significant differences in efficiency between small and large banks. Large banks have higher level of efficiency than smaller banks as shown in the table below. In contrast, Altarawneh and Shafie (2018) found that bank size in Jordan is negatively and significantly associated with the performance of banks in Jordan, indicating that larger banks have a negative influence on the efficiency. Fang et al. (2019) stated that larger banks might be difficult to manage, leading to lower efficiency. On the contrary, Duho et al. (2020) found that large banks have better performance compared to smaller firms which

aligns with the findings of the present study. Larger banks are said to have better profitability and risk control (Zhou et al., 2021).

Table 4.4: Efficiency comparison by size

Test Name	*Efficiency*
All Banks (2008-2019)	
Small Banks	0.565
Large Banks	0.765
Difference	-0.200
P-value (t-test)	0.000***
P-value (MW-test)	0.001***
P-value (KS-test)	0.002***

Note: The table presents the results from the parametric (t-test) and non-parametric (Mann–Whitney and Kolmogorov–Smirnov) tests. These tests are used to test the null hypothesis that there is no significant change in Jordanian banks efficiency between the small and large banks. The categorization is done based on the median value of the bank size. ***, ** and * indicate the statistical difference at 1%, 5%and 10% significance levels, respectively.

Conclusion

In conclusion, elaborated on the efficiency of banks in Jordan to further investigate how Arab Spring affected the banks' performance in the country using t-test, MW and KS test.The findings showed that efficiency of Jordanian banks increased after the Arab Spring where conventional banks performed better than Islamic banks.

The analysis also demonstrated the differences in efficiency trends over time. Islamic banks exhibited more fluctuation and movement in efficiency compared to conventional banks. During the Arab Spring crisis, Islamic banks' efficiency declined but later recovered and continued to increase. In contrast, conventional banks maintained a relatively stable level of efficiency. Furthermore, additional analyses examined the factors influencing bank efficiency. Bank size, GDP growth, and Central Government Debt were found to significantly impact the efficiency of conventional banks. However, for Islamic banks, inflation rate (INFR) and Central Government Debt were the significant factors affecting efficiency.

Overall, the findings suggest that conventional banks outperformed Islamic banks in terms of efficiency in the Jordanian context. This disparity may be attributed to various factors, including differences in business models and the focus of Islamic banks on real economy activities. Moreover, the Arab Spring crisis had a limited impact on bank efficiency in Jordan, indicating the resilience of the banking sector in the country during that period. These findings contribute to the understanding of the efficiency dynamics in the Jordanian banking sector, particularly in relation to the coexistence of conventional and Islamic banks. Policymakers, regulators, and bank management can utilize these insights to further explore the factors driving efficiency and develop strategies to enhance the performance of both types of banks.

It is important to note that this study has certain limitations. The analysis focused on a

specific period and a limited set of variables, which may not capture the entire complexity of bank efficiency. Future research could consider a broader range of factors and conduct a more extensive analysis to provide a comprehensive understanding of the efficiency dynamics in the Jordanian banking sector.

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Conflict of interest

The authors declare that they have no competing interests in relation to this study and its publication.

Data availability

The datasets generated and analysed during this study are available from the corresponding author upon reasonable request.

Ethics Declaration

As this study was based on publicly available secondary data and did not involve human participants directly, ethics committee approval was not required.

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