

The Effectiveness of Fintech Strategies in Mitigating Credit Risk: A Case Study of Jordanian Islamic Banks (2016-2022)

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Abstract: This study investigates the impact of financial technology (fintech) on credit risk in the Islamic banking sector in Jordan. Using data from three major Islamic banks in Jordan from 2016 to 2022, the study employs pooled data regression analysis to examine the relationship between fintech investments (computer equipment, software, and ATMs) and credit risk. The results indicate that investment in computer programs and systems significantly reduces credit risk in Islamic banks, while investment in computer equipment and the number of ATMs have no significant effect. The findings highlight the potential of fintech, particularly software and systems, in enhancing credit risk management in Islamic banks. However, the study also acknowledges the limitations of the sample size and the need for further research incorporating a broader range of fintech indicators and Islamic banks. The study contributes to the growing literature on fintech and risk management in Islamic banking and offers practical implications for Islamic banks and policymakers.

Keywords: Credit Risks, Financial Technology, Islamic Banks, Jordan

1. Introduction

The financial technology revolution has not only left its mark but has fundamentally changed the course of human history. The value of financial technology has increased due to digitization, which has made services more widely available. Big data, artificial intelligence, expertise, innovation, and digital technology contributed to the financial sector's explosive rise. Jordan has made a concerted effort to foster fintech development through banking support, government initiatives, and regulatory frameworks.

The Central Bank of Jordan supports fintech by facilitating many payment methods, promoting financial inclusion and decreasing dependency on cash. In 2018, the Fintech Regulatory Sandbox was created by CBJ, allowing fintech firms to provide cutting-edge financial services and goods under highly controlled observation. Jordan safeguards financial stability and consumer protection through every regulatory framework. The country has enacted laws, and regulations have matured that maintain digital transactions, data protection, cybersecurity, secure transactions, and innovative services. As demonstrated by the high risk reduction that some Islamic banks and financial intermediaries have been able to establish through this technology, advancements can be an essential defensive strategy. For example, robust credit scoring models, automated underwriting systems, and real-time monitoring tools allow Islamic banks to make accurate credit evaluations using accurate borrower creditworthiness data, anticipate emerging risks, and develop all new lending techniques. Also, banks can detect early signs of credit deterioration using advanced data analytics and machine learning algorithms, enabling them to stop losses through their treatments. These technologies improve the efficiency of credit risk management while safeguarding Islamic banking operations' security and resistance. This observation confirms the recommendation offered by this study that Islamic banks should rely more on fintech. This will give them great hope and trust concerning the future of Islamic banking since it successfully lowers the very credit risks they face (Al Jazeera Bank, 2021).

Fintech severely threatens traditional banking and the financial sector because of its disruptive yet similar financial services. The Islamic banking and financial industries are also highly pressured since Islamic institutions charge more fees than traditional banks do. Islamic banking has the potential to grow throughout developing countries and strengthen its position as a major player in the financial sector. Fintech's gains in financing include efforts to simplify financial transactions and investments and make it very simple and easy for clients to perform banking-related business even though they must attend in person. Few studies have specifically examined Fintech's impact on credit risk in Islamic banks, despite the fact that some have examined the wider consequences of the technology on financial institutions' performance and risk management. Furthermore, many previous studies, especially in the Middle East, have lacked empirical data from actual banking contexts. The study offers significant empirical insights into the effect of Fintech investments on credit risk within a particular regional context by concentrating on Islamic banks in Jordan along with providing a comprehensive view of how technological innovations alter risk management methods in Islamic banks by examining the impact of Fintech investments on credit risk. By determining how Fintech investments affect credit risk, authorities may create focused plans to capitalise on Fintech's advantages while reducing possible hazards to Islamic banking operations. Therefore, this paper is structured as follows: the next section presents and discusses the theoretical framework and research methods, the case study findings are then examined, and the final section includes a broad discussion and conclusions drawn from the study.

2. Literature Review

Fintech is a revolutionary breakthrough in the financial industry, as it is the product of a link between two main sectors, namely the technology sector and the financial sector. This interaction between technology

and money is not new, as the relationship between the technology sector and the financial sector is long. Still, the COVID-19 pandemic represented a pivotal moment that contributed to the speed of its spread, as it has become used today. It broadly addresses the needs of all segments of society and enables the customer audience to access financial services efficiently.

Fintech has broken the time and place restrictions (Sun, Y. L, 2021), making access to information viable and less expensive than traditional methods (Hidajat, T, 2020). Moreover, the advancement of fintech has led to the development of various financial tools and applications (Siska, 2022) and has played an increasingly significant role in facilitating access to financial services and thus enhancing competition (Navaretti et al, 2018). Enhancing customer attraction strategies, expediting the processing of intricate transactions, improving financial inclusion, cutting service costs, offering sophisticated financial analysis, knowledge transfer, achieving transparency, and achieving financial stability are all made possible by fintech (Union of Arab Banks, 2019).

Fintech has entered a new phase of rapid development, which is significantly affect financial institutions. Technical programs are designed to suit the model of traditional financial institutions, which makes the Islamic financial industry face intense competition, especially when compared to the services of conventional financial institutions, as it is a challenge facing these institutions. Therefore, successful institutions benefit from contemporary technologies to provide services and not lose the opportunity to compete in the financial market (Union of Arab Banks, 2019). The world today is going through an unprecedented wave of transformation. Therefore, Islamic financial institutions and supervisory and regulatory authorities must acquire, test, adapt and benefit from these new practices to achieve success and continue operating (General Council of Islamic Banks and Financial Institutions, 2022).

Nowadays, banks are fully engaged in the fintech era, leading to new business models and risks. Islamic banks are not immune to these developments, as they have been able through fintech to provide efficient and safe digital financial products and services, which contributed to accessing its services quickly and conveniently. Islamic banks can expand the use of fintech to meet the needs of their customers, looking for digital solutions that reflect their lifestyles and at the same time, are compatible with the principles of Islamic Sharia. The current customer audience has adapted to the speed and ease of using smart applications in their daily lives, especially mobile phone applications. In return, they expect banking and financial services to be provided to them similarly. Accordingly, Islamic banks had to take immediate steps towards adopting fintech. This ensures that it quickly adapts to customers' diverse desires and expectations and always meets them wherever they are. Since customer expectations have changed, it is necessary to focus now on meeting customer requirements and not on products, as customers request services through electronic channels instead of traditional channels, especially the younger generations, which requires quick decisions and designing products according to their desires. Some believe that banks in their current, traditional form will not survive and will not be able to continue competing, as new financing facilities provide their services in a rapidly automated manner and base their decisions on data, including cash flows to customers on payment platforms or even the customer's behavior on social media, or the customer's classification on e-commerce websites and other non-traditional information sources (Gaudio, 2021; Mahboub, 2018). That is, fintech becomes an essential factor in marketing through electronic platforms, providing electronic services, or even making and implementing decisions. A bank that does not deal with this will not be able to continue competing (Association of Banks in Jordan, 2021).

FinTech in Islamic banks focuses on providing ethical and fair financial services to its customers and users based on the principles of Islamic finance. The target audience for this technology is customers who want to assess their financial needs including saving, investing and financing responsibly. Therefore, solutions provided by fintech through convenient wallets, platforms and application services accessed via mobile phones would be the appropriate solution (Hamdan, et al, 2022; Gomber et al, 2018). Fintech can

also be essential in providing financial services to groups with difficulties accessing them, such as small and medium enterprises (Global Islamic fintech, 2022). A survey of global Islamic bankers for 2020 conducted by the General Council of Islamic Banks and Financial Institutions showed that rapid developments in fintech and digital transformation are at the core of the work of Islamic banks and have become their primary concern (Council of Islamic Banks and Financial Institutions, 2020). Thus, fintech contributes to enhancing financial inclusion in a way that is compatible with the specificity of Islamic banks by providing innovative financial services to customers looking for modern, integrated financial options that are compatible with their Islamic principles. The greatest way for Islamic banks to expand the range of services they provide and boost revenue is through fintech. Fintech will also help Islamic banks enter the international competition race. Significantly, increase their market share and provide comfort and ease to their customers. Islamic banks have come to understand the value and potential of fintech in assisting them in reaching their objectives, particularly in the context of the digital transformation brought about by the Corona crisis. Fintech utilization permits expansion in all Islamic banking transactions, including payments, collections, working capital, liquidity management, and other bank activities.

Technology and data management are the most critical elements that contribute to improving Islamic financial institutions' flexibility in the long term. Given that innovation and information technology rank second in the Global Survey of Islamic Bankers in 2021. One of the most significant factors influencing the growth and development of the banking sector is that leaders in the Islamic financial industry should recognize the significance of embracing fintech innovation to stay up with global developments. Because some banks face several challenges in using technology due to infrastructure or established business models, a few Islamic banks consider themselves more advanced in using technology to implement new business models or compete with existing banks (General Council of Islamic Banks and Financial Institutions, 2022).

Despite the growth and spread that Islamic banks have witnessed, they have faced and continue to face many risks, especially with introducing fintech into their operations. This requires reconsidering and understanding these risks and determining how they can be addressed and their adverse effects reduced. Fintech can modify the edifice of traditional financial services by making them reliable and accessible. However, the rapid development of fintech services poses a threat. All preventive measures must be taken to ensure the security and integrity of the banking sector, given that fintech and its many applications present opportunities and challenges for financial institutions (Union of Arab Banks, 2019). It is known that technology has played a significant role in business sustainability during the Corona pandemic, as the financial sector witnessed a noticeable acceleration in adopting the digitization process and a change in customer trends. However, technology represents one of the biggest challenges that have been monitored since the launch of the global survey of Islamic bankers, as it ranked first among the biggest concerns for 2022 with a score of 4.4, while it ranked fifth in 2021 with a score of 4.2; Therefore, IT and cybersecurity risks are likely to be at the forefront of banks' concerns for a long time to come (General Council of Islamic Banks and Financial Institutions, 2022). Islamic banks will not be immune from these risks (Al-Habashna, 2023). Therefore, it is necessary to guard against the risks associated with fintech innovations. As a double-edged sword, it can be called the "Fintech dilemma." Just as fintech brings many advantages to banks by enhancing their digital transformation, it also exposes them to many risks. Banks will not only be harmed but also the entire financial system. Consequently, when using these techniques, all potential risks must first be identified, measured, combated, and controlled.

FinTech entails technology and money-related hazards, which may worsen these risks (Zhong Huian, 2018). Conventional financial risks like credit risk, operational and legal compliance risks, liquidity risk, systemic financial risks, and risks brought on by non-financial elements such as information technology are among the possible hazards associated with fintech (Saleem, 2021). The process by which fintech

affects the systemic risks facing the banking sector (Wang & Wu, 2018). As per Li and Ye (2019), there will be changes in the types and characteristics of risks due to innovation and development in fintech. Several hidden risks, such as operational risks, cybercrimes, breach of privacy and fraud will also emerge, as well as systemic risks and business hazards (Li and Ye, 2019). Zhang (2018) pointed out three main risks of fintech: financial fraud through fintech. Operational risk is second because it is simple to make operational mistakes that result in capital loss concerns. Therefore, consumers and financial practitioners do not grasp the intricate procedures of fintech design. The third risk is the likelihood of privacy breaches and data theft of customers (Zhang, 2018). Yang (2019) affirmed that fintech exacerbates risk by complicating financial institutions' exposure. Fintech makes financial services more accessible but may also attract high-risk clients at various levels, raising the possibility of credit risk (Yang, 2019). Wang & Wu (2018) and Qiu et al (2018) found that the level of risk is high in banks due to fintech. Some studies have opined that using fintech by banks can decrease banks' risk level. The study by Guo & Shen (2016) revealed that if commercial banks use fintech effectively, they could reduce the costs of banking risk management (Guo & Shen, 2016), which was also supported by several studies, including Li et al (2022) and Jin et al (2020). According to Li et al (2022), fintech can also lower risk because AI technology can enhance asset portfolios by compliance requirements, offer customized services to clients with varying risk tolerances, and accurately measure the risks in banks. It can also provide various solutions for risk identification, early warning, and elimination (Li et al, 2022).

Fintech innovations may be considered a wide range of technology developments, ranging from digital platforms and Blockchain to AI and machine learning. However, they have real potential for dynamic impacts on many aspects of bank activities, such as credit risk. In comparison to conventional banks, Fintech innovations have unique opportunities to enhance efficiency, access and transparency in Islamic banking within Sharia rules. For example, for Islamic finance transaction a context, Blockchain can be used for smart contracts, and cut transaction costs and provide for transparency in Sharia law enforcement (Hassan et al., 2020).

Shah, et al. (2023) used both primary and secondary sources of data which covered 2009-2021; primary data was on fintech awareness and adoption. Lile Et al concluded the effect fintech has on pre- and post-financing credit risks of fine sharia banks after study financial and economic factors. This paper analyzed how decisions made using these reduce credit risks controlling on GDP, BRD size, ROA, and leverage using a baseline regression analysis. I also addressed the concerns about endogeneity using a dynamic panel two-stage generalised method of moments. The Asia Pacific area, especially Indonesia and Malaysia, is the frontrunner in fintechsight- accepting and – depending on their benefits. Results showed large variations in and around fintech awareness and acceptance one more Islamic countries are. Prefinancing crept from normal risk's position is more influenced by these variables compared to post financing.

Al Hammadi, et al. (2024) investigated the effects of digitalization especially FinTech on the UAE Islamic banks' risk management efficacy. In order to provide an outline for the inquiry, the researcher developed a conceptual model that claims a variety of elements determined risk management outcome, such as acceptance of FinTech, capabilities developed by the bank, organization's digital maturity, and IT security. The primary data was collected in form of surveys among nine Islamic organizations in United Arab Emirates, and the analysis was conducted using the Partial Least Squares Structural Equation Modelling. The results of this inquiry indicate a positive impact of fintech and capabilities development on the effectiveness of risk management. Digital transformation on its own did not significantly improve efficacy. The correlation between the parameters did not alter under the regulatory context as expected.

Since lending and financing are a bank's leading business and a means of generating profits, credit risks are among the most frequent dangers that banks encounter. As a result, they are the main risks to

which banks are exposed and have the most significant influence on their ability to maintain financial stability. This is particularly true given that specific issues with the credit investigation system, such as inadequate oversight and incomplete credit data, can quickly result in credit risks (Jiang et al, 2019).

Credit risks have registered high scores in the Islamic banking risk index, according to the 2022 Global Islamic Bankers Survey Report, where credit risks appeared in fourth place as one of the most worrisome risks for Islamic banks, noting that they are closely linked to other risks, such as collateral risks and liquidity risks. In light of the economic and political conditions that the region is going through, these risks are reflected in the rate of increase in non-performing debts and thus increase the risks of non-payment and its repercussions on profitability, which requires a more precise approach to granting financing and balancing between liquidity, profitability and guarantees. The year 2022 witnessed remarkable optimism from Islamic banks over the year 2021 due to the decline in the effects of the coronavirus pandemic, despite the political and economic conditions, which occupied a critical part of the risk considerations of Islamic banks and financial institutions (General Council for Islamic Banks and Financial Institutions, 2022).

With the growth and success achieved by Islamic banks due to the increasing demand for their products and services, and to achieve greater spread in the Islamic world. It needs a solid strategy to operate in local and global environments, as it is now in a position that qualifies it to face the challenges and risks in the financial sector (Bank Al Jazira, 2022). Thus, the researchers believe that adopting fintech is one of the most essential strategies for banks to confront and reduce credit risks. Given the importance to this issue, this paper seeks to investigate the impact of fintech on the credit risks faced by banks, for which the following main hypothesis and sub-hypotheses are formulated:

H₁: Financial Technology has a statistically significant effect on reducing credit risks in the Jordanian Islamic banking sector. The following sub-hypotheses fall under this hypothesis:

H_{1a}: There is a statistically significant effect of investing in computers and computer programs in reducing credit risks in the Jordanian Islamic banking sector.

H_{1b}: The number of ATMs statistically significantly reduces credit risks in the Jordanian Islamic banking sector.

3. Research Methodology

In light of the previous analysis, it is clear that some contradictions mar the potential relationship between fintech and credit risk. There is still a lack of studies on whether commercial banks' fintech adoption affects their risk level. There are also no studies related to the impact of fintech on credit risks in Islamic banks, which requires research into the nature of this relationship. Therefore, this study adopted the descriptive analytical method to address its problem and test its hypotheses by gathering information and data regarding the fintech literature to develop a theoretical framework for the study using the descriptive technique. In addition, analyzing and understanding relationships to arrive at conclusions of the analytical method used in the applied component of the study. This section describes the population, the study sample, and the data sources in the first requirement to achieve the study's goal. The second requirement is the variable selection. The third requirement also presented the mathematical model used to verify the validity of the hypotheses. The standard study was conducted on the study sample in the fourth requirement. This is to produce, evaluate and discuss the results.

3.1. Variable Selection and Empirical Design

Samples and Data Sources

The research population includes all active Islamic banks in Jordan, including the fourth-ranking bank. The Jordan Islamic Bank, the Islamic International Arab Bank, and the Safwa Islamic Bank were the only three Jordanian Islamic banks included in the study sample. From 2016 to 2022, information was collected from the Islamic banks that were the focus of the study's yearly financial statements and reports. Through their inclusion in the study sample, a substantial percentage of the nation's Islamic banking market is covered by the research. Because of this, the conclusions drawn from these banks can be regarded as typical of Jordan's larger Islamic banking industry. Given that the selected banks have probably implemented Fintech solutions to differing degrees, it is possible to look into the connection between Fintech investments and the results of credit risk management. These banks' financial statements and reports have data that is readily available, making them appropriate for inclusion in the study sample.

Finding and obtaining the pertinent financial statements and reports from the selected Islamic banks required visiting their websites and using their financial databases, which was the first stage in the data collection process. The researchers made several validations and inspections to ensure that the financial data is correct based on the reports of the Islamic banks. Getting complete and current financial accounts and reports from the chosen Islamic banks was one of the main data collection issues.

Limitations: FinTech is a broad term that encompasses several different concepts, including digital payment systems, blockchain technology, artificial intelligence, and mobile banking. If FinTech is seen as a single independent variable, then the varying effects of different technologies on bank credit risk-taking may be missed. Bank credit risk-taking is impacted by internal bank rules, risk appetite, and market dynamics in addition to external influences like FinTech adoption. It is important to take into account endogeneity to not get a biased estimation and such false correlations in the analysis. The conclusions from only three Islamic banks cannot be generalized to the whole number of Islamic banks in Jordan and all over the world. The traits, operations, and output of these particular institutions don't accurately capture the complexity and diversity of the nation's whole Islamic banking sector.

Potential Ways to Address Future Research: The FinTech variable can be broken down into its parts, and researchers can look at how each affects bank credit risk-taking separately. With the help of this method, it is possible to understand how specific technologies affect risk-taking behaviour in a more subtle way. Researchers may resort to advanced econometric techniques, such as propensity score matching, panel data analysis with fixed or random effects, and instrumental variable regression, to minimize the endogeneity problem. These techniques allow for controlling potential confounding variables, thus making causal conclusions more credible. In the future, other research projects will have to take a comprehensive approach to evaluating credit risk and consider both quantitative and qualitative factors. A great number of proxies can be used in this regard, including loan loss provisions, credit ratings, default probability models, and qualitative assessments of risk management procedures.

3.2. Variable Selection

3.2.1. The Independent Variables: FinTech (FT)

Based on the previous literature review, different indicators were created to measure FinTech innovations in banks. According to the International Monetary Fund (IMF, 2017) and other research organizations, venture capital can be used as a gauge for advancing fintech innovation (Li et al, 2022). Banks' adoption of fintech innovations requires hardware, systems and software investment. Accordingly, fintech (the independent variable) includes three main components:

1- Computer equipment: It is measured by the total investment in computer equipment in the bank during the year (Nwala et al, 2020; Rashid, 2018).

2- Computer systems and software: It is measured by the total investment in computer systems and software in the bank during the year (Rashid, 2018).

3- Automated teller machines: This is measured by the total number of ATMs at the bank during the year (Monyoncho, 2015; Rashid, 2018).

Note that there is no particular account to measure the level of fintech used in banks operating in Jordan, as the annual reports issued by banks do not publish data on the use of fintech except data related to the use of ATM services and their number.

3.2.2. The Dependent Variable: Bank Credit Risk-taking (RISK)

Credit risk is one of the most considerable and common risks to which commercial banks are exposed, which was previously emphasized in the study. Accordingly, credit risk was used based on the study of Cheng & Yang (2020) and Zhang et al (2023), as the process of granting credit constitutes a risky business. As for Islamic banks, credit granting operations include financing contracts under Murabaha, Musharakah, Ijara, and other Sharia financing formulas, and each type of these contracts leads to credit risks, which are more critical and complex for Islamic banks, significantly since they cannot charge a fine as a result of late payment (Al-Fawaz et al, 2016). Islamic banks confront a different risk than conventional banks, particularly in Islamic financing formulas that depend on debt contracts. As such, their performance measurement will be based on the ratio of non-performing financing to the overall financing that the bank has issued. Credit risk is the primary risk associated with postponed sales such as Murabaha, leasing, and instalment sales, which result in debts on the bank's records (Islamic Financial Services Board, 2005).

3.3. The Mathematical Model Used

A standard model was developed to test the study's hypotheses. The model was prepared based on a study of Irshad (2017) with the dependent variable financial performance (Fin Perf) replaced by the credit risk variable ($RISK_{it}$) in the current study, as follows (Irshad, 2017):

$$RISK_{it} = \alpha_0 + \beta_1 \log hardware_{it} + \beta_2 \log software_{it} + \beta_3 \log ATM + \mu + \varepsilon_{it}$$

Whereas:

$RISK_{it}$: Credit risk, measured by the ratio of non-performing financing to total financing.

Log Hardware_{it}: An independent variable expressing the natural logarithm of the computer investment for bank I in year t.

Log Software_{it} is an independent variable that expresses the natural logarithm of investment in computer software and systems for bank I in year t.

Log ATM_{it}: An independent variable that expresses the natural logarithm of the number of banks I ATMs for year t.

ε_{it} : Random error term

i : The number of banks studied in the model

t : The period, which starts from 2016 until 2022.

β_1 , β_2 , and β_3 represent the coefficients of the independent variables.

4. Model Estimation Analysis and Results

4.1. Descriptive statistics

Table 1 shows descriptive statistics of the dependent and independent variables from 2016-2022.

Table 1: Descriptive Statistics for 2016-2022

Variable	Views	Lowest Value	Highest Value	Mean	Median	Standard Deviation
Computer equipment	21	14	15	14.61	14.66	.274
Computer programs and systems	21	13	15	14.22	14.32	.664
ATM machines	21	4	6	4.66	4.41	.615
Credit risk	21	60	92	79.08	78.30	8.299

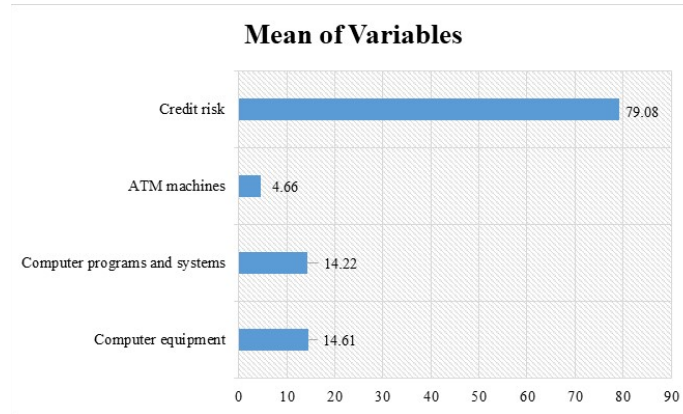


Fig.1: Mean of Variables

It was clear from the results of the table (1) and figure (1) above that the average natural logarithm of computer equipment reached (14.61), and the highest value reached (15). The average natural logarithm of computer programs and systems (14.22) reached the highest value (15), the average natural logarithm of the ATMs (the ATM) was (4.66) and the highest value reached (6). The average credit risk reached (79.08), and the highest value reached (92).

4.2. Model Efficiency and Statistical Quality

Multiple Linear Regression (MLR) evaluated the significance of the effect of the independent variables on the dependent variable and the validity of the study model. Before the regression analysis, appropriate statistical tests were employed using statistical software SPSS 24. By computing the Variance Inflation Factor (VIF) for each independent variable and ensuring that the contrast inflation factor (VIF) does not exceed value (10) and that the value of the permissible contrast (Tolerance) is more significant than (0.05), it is ensured that there is no high correlation between the independent variables using the Multicollinearity Test. If the value of the coefficient was less than (1), the skewness coefficient for the study variables was also computed to ensure the data had a normal distribution. Table 2 shows the Variance Inflation Factor and Skewness Test Results.

Table 2: Variance Inflation Factor and Skewness Test Results

Independent Variables	Permissible Variance Test	Contrast Inflation Factor (VIF)	Skewness Coefficient
Computers	.624	1.603	-.243

Computer programs and systems	.635	1.574	-.152
ATM machines	.443	2.258	.298
Dependent Variable			
Credit Risk			-.324

According to Table No 2, the permitted contrast test values ranged between (0.443-0.635), greater than (0.05). (3), which summarizes the aforementioned tests. Moreover, the contrast inflation factor test values were less than (10), ranging between (1.574-2.258), indicating no high correlation between the independent variables. All requirements have been satisfied since the skewness coefficient values were smaller than (1), confirming the data's normal distribution. By doing this, the assumptions of the multiple regression analysis about the data are guaranteed to be met. Table No 3 shows the results of the correlation between each of the independent variables (computer hardware, computer programs and systems, ATM machines). Table 3 illustrates heteroscedasticity and autocorrelation tests.

Table 3: Results of Heteroskedasticity and Autocorrelation

Heteroskedasticity	Statistic	p-value
Breusch-Pagan	1.031	0.251
Koenker Test	0.485	0.357
Autocorrelation - Durbin Watson	2.152	

The table shows heteroskedasticity through Breusch Pagan and Koenker tests indicated by higher p-values such as 0.251 and 0.357 respectively. Similarly, Durbin Watson statistic is 2.152 which indicates no positive autocorrelation between the variables.

Table 4: Correlation between independent variables

Independent Variables	Computers	Computer Programs	ATM machines
Computers	1		
Computer programs and systems	.082	1	
ATM machines	.555	.543	1

The table shows no multicollinearity or autocorrelation between the variables, and their relationship is very weak. Additionally, there is no statistically significant correlation, and the correlation value is not greater than 0.60. These findings indicate that the study model successfully explains and identifies how the independent variables affect the dependent variable. Computers and ATMs had the highest association coefficient (0.555). In contrast, computers and computer programs had the lowest (0.082).

4.3. Model Estimation Results

Given that the study sample is sectional and spans a time series of years (2016–2022), Pooled Data Regression in the form of pooled least square utilizing the square method is the suitable regression model

to quantify this association. Table No. 5 Shows the relationship between the independent variables, computer hardware, computer programs and systems, ATMs, and the dependent variable, credit risk.

Table 5: Model Estimation Results

Variables	Coefficient	Std. Error	t-stat	Sig.
Constant	-107.07	95.867	-1.117	0.28
Computers	3.914	6.118	0.64	0.531
Computer Programs and Systems	-8.973	2.502	-3.587	0.002
ATM Machines	0.296	3.237	0.092	0.928
R-Square	0.568			
Adj. R-Square	0.491			
F-Statistic	7.437			
F-Sig.	0.002			

Table 5 demonstrates the Model Estimation Results for this study. It is clear from the table above, through the values of the estimated parameters, that computer programs and systems affect credit risk. The negative sign indicates that an increase in computer programs and systems reduces credit risk. At the same time, computers and ATMs do not affect credit risk at the significance level (0.05). While the value of the coefficient of determination (R^2) provides a better explanation for changes in credit risk, as the value reached 56.8%, and the F value reached (7.437) at statistical significance (0.002).

5. Discussion

This study's results can be explained by the fact that Islamic banks can increase the efficiency of their credit risk management by developing unique programs and systems using fintech and building tools and programs to analyze the risks they face and thus reduce them. Numerous studies have corroborated this, showing that advanced technologies, such as voice recognition and biometrics, can be used in fintech to authenticate the customer's identity (Al-Habashna, 2023; Cao, 2017; Cheng et al, 2022; Zhang et al, 2023; Hasan & Sunarti, 2019) and improve data accuracy, which can lower internal risks, systemic risks and fraud (Fuster et al, 2019).

Fintech also allows Islamic banks to increase the channels and sources of information about financing applicants and guarantee their financial solvency, all of which help to lessen the likelihood of debtor default. These benefits also help mitigate information asymmetry between banks and financing applicants. Therefore, fintech innovation may reduce risks for banks and associated losses (Li et al, 2022). Another noteworthy benefit of fintech is how simple it is to analyze big databases to assess funding applicants (Vives, 2017).

Financial institutions collect information about finance applicants, including their spending patterns, late payments, defaults, and personal events. Using data analysis tools, banks will expand their service and credit facilities to customers they previously considered high-risk. Banks will also issue a correct record of customer risks, and the data will be viewed as an asset for financing. Predictive analytics models can also be used to analyze a customer's credit history, financing applications, or other data to verify that the customer will not default in the future. By creating a thorough consumer profile using unstructured data and structured and social media comments, this approach helps lower risk exposure. By accessing information and data to be considered loan guarantees, technology helps to broaden the pool of credit (Islamic Development Bank, 2022).

Thus, fintech through smart programs can help better determine the creditworthiness of financing applicants when the institution screens those using big data and artificial intelligence. Accordingly, it was necessary to exploit developments in information technology regarding new applications and software and the large volume of data available to deal preventively and in advance with any risk by focusing on analyses and consultations (Association of Banks in Jordan, 2021).

The pool of data owned by financial institutions is not limited to financial results and asset prices. Instead, it includes data generated by business operations, data produced by machines, and data generated by social media and user systems. Information represents power and is one of the main advantages of financial institutions through their knowledge and possession of huge amounts of financial data and customer-related information, which they exploit to provide a better customer experience and customized solutions for them (Islamic Development Bank, 2022). The application of fintech in the banking sector will have a significant impact because it is one of the industry's most dependent on information gathering, processing, analysis, and reporting (information) activities required to meet customers' financing needs. It will assist Islamic banks in processing data on business operations and product marketing in a timely and correct manner (Hasan & Sunarti, 2019).

Banks can also effectively employ fintech to develop appropriate early warning mechanisms and techniques and use them to predict credit risks. Through early warning techniques, financial risks can be identified in advance and warned against, and these warning indicators can be used to reduce the impact of the risks and losses they cause. Banks can also use fintech to monitor their funds flow to enhance risk management after granting financing so that they are prepared when any problems related to debt default occur. Although the principles on which Islamic banks were founded contributed to alleviating the risks and recurring crises that harmed traditional banks, fintech also had a share in reducing the risks to which Islamic banks are exposed through the innovations and programs it provides that allow the integration of control elements. Effectively manage risks, which is at the heart of digital resilience.

However, Islamic banks still have not fully exploited the opportunity available to them through fintech, as the dissemination of technology will not only increase efficiency but will also be a growth path that heralds a change in the quality of banking services and can support the profound transformation that has occurred in the banking experience and redefine its scope. This technological revolution will continue to expand the boundaries of efficiency, and innovative new business models will emerge soon as the full potential of new technologies is realized worldwide and in various economic sectors (Islamic Development Bank, 2022).

In light of the above, the importance of fintech for Islamic banks becomes clear not only through the advantages it provides that are reflected in their services and products but also extends to the way they confront credit risks, especially since Islamic banks were not immune to the financial, political, and health crises facing the global economy that affected them. Because Islamic banks are an integral part of the global financial system, they face many risks, like financial institutions worldwide. Therefore, they must adopt fintech and deal with it for its expected role in reducing the risks it faces.

The risks facing Islamic banks have increased. Their nature has changed in light of developments in financial liberalization, the increasing use of new financial instruments, and the strong entry of technology. Therefore, Islamic banks sought hedging methods that differed from the traditional model and did not serve the nature of their work (Islamic Development Bank, 2022).

6. Conclusion

The objective of this study was to evaluate the possible nature of the relationship between fintech and credit risks and to assess how fintech might lower credit risks in the Islamic banks in Jordan. Moreover, this study is one of its kind to examine how fintech affects credit risk in the Jordanian Islamic banks,

which makes it noteworthy. Previous research has explored the impact of fintech on performance and credit risks in both conventional and Islamic banks. It has not delved into the specific influence of fintech on credit risks. Thus, this research utilized an approach to tackle its issue and validate its assumptions by collecting insights and data from fintech literature to construct a theoretical framework, for the study through descriptive methods. Moreover, examining and grasping connections to draw conclusions from the approach employed in the aspect of the research. The research population includes all active Islamic banks in Jordan, including the fourth-ranking bank. The Jordan Islamic Bank, the Islamic International Arab Bank, and the Safwa Islamic Bank were the only three Jordanian Islamic banks included in the study sample. From 2016 to 2022, information was collected from the Islamic banks that were the focus of the study's yearly financial statements and reports. The findings of this study indicate that the study model successfully explains and identifies how the independent variables (computer equipment, computer programs and systems, and ATMs) affect the dependent variable (credit risk), where Computers and ATMs had the highest association coefficient (0.555). In contrast, computer equipment and computer programs and systems had the lowest (0.082). Despite fintech's many advantages and benefits, it also brings many risks. The multiple correlation analysis results support the significant effect of fintech represented by computer programs and systems on reducing credit risks in the Jordanian Islamic banks. Whereas, investment in computer equipment and the number of ATMs has no significant effect on credit risk in the Jordanian Islamic banks.

For this purpose, Islamic banks must strive to keep pace with the latest technological developments and follow up on the risks that arise from them to ensure that their efforts are directed towards building their technological readiness in the future in a way that ensures the sustainability of their growth and their success in achieving the goals they aspire to, which are not limited to just the goal of survival, but extend beyond it to the goal of leadership and excellence. the importance of adopting fintech for Islamic banks to reduce their credit risks becomes clear. Fintech is not an end in itself but rather a means to achieve an end. Therefore, Islamic banks have to consider fintech seriously to develop their work and maintain their achievements by keeping pace with the developments of this era, the “age of technology,” which expresses innovation in Islamic financial thought and does not contradict it. There are specific reasons and benefits for Islamic banks to use fintech. Fintech must be handled correctly to avoid going against the established Sharia principles founded by these institutions. Only then can it fulfil its potential to enhance the performance of Islamic banks and lower the risks they face. For Islamic banks, the future looks bright and has prospects, given the increasing use of fintech and its predicted role in enhancing their competitive edge and sustaining their successes.

This study proposes the following Suggestions: First, Islamic banks must take serious measures to deal with the risks they face, mainly since their use of fintech will entail potential risks. Second, increasing Islamic banks' reliance on fintech, especially related to programs and systems that can help predict and reduce these risks, is necessary because of its positive impact on lowering credit risks. Third, Training human cadres working in Islamic banks to deal appropriately with fintech requires specialized human capital.

In conclusion, this study provides empirical evidence on the role of fintech in reducing credit risk in Islamic banks in Jordan. The results suggest that investment in computer programs and systems is a significant determinant of credit risk reduction. In contrast, investment in computer equipment and the number of ATMs have no significant impact. These findings underscore the importance of strategic fintech investments for Islamic banks to enhance their credit risk management capabilities. However, the study also highlights the need for Islamic banks to carefully consider the potential risks associated with fintech adoption and to develop appropriate risk management strategies. The study's limitations, such as the small sample size and the limited range of fintech indicators, should be addressed in future research.

Further studies could explore the impact of fintech on other types of risks in Islamic banks, as well as the potential moderating effects of regulatory and institutional factors. Despite these limitations, the study makes a valuable contribution to the growing literature on fintech and risk management in Islamic banking and offers practical insights for Islamic banks and policymakers in Jordan and other developing countries.

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