An-Najah National University
Faculty of Graduate Studies

THE EFFECTS OF FINTECH ADOPTION ON BANK PROFITABILITY: EVIDENCE FROM ARAB EMERGING MARKETS

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This Thesis is Submitted in Partial Fulfillment of the Requirements for the Degree of Finance, Faculty of Graduate Studies, An-Najah National University, Nablus - Palestine.

2024

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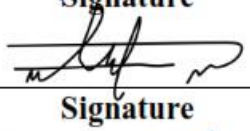
Dr. Mohammed Saleh **External Examiner**	 **Signature**
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Dedication

The researcher may dedicate his work to relatives, friends and family members.

This thesis is dedicated to my beloved parents, Zoher Farhood and Mother's, whose unwavering love, support, and prayers have been the cornerstone of my success. Their sacrifices and encouragement have always motivated me to strive for excellence.

To my siblings, who have been my source of strength and joy, I am deeply grateful for your continuous support and understanding during this challenging journey.

I also wish to dedicate this work to my esteemed supervisor, Dr. Muath Asmar, whose invaluable guidance, constructive criticism, and encouragement have significantly contributed to the completion of this thesis. His mentorship has been a beacon of inspiration throughout my academic journey.

To my professors and mentors, who have imparted knowledge and wisdom that have shaped my academic and professional growth, I express my deepest gratitude.

Additionally, I dedicate this work to my friends and colleagues, who have walked alongside me in this academic endeavor, offering support, companionship, and encouragement during times of difficulty. Your presence has made this journey all the more rewarding.

Finally, I dedicate this thesis to all those who believe in the power of education and knowledge as a means to make a difference in the world.

Acknowledgements

First and foremost, I would like to express my deepest gratitude to my supervisor, Dr. Muath Asmar, for his unwavering support, insightful guidance, and constructive feedback throughout the course of my research. His expertise and encouragement were instrumental in shaping this thesis and bringing it to completion.

I am also immensely grateful to the faculty and staff of An Najah National University, particularly the Department of finance, for providing a stimulating academic environment and for their invaluable support during my studies. The knowledge and skills I have gained here will serve as a solid foundation for my future endeavors.

A special thanks goes to my parents, Zoher Farhood and Mother's, whose endless love, prayers, and sacrifices have been my greatest source of strength. Without their constant encouragement and belief in my abilities, this achievement would not have been possible.

I would also like to extend my sincere appreciation to my siblings, who have always been a source of support and motivation. Your patience and understanding have helped me stay focused during the challenging times of this journey.

I am indebted to my friends and colleagues, for their companionship, advice, and encouragement. Your support has been invaluable, and I cherish the moments we shared during this journey.

Lastly, I would like to thank everyone who contributed to this work, directly or indirectly. Your assistance and encouragement have played a vital role in the successful completion of this thesis.

Thank you all.

Declaration

I, the undersigned, declare that I submitted the thesis entitled:

THE EFFECTS OF FINTECH ADOPTION ON BANK PROFITABILITY: EVIDENCE FROM ARAB EMERGING MARKETS

I declare that the work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

Student's Name	**Hasan Zoher Hasan Farhood**
Signature:	
Date:	**11/09/2024**

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THE EFFECTS OF FINTECH ADOPTION ON BANK PROFITABILITY: EVIDENCE FROM ARAB EMERGING MARKETS

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Abstract

This study examines the impact of financial technology (fintech) adoption on bank profitability across eight countries from 2015 to 2022, employing the system generalized method of moments for analysis. The research addresses the ongoing ambiguity surrounding the relationship between fintech adoption and bank profitability. As technological innovation profoundly transforms the financial sector, it is crucial to determine whether fintech integration enhances or diminishes the profitability metrics of banking institutions.

This research assumes significance by contributing a consolidated and profound analysis of the conflicting evidence surrounding the intricate interplay between Fintech adoption and the of bank profitability within the banking sector. The anticipated findings are poised to inform strategic decision-making among banking practitioners, policymakers, and researchers, thereby fostering a more informed and strategic approach the evolving landscape of financial technology.

The study's sample consists of 55 banks, including those from Jordan, Palestine, and the Gulf Cooperation Council (GCC) countries—Saudi Arabia, Kuwait, Bahrain, Qatar, Oman, and the UAE. Notably, 20 of these banks are Islamic.

The findings reveal a significant relationship between the fintech index and the performance of banks in Arab emerging markets. However, the relationship between the fintech index and bank profitability is not uniformly strong across the surveyed countries.

Future research should aim to identify key fintech indicators that are applicable across all emerging markets. Additional studies are needed to explore the intersection of fintech and the COVID-19 pandemic, as well as its effects on bank profitability. Researchers are encouraged to apply fintech indicators to sectors beyond banking to assess broader

impacts and to investigate the influence of fintech on bank profitability in different emerging economies.

Keywords: Fintech adoption index, Profitability Banks, Arab Emerging Markets.

Chapter One
Introduction and Theoretical Background

1.1 Introduction

Over the past few years, the integration of digital technologies into the financial sector has given rise to Fintech, driving swift and transformative changes that business leaders and regulatory bodies in the banking industry find challenging to keep pace with. This is particularly due to issues affecting financial intermediaries and customers, as well as potential risks to the stability of the financial system (Elia, Stefanelli, & Ferilli, 2023). Fintech represents a technological innovation within the financial services sector. Fintech solutions are systems created to streamline particular financial transaction processes. Regulatory bodies classify Fintech into categories such as payment systems, market infrastructure, lending, financing, investment and risk management, capital allocation, and various financial services. During the COVID-19 pandemic in 2020, banks enhanced their financial technology services to enable customers to make transactions from home (Medyawati, Yunanto, & Hegarini, 2021; F. Yin et al., 2022).

The global financial technology revolution is well underway. While technology has played a role in the financial services industry since the 1850s, it is only in the last 20 years that the term Fintech has been used to refer to technological innovations capable of reshaping financial services (Murinde, Rizopoulos, & Zachariadis, 2022). These advancements are fostering the development of new business models, processes, applications, and products, ultimately benefiting consumers. During the same period, the banking sector has experienced significant technological and regulatory changes, driven by deregulation and liberalization, advances in information and communication technologies, innovative transaction and savings solutions, changes in cybersecurity, and digitization (Murinde et al., 2022). On other hand advancements in technology are transforming the financial system, introducing new financing modes such as e-financing and mobile technology. This shift has made the finance industry more technology-driven, presenting both opportunities and challenges.

Banks traditionally occupy a central position within the financial system. According to financial intermediation theory, they play a vital role in mobilizing and reallocating social capital by utilizing liquid liabilities to fund illiquid assets, thus supplying liquidity to the

market. Their critical functions in macroeconomic regulation and risk mitigation reinforce their dominant status. Banks possess a robust ability to attract deposits and serve as the primary source of financing for both businesses and households. To ensure the stability of the national economy, banks must engage in comprehensive liquidity management practices to effectively balance the demand and supply for liquidity in the market. This requirement has become even more critical in the volatile business environment following the COVID-19 outbreak, where banks face greater liquidity management demands due to changes in market demand for loans, deposit absorption capacity, and government policy interventions (Tang, Hu, Corbet, Hou, & Oxley, 2024).

A strand of studies suggests that financial Fintech innovation complements traditional banking, as banks have accumulated extensive customer information and transaction data. This data advantage enables banks to achieve better business performance compared to internet microlending companies (Tang et al., 2024). For instance, the 'big data' held by banks can be used to identify potential borrowers, thereby reducing credit risk (Shaikh et al., 2020). Analyzing the role of big data in housing loans reveals that banks can make better predictions about borrowers' behavior, thus reducing risk. Additionally, data mining techniques such as cluster analysis, edge computing, automatic reasoning, and high-frequency algorithms help mitigate the cyclicality of commercial banks (Zhao, Li, Yu, Chen, & Lee, 2022).

While the body of literature on Fintech is expanding rapidly, there remains a necessity to consolidate the research specifically related to Fintech in banking and finance. This will help disseminate comprehensive knowledge to relevant stakeholders. Banks, non-bank financial institutions, stock exchanges, and cryptocurrency platforms are increasingly embracing digital technologies and innovative business models. In the information and communication technology era, many companies and industries are integrating Fintech into their financial processes, leading to improved and automated service delivery and applications. The 2008 global financial crisis accelerated the demand for Fintech services as users sought alternatives to conventional financial services. This transition extends across various sectors, including education, banking, lending (such as shadow lending and peer-to-peer (P2P)), and cryptocurrencies, and investments in stocks. Blockchain technology, in particular, supports decentralized financial platforms, empowering these innovative approaches (Pandey, Hassan, Kumari, Zaied, & Rai, 2024).

These days, the financial world is evolving rapidly. Technological advancements in IT and telecommunications, along with intense international competition, have driven significant transformations in the banking sector across many countries. In today's increasingly complex and dynamic environment, banks are evolving into more diversified institutions, reorganized, computerized, and universal, with many progressing towards internationalization. This transformation necessitates evaluating and analyzing banks from a fresh perspective. The banking sector has experienced substantial growth, playing a key role in supporting the nation's economy. In recent years, banks have generally maintained strong solvency, achieved notable profitability, and demonstrated high-quality management, all while ensuring the effectiveness of their control systems. This success can be attributed to a favorable economic climate, proactive regulatory support, and a well-regulated, well-managed, and secure market environment (Derbali, 2021).

Islamic banks are expanding rapidly across both Muslim and non-Muslim countries, including Asia, Australia, Africa, the Gulf region, Europe, and the Americas, with total assets reaching $2.29 trillion in 2021 (Sihotang, Hasanah, & Hayati, 2022). Indonesia, home to the largest Muslim population globally, has significant potential to develop its Islamic banking sector to offer financial services in line with Sharia principles. The banking system in Indonesia operates under a dual financial framework, featuring both Sharia-compliant banking systems and conventional (Sihotang et al., 2022).

Profitability is a crucial element for performance evaluation, indicating the proportion of profit relative to asset investment, equity, or sales. Improving profitability is a key objective for enterprises. A stable economy with high performance can generate sufficient financial resources for sustainable development, thereby attracting attention and investment from both domestic and international investors. Profitability serves not only as a reliable basis for assessing business profitability but also as a useful tool for forecasting future business outcomes. It reflects shareholders' wealth and, accordingly, attracts investors. Therefore, identifying the various factors that indirectly or directly affect performance is an essential research theme in strategic, economics, accounting, finance, and management (T. H. J. J. o. E. D. Nguyen, 2020).

The crux of the research problem lies in the persistent ambiguity surrounding the relationship between Fintech adoption and bank profitability. As the financial landscape

undergoes profound changes driven by technological innovation, it becomes essential to discern whether the integration of Fintech enhances or hinders the profitability metrics of banking institutions. Conflicting evidence across academic studies underscores the need for a comprehensive investigation to reveal the underlying factors contributing to these discrepancies. Although numerous studies have examined bank profitability and its determinants, there is a notable gap in exploring the relationship between financial technology and profitability. This study aims to address this gap, providing a deeper understanding of how Fintech adoption influences profitability within the banking sector.

This study contributes substantially to the extensive literature on bank profitability. Traditionally, this literature has focused on assessing the potential variables influencing bank profitability and its dynamics over the business cycle(Abdeljawad & Farhood, 2024; Abdeljawad, shehadeh, & Farhood, 2024; Alarussi & Gao, 2023; Belcaid & Al-Faryan, 2023; Bitar, Kabir Hassan, & Hippler, 2018; Bolarinwa, Akinlo, & Onyekwelu, 2021). Our study provides a new angle by investigating the consequences of bank profitability, specifically through its impact on financial technology. In doing so, we add a new perspective to the literature on the intersection of finance and Fintech (Carbó-Valverde, Cuadros-Solas, & Rodríguez-Fernández, 2022; Cheng & Qu, 2020; Chhaidar, Abdelhedi, & Abdelkafi, 2023; Shaikh et al., 2020; R. Wang, Liu, & Luo, 2021; Y. Wang, Xiuping, & Zhang, 2021; F. Yin et al., 2022; Zhao et al., 2022).

The findings suggest that financial technology methods for service delivery can boost bank perforamnce. Consequently, expanding these channels for offering banking products and services should be encouraged. The negative correlation and relationship between bank overhead expenses and profitability highlights the need for banks to reduce branch numbers and increase their use of Fintech solutions. Additionally, the data reveal a negative relationship between regulatory capital and bank performance, aligning with the traditional risk-return hypothesis. The findings also indicate that banks facing higher credit risk tend to charge higher interest rates to offset potential default risk. Notably, the study shows that greater market power negatively impacts bank profiatbility, implying that a less concentrated banking system may enhance profitability. Moreover, increased financial development positively affects bank profitability, suggesting that improvements in the financial market can lead to better bank profitability.

The importance of this research lies in exploring the relationship between financial technology and the profitability of banks in emerging countries, specifically the Gulf Cooperation Council, Jordan, and Palestine. To this end, we created two financial indices adoption for financial technology based on previous studies (Cheng & Qu, 2020; H. H. Khan, Khan, & Ghafoor, 2023).

1.2 Study problem and questions

The crux of the research problem lies in the persistent ambiguity surrounding the relationship between Fintech adoption and bank profitability. As the financial landscape undergoes profound changes driven by technological innovation, it becomes essential to discern whether the integration of Fintech enhances or hinders the profitability metrics of banking institutions. Conflicting evidence across academic studies underscores the need for a comprehensive investigation to reveal the underlying factors contributing to these discrepancies. Although numerous studies have examined bank profitability and its determinants, there is a notable gap in exploring the relationship between financial technology and profitability. This study aims to address this gap, providing a deeper understanding of how Fintech adoption influences profitability within the banking sector.

What is the impact of financial technology adoption of bank profitability in Jordan, Palestine, and GCC countries?

1.3 Significant of the study

This research assumes significance by contributing a consolidated and profound analysis of the conflicting evidence surrounding the intricate interplay between Fintech adoption and the of bank profitability within the banking sector. The anticipated findings are poised to inform strategic decision-making among banking practitioners, policymakers, and researchers, thereby fostering a more informed and strategic approach the evolving landscape of financial technology.

- To investigate the impact of Fintech adoption on profitability within Arab emerging markets, seeking to determine if relationship prevails between the two variables.

1.4 Literature review

1.4.1 Financial technologies (Fintech)

The financial services sector is entering a new era driven by digital technology, introducing new players known as Financial Technology (Fintech). The rapid growth of Fintech, particularly in peer-to-peer lending, is noteworthy, with loan transactions surging by 785% from 2017 to 2018. This rise poses both a potential threat and an opportunity for traditional banks. While Fintech could disrupt the banking industry, it also offers opportunities for collaboration, such as extending financial services to the unbanked population and increasing fee-based revenues through payment gateway partnerships (Monika, Azam, & Teguh, 2021). The Financial Services Authority (Otoritas Jasa Keuangan, 2015) defined Fintech as a technological innovation within the financial services industry. Fintech products are designed as systems that facilitate specific financial transaction mechanisms, streamlining processes and enhancing the efficiency of financial operations (Keuangan, 2015; Medyawati et al., 2021).

Medyawati, Yunanto, and Hegarini (2021) conducted a study analyzing the impact of ATM technology, internet banking, and mobile banking on profitability. Their findings indicate that ATM technology alone not significant affect profitability, which is instead influenced by internet and phone banking. On other hand, when combined, ATM technology, internet banking, and phone banking collectively impact profitability. The study demonstrates that Fintech significantly affects bank profitability, particularly profitability. These results suggest that mobile and internet banking enhance bank profitability, contributing to the understanding of factors influencing banks' financial performance. The research is constrained by the exclusion of certain Fintech variables, such as electronic money (e-money), which could offer additional insights. Additionally, the study was conducted during the Covid-19 pandemic, which posed challenges to data collection and may have influenced the overall findings. (Medyawati et al., 2021).

On other hand, Fintech disruption has been swift and extensive in China, transforming it into an almost cashless economy. Traditional Chinese banks have seen their core profit areas challenged by payment platforms, digitalization networks, and e-commerce providers. These platforms also pose a threat to banks' ability to retain depositors. On the lending side, crowdfunding and Peer-to-Peer (P2P) lending are encroaching on banks'

core business lines (Katsiampa, McGuinness, Serbera, & Zhao, 2022).This scenario could similarly unfold in emerging markets like Jordan, Palestine, and the Gulf Cooperation Council. Digitalization undermines traditional banks' face-to-face consumer finance and wealth management roles. Consequently, traditional banks have been compelled to develop and acquire Fintech capabilities. In recent years, most Chinese financial institutions have invested in Fintech partnerships, joint ventures, and alliances, further advancing digitalization trends (Katsiampa et al., 2022).

As China's economic development enters the "new normal" phase during the 13th Five-Year Plan period (2016–2020), the economy has shifted from rapid to moderate growth. This transition has led to tighter supervision of the banking sector, causing a reduction in social credit and increasing downward pressure on GDP. The rise of private and foreign banks has also intensified competition among Chinese commercial banks. Simultaneously, interest rate liberalization and the advancement of Fintech have significantly influenced the long-term development of China's commercial banking sector. Fintech has a varied impact on different financial industry sub-sectors, including banking, transfers, brokerage, insurance, and asset management. While Fintech is generally seen as a positive force for the financial industry, its effects vary across sub-sectors. For instance, e-transaction technologies have a negative impact on traditional banking operations. The relationship between financial technology and banks can best be described as "co-opetition," where they both compete and collaborate within the same financial service areas, each offering distinct advantages (Jigeer & Koroleva, 2023). Also Katsiampa et al (2022). The study found evidence of performance stabilization among traditional banks towards the end of the observation period. In contrast, financial technology lenders displayed high volatility in financial returns and faced significant, prolonged declines in prudential performance, as indicated by both Special Mention Loan (SML) and Non-Performing Loan (NPL) rates. For more 35 traditional Chinese banks, the average NPL rate increased from 0.90% to 1.50% between the financial year-ends of 2013 and 2019. Meanwhile, for more 20 Fintech lenders, the average NPL rate surged significantly from 2% to 5% over the same timeframe. In terms of financial returns, both online lenders and traditional banks benefited from higher Value at Risk (VaR) and equity capital ratios (Katsiampa et al., 2022).

Yunita (2021) found no significant differences in the opportunities and challenges faced by digital conventional banks compared to Islamic banks in a digital environment. While Islamic commercial banks and conventional commercial banks operate under different systems—the interest rate system for conventional banks and the profit and loss sharing system for Islamic banks—they both face similar challenges digitally. Conventional banks are highly sensitive to changes in global interest rate benchmarks. During periods of turmoil in the global or national financial system, digital conventional banks experience structural breaks in profitability sooner than Islamic banks due to their reliance on the interest rate system. In contrast, Islamic banks, which use profit and loss sharing systems, rely on financing through mudharaba and musharaka contracts, making them less immediately impacted by global financial crises (Yunita, 2021).

In addition, in recent years, the business landscape of the banking industry has undergone significant transformation. Following the financial crises of 2007–2008, Financial Markets Authorities enhanced regulations in the banking sector by introducing new standards and bolstering existing ones. Concurrently, advancements in information technology and financial technology (Fintech) have driven the need for more innovative solutions within the banking industry. Fintech has become integral to the sector, representing profound and cutting-edge technological innovation in finance. Its critical innovations are profoundly disruptive, significantly impacting the financial system and its infrastructure (Liu et al., 2021). Liu et al. (2021) found that Fintech significantly and positively influences banking firms in China across all models, including ESG composite scores and subcomponents of ESG scores. This indicates that Fintech is a crucial factor in determining the returns of banking firms in China (Liu et al., 2021).

The revolution in technology, financial technology (Fintech) has been a key driver of integration in the global financial market, fostering interconnectedness and enhancing the efficiency of financial transactions across borders. This integration has enabled businesses to expand beyond borders and empowered customers with convenient payment solutions. Fintech leverages cutting-edge digital technologies to enhance and automate the delivery of financial services to consumers. In today's global business landscape, financial technology plays a pivotal role across various industries, including real estate, retail, education, fundraising, and investment management. It relies on specialized algorithm-driven software and applications that enable banks and businesses

to manage their financial processes and operations more efficiently (Alsmadi, Alrawashdeh, Al-Gasaymeh, Al-Malahmeh, & Moh'd Al_hazimeh, 2023). Alsmadi et al. (2023) found that business enablers play a crucial role in advancing Fintech. Key factors such as strong cash flow, high fintech adoption rates, and a robust technological infrastructure are essential for financial technology development. Conversely, organizational reluctance to adopt Fintech hinders progress. Thus, business enablers are crucial for Fintech development. Additionally, the study indicates that Fintech enhances bank performance by improving customer satisfaction and enabling organizations to adopt more environmentally friendly processes (Alsmadi et al., 2023).

Venture capital (VC) is a highly effective funding source for high-tech entrepreneurial firms that lack access to other financing options. Venture capital companies provide capital and excel at identifying promising online technology ventures, offering value-added support and intensive monitoring. However, there is limited understanding of how these screening and monitoring processes specifically impact Fintech ventures and how venture capital firm may vary in terms of affiliation and performance measures (Turki & Nahidi, 2024). According to Turki and Nahidi (2024) discovered that bank-affiliated venture capitals (BVCs) possess a distinctive capability for precise screening, especially when identifying Fintech firms with a solid economic track record. This emphasis on high-performing companies could represent a strategic approach for BVCs, potentially enhancing their investment portfolios and optimizing profitability. These insights provide strategic guidance for both financial technology entrepreneurs and investors. For entrepreneurs, securing BVC funding may hinge on demonstrating both bank affiliation and solid economic profitability. For investors, this knowledge can refine their investment criteria, favoring financial technology firms with proven economic resilience and growth (Turki & Nahidi, 2024).

Over the past few decades, the operations of the banking sector have undergone significant changes. The financial crisis of 2007–2008 prompted banks to implement measures to stabilize the sector and introduce innovations to mitigate risk. Advances in financial technology (Fintech) have significantly enhanced the banking sector's ability to extend its financial services, a phenomenon researchers refer to as the 'Fintech Revolution (Yin et al., 2022).

Fintech emerged from the 'Financial Services Technology Consortium,' a Citi group initiative promoting technological collaboration. It involves integrating digital technologies with financial activities and services, revolutionizing traditional banking functions with innovations such as peer-to-peer lending (P2P), Cryptocurrencies, digital lending, crowdfunding, and online payments. These e-services have expanded the influence of non-banking financial services, driven by Big Data, The four key pillars of Fintech are Cloud Computing, Blockchain, Intelligence, and Big Data (Yin et al., 2022).

Big Data is particularly valuable for Market changes and evolving client demands have significantly shaped the financial services landscape, enhancing fraud detection, and developing new marketing strategies (Yin et al., 2022). In addition Yin et al. (2022) analyzed the impact of the financial technology era on the stability of the non-performing loans (NPLs) and Chinese banking sector. The study divided the data into the first and second waves of the financial technology era. The results indicated that the second wave had a notably positive impact on non-performing loans (NPLs) and the overall stability of the Chinese banking sector. The advancement of the Fintech revolution has fostered a more robust tracking and monitoring environment, benefiting traditional banking by simplifying credit access through Fintech lenders. Furthermore, Fintech innovation has paved the way for the emergence of new investment opportunities, further contributing to the sector's growth and resilience (Yin et al., 2022).

According to Wang, Liu, and Luo (2021), financial technology is defined within the context of rapid advancements in technologies like big data, cloud computing, blockchain, and artificial intelligence. These innovations are driving the global expansion of financial technology, or 'Fintech.' Broadly, Fintech refers to technologically driven financial innovations that can lead to new business models, applications, processes, and products, significantly impacting financial markets, institutions, and services. Fintech innovations are rapidly emerging across multiple areas of finance, such as investment management, credit provision, equity capital raising, wholesale payments, insurance and retail finance.These innovations not only challenge traditional financial services but also serve as catalysts for driving further innovation, their transformation, and modernization within the financial industry (R. Wang, Liu, & Luo, 2021).

Fasano and Cappa describe Fintech as an emerging phenomenon with blurred boundaries, due to its many differing definitions. Fintech represents the various intersections between technology and , finance covering areas such as internet banking, blockchain, peer-to-peer lending, mobile payments, cryptocurrencies, crowdfunding, robo-advisory, and insurtech. In general, Fintech firms can be defined as technologically advanced companies that leverage digital business models to innovate and deliver financial services. While Fintech is proliferating globally, the pace and extent of its adoption vary across different national markets (Fasano & Cappa, 2022).

In the twenty-first century, economies and financial markets have technologies and witnessed a surge of innovations, transforming financial services and products, especially within the banking sector. Financial technology aims to deliver automated and enhanced financial services. Initially, it referred to computer technology used in the back offices of banks and trading firms. However, the financial sector now depends on advanced information technologies such as Big Data, Artificial Intelligence (AI), the Internet of Things (IoT), and Blockchain. Fintech streamlines the flow of information, reduces operational costs, encourages ongoing enhancements in transactional lending, and accelerates processing speeds, making financial services more efficient and accessible (Chhaidar, Abdelhedi, & Abdelkafi, 2023).

Katsiampa et al. (2022) found that Fintech disruption has been rapid and extensive in China. Transactionally, China has transformed into a nearly cashless economy. Traditional Chinese banks have encountered substantial competition in their core profit areas from payment platforms, expansive digital networks, and e-commerce providers, which are directly vying for depositor retention. In the lending sector, advancements in peer-to-peer (P2P) lending and crowdfunding pose a significant threat to banks' primary revenue streams. Additionally, digitalization is reducing the need for banks' traditional "face-to-face" interactions in consumer finance and wealth management. These various challenges have driven banks traditional to develop and acquire financial technology capabilities to stay competitive. In recent years, most Chinese financial institutions have invested in alliances, Fintech partnerships, and joint ventures, further deepening and extending existing digitalization trends (Katsiampa et al., 2022).

In recent years, the business landscape of the banking industry has undergone significant transformation. Following the financial crises of 2007-2008, Financial Markets Authorities strengthened regulations in the banking sector by introducing new standards and bolstering existing ones. Additionally, advancements in information technology and financial technology have necessitated more innovative solutions within the banking industry. Fintech has become an integral part of the banking sector, representing one of the most profound and cutting-edge technological innovations in the financial field. Furthermore, Fintech is highly disruptive, driving critical innovations within the financial system and its underlying infrastructure (Liu et al., 2021).

However, Fintech introduces including cybersecurity threats, regulatory compliance, systemic risks, and new challenges. The dynamic and rapidly evolving nature of financal technology innovations has sparked concerns regarding their potential impact on the stability of the banking sector. Additionally, there are questions about the benefits and risks for traditional banks adopting Fintech, especially as they face increasing competition from financial technology startups. The difficulty in quantifying Fintech development has contributed to the lack of empirical evidence in this field. Some studies use text mining techniques to measure the extent of financial technology innovation and its relationship to banks' financial stability (Khan et al., 2023).

Fintech, the fusion of technology and finance, is an emerging industry that leverages technology to enhance activities within the finance sector. Over the past decade, Fintech has gained prominence in global financial markets, with a proliferation of Fintech enterprises. The rapid advancement of Fintech has garnered significant academic attention. Many studies have praised the emergence of financial technology, emphasizing its potential to revolutionize financial services by making more secure, more convenient, and transactions cheaper. As Fintech continues to evolve rapidly, it has also significantly influenced the banking sector. The impact of financial technology on banking generally stems from two primary sources: external financial technology and internal bank financial technology. External financial technology refers to innovations originating outside the banking industry, typically developed by financial technology companies. External financial technology primarily affects commercial banks through competition and technology spillover effects (Cheng & Qu, 2020; Khan et al., 2023).

Bank financial technology refers to the integration of emerging technologies within the banking industry, including cloud computing, blockchain, artificial intelligence, internet technologies, and big data. In recent years, the advancement of Bank Fintech has become a dominant trend in the broader financial technology landscape, driving innovation and transforming traditional banking operations. An increasing number of commercial banks are employing these advanced technologies to enhance their operations, improve customer service, and stay competitive in the rapidly evolving financial landscape (Al-Matari, Mgammal, Alosaimi, Alruwaili, & Al-Bogami, 2022; Carbó-Valverde et al., 2022; Cheng & Qu, 2020; Chhaidar et al., 2023; Elia et al., 2023; Fasano & Cappa, 2022; R. Wang et al., 2021; F. Yin et al., 2022).

In the banking system, the adoption of new delivery methods for depositor services, such as automated teller machines (ATMs), online banking, and call centers, can achieve greater economies of scale compared to traditional branch networks. Furthermore, advancements in payment technologies like point-of-sale (POS) terminals and multifunctional card issuance have created economies of scale and network efficiencies in back-office operations. These innovations have also streamlined fund transfers between individuals and organizations within a country. As the direct costs for banking services increasingly reflect the cost differences between electronic and paper-based transactions, a nation's overall payment costs can decline in real terms. It is estimated that by transitioning from a paper-based system to an electronic one and substituting ATMs for standalone branch offices, a country could achieve annual savings equivalent to 1% of its gross domestic product (GDP). Therefore, it is essential to consider innovation in banking services when determining the factors affecting bank performance (Le & Ngo, 2020).

A bank is an institution engaged in monetary and financial transactions, including loans, investments, investments, and deposits. This sector plays crucial roles such as providing essential financial services to the economy, contributing to economic growth, efficiently allocating resources, reducing transaction costs, creating liquidity, facilitating economies of scale in investment, and spreading financial losses (Isayas, 2022). Given the vital role of this sector, it is imperative that banks maintain a certain level of performance.

The banking sector is a crucial component of a nation's economy, warranting special attention from policymakers. Banks play a significant role in the financial system and are

a fundamental aspect of economic theory and finance. In Indonesia, banks have been integral to the economy since independence and continue to be vital today. Indicators such as assets and loans are used to demonstrate the banking sector's role and growth (Hasan, Manurung, & Usman, 2020). In both developed and less developed countries, traditional or conventional banks serve as the cornerstone of the financial sector. In developing and emerging market countries, banks remain the dominant financial institutions. These regions often exhibit characteristics such as low per capita income, limited asset levels, lenient accounting standards, and a corporate sector largely comprised of small, family-owned businesses. Due to inadequate infrastructure in these developing countries, it is unsurprising that banks and other financial intermediaries have emerged as the primary financial entities, while capital markets have lagged in their development (Jadah, Alghanimi, Al-Dahaan, & Al-Husainy, 2020).

Before the 2008 crisis, improvements in the macroeconomic environment and high levels of gross domistic product supported a significant increase in non-governmental credit in the Central and Eastern European (CEE) region, particularly credit denominated in foreign currencies due to large foreign direct investment (FDI) inflows. This heightened the banking systems' exposure to foreign exchange risk and revealed significant vulnerabilities when the crisis unfolded. In response, central banks sought to address these vulnerabilities by implementing measures such as imposing credit ceilings, as observed in Bulgaria and Croatia, or raising the minimum reserve requirements for deposits held in foreign currencies, as seen in Croatia and Romania. However, these measures had limited and short-term effects (Horobet, Radulescu, Belascu, & Dita, 2021).

Bank performance and stability have gained increasing attention within regulatory and supervisory frameworks, highlighting their critical role in forecasting financial distress and preventing bank crises. Understanding the determinants of performance in commercial banks is vital for assessing their competitiveness, overall stability, and operational efficiency, which are key factors in maintaining a healthy financial system (Al-Matari, 2023). The key determinants of bank performance can be categorized into two groups: internal (bank-specific) and external (macroeconomic) explanatory variables. From the standpoint of these indicators, factors such as bank size, credit quality, liquidity, and a country's economic conditions have been identified as significant drivers of bank profitability. Internal factors reflect the bank's management and operational efficiency,

while external factors encompass broader economic environments that influence financial performance (Koroleva, Jigeer, Miao, & Skhvediani, 2021).

Financial intermediaries play a vital role in economic and financial systems by providing essential services such as managing complex financial instruments, matching the supply and demand in financial markets, facilitating payment mechanisms, conducting risk transfers, and ensuring market transparency. They are also responsible for managing risks, contributing to the stability and efficiency of financial markets. In most economies, banks are the most important financial intermediaries, providing a wide range of services. The contemporary economic and financial systems of these economies rely on the efficiency of their banks to ensure economic growth. Conversely, inefficiencies and insolvencies in banks can lead to financial crises. Despite the trend of bank disintermediation in some economies, banks continue to play a central role in financing economic activities across various sectors. In addition to promoting economic growth, a profitable banking system strengthens an economy's resilience to adverse shocks and supports overall economic and financial stability. As a result, academicians, bank management, regulatory authorities, and researchers remain deeply interested in exploring the internal and external factors that determine bank performance (Rahman, Yousaf, & Tabassum, 2020).

In developing countries, the roles of the banking sector are undeniably vital. The growth of investment projects across diverse industries, supported by commercial banks, creates more job opportunities for domestic citizens, thereby reducing unemployment rates. During periods of economic contraction or unfavorable business cycles, the central bank can stabilize the vulnerable economy by implementing appropriate monetary policies for commercial banks to follow. As a result, inflation, deflation, and other associated risks can be controlled, leading to overall economic improvement. In summary, the growth of a developing economy largely depends on the soundness and health of its banking sector, particularly commercial banks (Dao, 2020).

On other hand, Ebrahim, Kumaraswamy, and Abdulla (2021) found that financial technology presents numerous opportunities for integrating technology into the banking industry. This integration has the potential to greatly enhance banks' operational performance, competitiveness, sustainability, innovation in new products and services,

and overall customer satisfaction. However, for successful Fintech implementation, banks must proactively address and overcome various challenges and obstacles. While financial technology in the banking sector is still in its early stages, it is anticipated to transform the delivery of financial products and services in the near future (Ebrahim, Kumaraswamy, & Abdulla, 2021).

Firmansyah, Masri, Anshari, and Besar (2023) found that the rise of financial technology (Fintech) has significantly transformed the financial landscape, driven by technological advancements and the global financial crisis. Their study employs the systematic literature review (SLR) technique to examine recent literature on Fintech adoption or acceptance using the Scopus database (2019–2022). They reviewed sixteen journal articles from various countries and theoretical backgrounds, selected based on inclusion criteria such as journal continuity in the Scopus index to ensure quality (Firmansyah, Masri, Anshari, & Besar, 2023).

The study identifies several determinants of Fintech adoption derived from commonly used theories like the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). Additionally, factors such as trust, financial literacy, and safety have been established as significant determinants by previous research. The results suggest that future studies on Fintech adoption should develop new constructs, as Fintech and customer behavior continue to evolve (Firmansyah et al., 2023).

Fintech refers to any management system or financial service that leverages technology to innovate and improve financial services. This encompasses financial applications and electronic software. Examples include electronic payment applications like Apple Pay, PayPal, and Google Wallet, as well as services involving virtual currencies, funding, financial advisors, and bots. Fintech seeks to introduce new or enhanced financial products and services, which enhance security, reduce costs, and improve financial inclusion, thereby stimulating economic growth and financial development. Due to its diversity, Fintech encompasses various forms, including Blockchain, Bitcoin Ethereum, and other cryptocurrencies (Almashhadani & Almashhadani, 2022).

Almashhadani and Almashhadani (2023) found that Fintech has positively impacted the banking performance of foreign banks in the UAE. The study also revealed that as the

quantity of electronic financial services provided to customer’s increases, the quality and performance of banks improve correspondingly (Almashhadani & Almashhadani, 2022).

Al-Matari et al. (2022) found a significant association between board size, board independence, board meetings, board experience, and corporate performance. The study revealed a significant relationship between the board of directors' scores and corporate profitability. However, the research also showed that Fintech did not moderate the relationship between the board of directors' scores and corporate performance (Al-Matari, Mgammal, Alosaimi, Alruwaili, & Al-Bogami, 2022).

The rise of financial technology is poised to enhance the presence and competitiveness of Islamic banking in developing countries (Alghadi, 2024). Alghadia (2024) conducted a study using annual data from 2017 to 2021, obtained from the annual statements of Jordan's Islamic Bank (JIB) registered with the Amman Stock Exchange. The research revealed that Fintech services, including internet banking, mobile banking, crowdfunding, and automated teller machines, significantly influenced JIB's financial performance. The positive value indicated a favorable relationship between Fintech services and the financial success of JIB during this period (Alghadi, 2024).

Fintech can be evaluated across multiple dimensions, resource allocation, including payment processing, risk management, and network. These dimensions can be combined with Fintech profitability metrics and big data indices to develop a comprehensive Fintech adoption index (i.e., financial technology development indicators), I employ factor analysis, focusing on five dimensions: big data, artificial intelligence, distributed technology, technological interconnectedness, and technology security. Additionally, the application layer incorporates four other dimensions (Wang et al., 2021).

Wang, Xiuping, and Zhang (2021) found that fintech development has boosted profitability, driven innovation, and enhanced risk control for commercial banks. By integrating fintech, these banks can refine their traditional business models, reduce operating costs, improve service efficiency, and develop more attractive offerings for customers, thereby enhancing overall competitiveness. The impact of fintech varies by bank size and type, with potential cost reductions in financial intermediation balanced by new regulatory challenges. The study highlights two forces shaping fintech's impact on inequality: robo-advisors, which may increase participation among lower-income

households, and alternative data sources in credit markets, which can reduce non-statistical discrimination. To achieve effective fintech integration, commercial banks need robust hardware (network facilities, high-performance computers, cloud servers, large-capacity storage) and advanced software (data mining, computation, distributed storage, batch processing, and artificial intelligence) (Y. Wang, Xiuping, & Zhang, 2021).

Cheng and Qu (2020) found that Fintech applications have recently become prominent in global financial markets, particularly in China, significantly impacting the banking industry. This trend is garnering substantial academic attention. Their study utilizes the two-step system Generalized Method of Moments (GMM) approach to estimate regressions, treating all bank variables as endogenous. They employ the first lag of the predetermined variables and the second lag of the endogenous variables as instruments. The columns of the optimal instrument matrix are consolidated by addition, resulting in a single instrument for each variable instead of one for each period. The validity of the instruments is assessed using the Sargan test statistic, and tests for first- and second-order autocorrelation in the residuals are also conducted (Cheng & Qu, 2020).

Cheng and Qu (2020) used hand-collected data from China spanning 2008 to 2017 to construct and measure bank Fintech, examining its effects on credit risk. Their key findings include bank Fintech and its subareas have shown a rising trend from 2008 to 2017, State-owned banks have developed more rapidly than other banks. Among the various subareas, internet technology saw the fastest growth, while artificial intelligence technology lagged behind. Additionally, the development of bank Fintech and its subareas is negatively correlated with credit risk, suggesting that advancements in bank Fintech help reduce credit risk. However, this negative impact of bank Fintech on credit risk is less significant in large banks, state-owned banks, and publicly listed banks. Despite the benefits, the study also notes that bank Fintech introduces technical and regulatory risks for commercial banks (Cheng & Qu, 2020).

The technological transformation of financial services has shifted business models and services from traditional, vertical correlation to digital, multi-sided platforms, largely driven by Fintech companies. While technology has long played a crucial role in financial services, Fintech firms take a more distinct, disruptive, and customer-focused approach. Through competition and innovation, these companies are poised to add significant value

to the financial sector as a whole. However, many Fintech firms encounter substantial challenges, particularly in terms of profitability and long-term survival (Carbó-Valverde, Cuadros-Solas, & Rodríguez-Fernández, 2022).

Valverde, Solas, and Fernández (2022) analyzed Spanish Fintech startups and found that larger, Solvent Fintech firms are more likely to attain profitability and report higher profit margins. Moreover, financial technology firms established by an existing company tend to be more performance and generate greater profits compared to those founded by groups of entrepreneurs. Interestingly, entrepreneurship positively influences performance when led by a single founder, who is 1.520 times more likely to achieve positive profits at an earlier stage. The study also revealed no evidence that being situated in a financial technology technological cluster enhances the likelihood of reaching breakeven. Additionally, the findings indicate that companies launched in incubators or those participating in financial technology accelerator programs are more likely to achieve profitability and do so more rapidly (Carbó-Valverde et al., 2022).

Financial technology (Fintech) is transforming the financial sector by leveraging technology and innovation to deliver financial services. Traditional financial institutions, especially banks, are prominent players in the fintech industry. The adoption of fintech innovations by banks significantly impacts their efficiency, profitability, and financial stability. Concurrently, government regulation plays a crucial role in fostering fintech innovation and maintaining financial stability. However, existing research on fintech is limited, likely due to the challenges in measuring fintech adoption, which include its multifaceted nature, data limitations, and the rapidly evolving technological landscape (Khan et al., 2023).

Khan, Khan, and Ghafoor (2023) found that The negative effects of Fintech adoption on financial stability are less pronounced for large and well-capitalized banks. Additionally, Islamic, foreign, and government banks experience a lesser impact from Fintech adoption compared to their counterparts. Furthermore, well-developed and competitive banking sectors have the capacity to mitigate the adverse effects of Fintech innovations on financial stability, allowing these institutions to navigate the challenges associated with technological advancements more effectively (Khan et al., 2023).

H_1: there is a negative relationship of Fintech index on the profitability of Arab Emerging Markets.

1.4.3 Liquidity

Low liquidity can compel banks to borrow at high interest rates, making their reputation crucial. Previous studies have yielded inconsistent findings: some researchers identified a significant negative relationship between the liquidity ratio and bank performance, while others found a clear positive link between liquidity and bank profitability.

Jadah, Alghanimi, Al-Dahaan, and Al-Husainy (2020) the findings revealed that the liquidity ratio shows only a minor correlation with the profitability of banks across all models. As a result, the hypothesis suggesting a strong relationship between the liquidity ratio and bank profitability is rejected, indicating that the liquidity ratio does not significantly determine the profitability of Iraqi banks (Jadah et al., 2020).

Saif-Alyousfi and Saha (2021) found a relationship between liquidity and profitability before, during, and after the financial crisis, with notable differences between Islamic and conventional banks. Islamic banks outperformed conventional banks in liquidity, capitalization, terms of fee income, market concentration, and asset quality. The study also examines these variables based on financial strength characteristics such as capitalization, liquidity, and size, highlighting the differences before, during, and after the financial crisis between Islamic and conventional banks (Saif-Alyousfi & Saha, 2021).

Rahman, Yousaf, and Tabassum (2020) found that low liquidity and weak asset quality lead to banking failures. Higher risk pressures management to diversify portfolios and increase liquid holdings to mitigate risk. In this context, risk is divided into credit risk and liquidity risk. Specific to the Pakistani banking sector, both types of risk are considered micro determinants. Higher levels of credit and liquidity risk result in more unpaid loans and lower returns. Empirical literature shows that credit and liquidity risks reduce bank profitability. Economic theory suggests a positive association between profitability and risks, where higher liquidity reduces risk and, consequently, profitability. Thus, a working capital strategy appears less risky in this balanced structure (Rahman et al., 2020).

On other hand, Al-Homaidi, Almaqtari, Yahya, and Khaled (2020) there found relationship between liquidity and performance in India(Al-Homaidi, Almaqtari, Yahya, & Khaled, 2020). An increase in the loan portfolio can lead to heightened liquidity risk if a bank's management is unable to effectively manage liabilities or finance the growth in assets on the balance sheet. However, when liquidity risk is viewed as a measure, it can have a positive influence on bank profitability, as it may drive banks to adopt more effective strategies for asset management and financial stability (Neves, Proença, & Dias, 2020).

Belcaid and Al-Faryan (2023) found that capital structure ratios, particularly solvency, liquidity, and capitalization ratios, have an undesirable effect on the performance of Moroccan banks (Belcaid & Al-Faryan, 2023). Banks help minimize the disparity between agents lacking liquidity (borrowers) and those with excess liquidity (depositors). Thus, they play a fundamental role in the economy, not only by adjusting liquidity but also by boosting productive sectors, supporting individual consumption, accumulating capital, and diversifying idiosyncratic credit risk through portfolios of multiple loans (Vera-Gilces, Camino-Mogro, Ordeñana-Rodríguez, & Cornejo-Marcos, 2020).

O'Connell (2022) found that, over an extended period, banks that maintain a lower level of deposits relative to their assets may anticipate higher overall profitability. This is primarily due to the reduced costs associated with managing expensive customer deposits, allowing these banks to allocate resources more efficiently and enhance their profit margins. The study also shows that banks increasing their short-term liquid asset holdings have seen higher profitability, consistent with previous findings. The underlying rationale is that funding markets incentivize banks to hold liquid assets, which helps to mitigate liquidity risk. However, this advantage is ultimately overshadowed by the opportunity cost associated with maintaining low-yielding assets on the balance sheet, as it limits the potential for higher returns on investments (O'Connell, 2022).

Duho, Onumah, Owodo, Asare, and Onumah (2020) found that liquidity risk is the risk of loss from being unable to liquidate assets at a reasonable price and time, while capital risk is the risk that a bank would lose its capital. Evidence shows that increasing cash holdings due to liquidity risk reduces return on assets and asset turnover but increases returns to shareholders (Duho, Onumah, Owodo, Asare, & Onumah, 2020). On other

hand, Katusiime (2021) found that liquidity risk has a negative and significant effect on bank profitability (Katusiime, 2021).

In addition, Kumar, Thrikawala, and Acharya (2022) found that capital ratio and bank liquidity are the major factors driving bank profitability in Arab countries (Kumar, Thrikawala, & Acharya, 2022).

Deposits are a crucial source of funds for banks and have a significant impact on their profitability. Customer deposits represent the easiest and most cost-effective source of funding for banks. It is widely acknowledged that deposits contribute positively to banking performance, provided there is sufficient demand for loans from borrowers, enabling banks to generate returns from their lending activities (Farooq, Khan, Atique Siddiqui, Tariq Khan, & Kamran Khan, 2021).

Banks may increase their deposits as they are an economical funding source, providing credit opportunities and other performance investments. During periods of rising economic growth, banks can enhance their performance investment opportunities by utilizing their surplus funds (Asmar & Farhood, 2024; Farooq et al., 2021).

Gazi, Alam et al. (2021) found a positive relationship between deposits and performance, though it is not significant (Gazi et al., 2021).

Deposits are the primary source of funding bank and are directly correlated with bank performance. They serve as a proxy for the bank's asset structure, indicating the diversification of its assets. A higher deposit amount increases the opportunity to earn profits by disbursing advances and loans. Nonperforming loans, which do not generate income, require banks to allocate provisions from their profits (Hossain & Ahamed, 2021).

Hossain and Ahamed (2021) hypothesized while deposits are generally positively correlated with bank profits, not all deposits prove profitable for banks. This is because deposits require interest payments to customers, and in the absence of strong investment opportunities, these interest expenses can reduce bank profitability. A bank's asset structure and the degree of investment diversification play critical roles in determining its earnings trends and future growth potential, as they influence how effectively a bank can capitalize on its deposit base. (Hossain & Ahamed, 2021).

Jreisat and Bawazir (2021) found a negative relationship between deposits and performane in the Middle East and North Africa region (JREISAT & BAWAZIR, 2021).

According to Angraini and Prastiwi (2020), banks rely on customer deposits to allocate credit to other customers. By securing more funds from customer deposits, banks can provide credit to those in need and thus make a profit. The study found that high deposits can increase bank profitability, while low deposits can reduce it (Angraini & Prastiwi, 2020).

Maria Elisabete Duarte, Joana, and Carmem (2022) found that the annual growth rate of deposits shows a statistically significant and positive impact on bank profitability in the Iberian Peninsula, including Portugal and Spain. The increased demand for deposits boosts bank profitability, possibly due to the increased purchasing power of depositors following the financial crisis. Consequently, banks may not need to implement aggressive policies, which could negatively affect performance through lower margins, to attract more depositors (Maria Elisabete Duarte, Joana, & Carmem, 2022). On other hand, Haider and Mohammad (2022) found that credit quality, interest income, deposit growth, and bank efficiency are important factors that impact bank profitability (Haider & Mohammad, 2022).

Doan and Bui (2021) found that the ratio of total loans to total deposits is positively related to profitability. An increase in this ratio leads to higher income from loans and lower costs of deposit mobilization, thereby boosting bank profitability. During the period studied, Vietnam's economy was recovering from the global financial crisis, and the banking sector played a crucial role in supplying capital, particularly to the manufacturing sector. As total loans increased, bank profitability improved. However, the loan-to-deposit ratio should be maintained at a moderate level, with investments focused on low-risk sectors to minimize liquidity risk and enhance profitability (Doan & Bui, 2021).

Jeris (2021) found that the deposits-to-total assets ratio influences bank profitability. Banks heavily rely on customer deposits; the more deposits a bank receives, the more loans it can issue, thereby generating more profit. The study showed that additional savings can help banks generate more income, while lower loans can adversely affect performance. Since deposits are the main source of funding, it is expected that growing deposits would expand the bank's business and generate more profits, having a positive

impact on bank profitability (Jeris, 2021). The Financing to Deposit Ratio measures the extent to which time deposits, demand deposits, savings, and other deposits are used to fulfill customer loan applications (Sihotang et al., 2022).

The loan-to-deposit ratio, a measure of liquidity, can affect banks' profitability. A higher ratio indicates lower liquidity, and vice versa. The relationship between the loan-to-deposit ratio and banks' profitability is debated. However, the ratio is generally expected to be positively related to profitability because loans are a primary income source. Collecting more deposits and lending them to quality assets generates more interest income for commercial banks. Conversely, holding a larger volume of liquid assets reduces a bank’s ability to generate interest income (Budhathoki, Rai, Lamichhane, Bhattarai, & Rai, 2020). Elekdag, Malik, and Mitra (2020) found a positive relationship between deposits and profitability for Euro area banks (Elekdag, Malik, & Mitra, 2020).

1.4.4 Solvency ratio

The solvency ratio reflects the residual claim of shareholders on a bank's assets and indicates the bank's capitalization position. Banks with a higher equity relative to liabilities generally experience greater profitability, as they are less reliant on borrowing, which reduces their funding costs. A higher equity-to-assets ratio supports more prudent lending practices and enhances performance, as it provides a cushion for absorbing potential losses from risky investments. Conversely, a lower solvency ratio increases bankruptcy costs, while a higher equity ratio can lower interest costs (Yao, Haris, & Tariq, 2018). Mohanty and Krishnankutty (2018) found a positive relationship between the solvency ratio and profitability. Older and well-capitalized banks are more profitable with lower funding costs (Mohanty & Krishnankutty, 2018).

Lower values of the equity to assets ratio imply higher leverage and risk for the bank. Banks with best solvency typically face lower borrowing costs, which improves their performance. Bal and Sönmezer (2022) found a positive and significant relationship between the solvency ratio and profitability in the banking sector in Turkey (Bal & Sönmezer, 2022).

The solvency ratio, or capital adequacy ratio (the ratio of equity to total assets), can positively affect bank performance by reducing the risks taken. However, higher solvency can also reduce the leverage effect, potentially increasing financing costs. Petria, Capraru, and Ihnatov (2015) found a positive relationship between the solvency ratio and profitability (Petria, Capraru, & Ihnatov, 2015).

Syarifah (2021) found that the solvency ratio measures the extent to which a company's assets are financed with debt. The primary ratio is used to determine whether the owned capital is adequate or the extent to which a decline in total assets can be covered by own capital. A higher level of debt can negatively impact the company if there is a continuous increase, potentially leading to bankruptcy and affecting the company's bond rating (Syarifah, 2021).

Solvency refers to a company's ability to fulfill its obligations, including making interest and principal payments. Analyzing solvency involves examining the components of a company's financial structure. Solvency ratios offer insights into the proportion of debt within the capital structure and assess whether earnings and cash flow are sufficient to cover interest expenses and other fixed charges. A company is deemed solvent if its assets are equal to or exceed its liabilities. Conversely, if total assets fall short of current liabilities, the firm faces insolvency risk and may struggle to meet its debt obligations. Solvency affects a company's ability to secure loans, financing, and investment capital, reflecting its financial health and stability. The degree of solvency is gauged by the relationship between assets, current liabilities, and equity at a specific point in time. Additionally, a company may address current or forthcoming liabilities by rapidly liquidating assets. Determining appropriate solvency levels is crucial for increasing profitability (Yenni, Arifin, Gunawan, Pakpahan, & Siregar, 2021).

Nguyen and Nguyen (2020) found a positive relationship between the solvency ratio and profitability. Higher solvency indicates greater financial stability, which enhances financial independence and security for enterprises. This stability allows enterprises to improve productivity and efficiency, thereby achieving greater profitability (T. N. L. Nguyen & Nguyen, 2020).

Solvency has also been used in research as an indicator of the financial performance of insurance companies and its impact on the profitability of agricultural cooperatives. Ullah, Faisal, and Zuhra (2016) found a positive relationship between the solvency ratio and profitability in the insurance industry of Bangladesh (Ullah, Faisal, & Zuhra, 2016).

Capital adequacy is used to determine the solvency of a bank and whether it has enough capital to support the risks in its financial statements. The Central Bank regulates bank capital to mitigate solvency problems (Agbeja, Adelakun, & Olufemi, 2015).

The solvency ratio displays the amount of debt used to fund business activities and indicates how well a business can manage its debt to pay it off and produce profit. It shows the amount of debt a business has in relation to its capital or assets. A company uses its own capital only if it does not have leverage or solvency factors (Fabiola Latifah, Delila Pandora, Kurnia Illa Allodya, & Maria Yovita, 2024).

1.4.5 Firm size

Ercegovac, Klinac, and Zdrilić (2020) found a positive but not significant correlation between the bank size of a banking firm and profitability. From a dynamic perspective, this indicator reflects the chosen overall business and risk operation model of an individual banking group (Ercegovac, Klinac, & Zdrilić, 2020).

Dao (2020) found that when it comes to the explanatory variable of bank size, numerous academic papers investigate the bank size-profitability relationship. Using Return on Equity (ROE) as a proxy for performance and measuring bank size by the volume of assets, they found that smaller banks operate more profitably. They applied the PAIRCLAS multicriteria methodology to investigate the effectiveness and profitability of UK small and high banks, distinguished by their banks sizes (Dao, 2020).

Elekdag, et al (2020) found that controlling for bank size is important, but its relationship to profitability is not conclusive. Some studies argue that larger banks benefit from economies of scale, enhancing their bottom line. In contrast, other studies claim that larger banks suffer from diseconomies of scale, reflecting agency, overhead, and managerial costs (Elekdag et al., 2020).

Teixeira et al. (2020) found a positive correlation between banks size and performance in the context of the financial crisis (Teixeira, Silva, Costa, Martins, & Batista, 2020).

The size of a bank is measured using the natural logarithm of its total assets. Larger banks can benefit from economies of scale, which enhance operational efficiency and lower costs, thereby creating a positive correlation between bank size and performance. However, agency costs and bureaucratic expenses tend to be higher in the management of large banks, which could result in a negative relationship between size and profitability (Torre Olmo, Cantero Saiz, & Sanfilippo Azofra, 2021).

Torre Olmo, Cantero Saiz, and Sanfilippo Azofra (2021) found a positive relationship between size and profitability across 48 countries (Torre Olmo et al., 2021) .Also Yin, Zhu, Kirkulak-Uludag, and Zhu (2021) found a positive relationship between size and profitability of Chinese banks (W. Yin, Zhu, Kirkulak-Uludag, & Zhu, 2021).

Bank size is a measurement scale that indicates the size of a bank, typically seen from the number of assets it holds. The size of a bank influences its ability to bear risks arising from various conditions faced in banking activities. Large banks are more attractive to consumers and find it easier to enter the capital market, resulting in a lower risk of bankruptcy. Consequently, this positively impacts the bank's level of profitability (Serly, Juliani, Susanto, Candra, & Nolivia, 2022).

Nguyen (2020) found differences between high-sized banks and less-sized banks in Vietnam. Bank capital adequacy positively impacts profitability for less-sized banks but has no significant impact on profitability for high-sized banks. Additionally, the study found that the return on assets and return on equity of large-sized banks are not significant relationship with Basel II implementation, whereas these correlations are statistically significant for small-sized banks (Nguyen, 2020).

Bank size is proxied by the logarithm of total assets and is expected to have a nonlinear effect on bank profitability. Larger banks have better opportunities for economies of scale, potentially leading to higher income. However, they also face higher bureaucratic burdens (Katırcıoglu, Ozatac, & Taspınar, 2020).

The study explores the impact of both absolute and systemic bank size on performance, risk, business strategies, and market discipline, focusing on an international bank context. A bank’s systemic size is measured relatively by the ratio of its liabilities to the country's Gross Domestic Product (GDP). The findings indicate that larger absolute bank size positively affects a bank's Return on Assets (ROA) and Return on Equity (ROE). However, banks with a large systemic size tend to be less profitable, suggesting that while absolute size can enhance performance, and systemic size may introduce constraints that limit profitability (Pak, 2020).

Akoi and Andrea (2020) found that the amount of assets owned by a bank, as indicated by total assets, shows that big banks with a lot of assets are positioned to reap significant profits from the market. The results depict that growth in bank size positions public banks for greater opportunities to enhance their performance. This aligns with previous studies that reveal a positive relationship between bank size and performance, highlighting the importance of bank managers establishing methods and approaches to enhance the size of public banks in emerging market economies (EMEs) (Akoi & Andrea, 2020).

Bank size and bank leverage can be used to predict performance, with lending activities being one of the primary determinants. Bank size controls economies of scale and is thus a key determinant of performance. However, empirical results indicate that the correlation between size and performance remains inconclusive, with findings yet to confirm a definitive correlation (Al-Eitan, Al-Own, & Bani-Khalid, 2022).

Al-Eitan, Al-Own, and Bani-Khalid (2022) found the study found that the number of loan accounts and the size of deposits had a negative and significant impact on the performance of commercial banks in Jordan. In contrast, the number of branches and ATMs showed no significant effect on bank performance. In summary, leverage and bank size were identified as the two primary determinants of commercial banks' profitability in Jordan (Al-Eitan et al., 2022).

Bank size is a good indicator, especially as banks are being asked to add more "green" investments to their balance sheets or replace "brown" investments with "green" ones. Larger banks face higher stakeholder pressure to implement climate change management. Consequently, the stability or growth in the size of banks' balance sheets is expected in

the future due to this transition. This is consistent with the literature, highlighting the impact of size (Caby, Ziane, & Lamarque, 2022).

Le (2020) found that size is negatively and significantly associated with profitability, supporting the too big to fail hypothesis. This suggests that large banks have more incentives to invest in risky assets (Le, 2020).

Bui and Nguyen (2021) found that firms were divided into different size classes to identify performance in each group. The findings showed that debt ratios negatively influenced profitability across all size classes due to increased interest and company risk. Fixed assets investment had varying effects: a negative relationship with small firms, a positive influence on large firms, and no significant effect on medium-sized firms (BUI & NGUYEN, 2021).

1.4.6 Management efficiency

The Operating Expense Ratio is a quantitative measure of a bank's efficiency, assessing how effectively management uses all production factors. This ratio, calculated as the ratio of total operating costs to total operating income, evaluates a bank's operational efficiency and its ability to function as a financial intermediary. Given that banks primarily act as intermediaries by collecting and distributing third-party funds, their operational costs and revenues are largely influenced by interest expenses and interest yields. An increase in operating costs directly reduces profit before tax, ultimately decreasing the bank's overall profitability (Sugianto, Oemar, Hakim, & Endri, 2020).

Gupta and Mahakud (2020) found that the cost-to-income ratio, measured as the ratio of non-interest expenses to total income, negatively correlates with profitability measures. They identified interest expenses as a significant determinant of bank profitability, influenced by market interest rates, competition, and the composition of funding sources. Higher interest expenses decrease the net interest margin and overall profitability of the bank, suggesting a negative correlation between interest expenses and performance (Gupta & Mahakud, 2020).

Ahmed et al. (2021) found that the effect of cost efficiency on non-performing loans (NPLs) is ambiguous. On one hand, banks that spend less on monitoring lending risks may appear more cost-efficient, but this can lead to an increase in NPLs in the future,

indicating an inverse effect of efficiency on NPLs. In addition, banks that incur higher costs to minimize lending risk but fail to control NPLs due to poor managerial skills are described as exhibiting bad management. Research indicates a negative relationship between operating efficiency and non-performing loans (Ahmed, Majeed, Thalassinos, & Thalassinos, 2021).

Khan (2022) identified operating efficiency as a measure of effective management, where lower efficiency indicates more efficient bank management. Specifically, it refers to the ratio of expenses incurred by a business to the revenue it generates. In the context of banks, this is often expressed as the ratio of operating expenses to interest income. Khan reported a negative and significant relationship between operational efficiency and return on equity (ROE) in commercial banks. Despite this, operational efficiency remains a crucial factor influencing banks' profitability in the European Union (EU) (S. J. J. o. C. B. T. Khan, 2022).

Hasan, Manurung, and Usman (2020) found that Net Interest Margin, the Ratio of Operational Expenses to Operational Profit (OEOI), Capital Adequacy Ratio (CAR), and Loan to Deposits Ratio (LDR) significantly affect a bank's profitability as measured by profitability. Additionally, the Federal Reserve rate and cement consumption significantly impact a bank's profitability as measured by profitability. They also found that NIM, Non-Performing Loans (NPL), OEOI, and LDR significantly affect a bank's profitability, with cement consumption also notably influencing profitability (Hasan et al., 2020).

Derbali (2021) found that credit risk and the ratio of general operating expenses to total assets negatively impact bank profitability. Specifically, the average cost-to-income ratio, which measures general operating expenses relative to net banking income, was identified as having a negative effect on bank profitability (Derbali, 2021).

Le and Ngo (2020) found that banks with more automated teller machines (ATMs) may reduce operating expenses such as branch maintenance, labor costs, and other related expenses. This finding aligns with other research suggesting that IT-based methods of service delivery significantly decrease operating costs, thereby improving bank profitability (Le & Ngo, 2020).

Ngumo, Collins, and David (2020) found that operational efficiency is typically assessed using the operating efficiency ratio, where a lower ratio is preferred because it signifies that operating expenses are lower relative to operating revenues (Ngumo, Collins, & David, 2020).

Al-Homaidi et al. (2020) defined the operating efficiency ratio as the total operating expense to total assets. Prior studies indicated that this ratio negatively correlates with Return on Assets and Return on Equity. However, contradictory results in their research suggest that the management efficiency ratio influences banks' profitability, emphasizing that operating efficiency is an important determinant of bank performane (Al-Homaidi et al., 2020).

1.4.7 External factors

Higher gross domestic product (GDP) growth typically boosts the demand for lending, which positive impacts bank performance. In adaption, if managers accurately anticipate inflation and adjust interest rates accordingly, the effect on bank performance remains positive. However, if they fail to do so, the impact can turn negative. Additionally, economic freedom variables from the Heritage Foundation, fiscal policy, monetary freedom, and including government spending, can affect bank performance in varying ways, either enhancing or constraining profitability and operational efficiency depending on how these factors interact with the banking environment. There is no universally optimal level of government spending, as its impact varies across countries. Excessive government spending and debt can harm financial sector profitability. Consequently, both excessive and insufficient government spending can negative affect performance, while a moderate level of spending is generally expected to have a positive effect. Additionally, extreme levels of government spending and fiscal and monetary freedom can negatively impact profitability, especially when institutions and national governance supporting the financial sector are weak (Djalilov & Piesse, 2016).

Gross domestic product growth (GDPg) and inflation are key macroeconomic variables influencing bank profitability. GDP serves as a major driver for individual and collective investment decisions, as well as deposit formation by individuals and legal entities, and other economic activities, is expected to positively impact bank profitability. This is due to increased financial monitoring of ongoing operations, crediting of the economy, and

the positive effects of credit and deposit multiplication, which enhance banks' financial potential (Pervan, Pelivan, & Arnerić, 2015).

Inflation, as measured by the Consumer Price Index (CPI), can impact bank performance in both positive and negative ways. Economic theory suggests that inflation significant influences interest rate structures. Higher inflation often leads to increased interest rates on loans, which can boost bank performance. However, elevated interest rates also raise the risk of loan defaults, as inflation affects the budgets of households and businesses, potentially straining their liquidity and diminishing their ability to repay debts. Consequently, when inflation leads to higher default rates, it can negative affect bank profitability (Pervan et al., 2015).

Ahmad, Koh, and Shaharuddin (2016) studied the determinants of bank profitability in Latin America, particularly focusing on Net Interest Margins (NIMs) due to traditionally high interest spreads in the region. They found that macroeconomic variables, rather than bank-specific factors, are the primary determinants of Brazilian banks' margins. Key Latin American macroeconomic variables influencing bank margins include GDP growth, interest rate volatility, inflation, banking concentration, regulator-imposed reserve requirements, and forced investments (Ahmad, Koh, & Shaharuddin, 2016).

Owoputi, Olawale, and Adeyefa (2014) found that the coefficient of the real gross domestic product growth rate (RGDP) is positive but insignificant, suggesting that GDP growth have not significant effect on bank profitability in Nigeria. This may be attributed to the fact that GDP growth in Nigeria is often celebrated without any substantial improvement in industrial production or the standard of living of the general population (Owoputi, Olawale, & Adeyefa, 2014).

Islam and Rana (2019) found that economic proxies such as gross domestic product (GDP) and inflation were insignificant in explaining the variability of Net Interest Margins (NIMs) (Islam & Rana, 2019). On other hand Yüksel et al. (2018) found that gross domestic product growth had the highest positive correlation with profitability among the independent variables studied. Non-interest/interest income also had a positive correlation with performance. In contrast, the loans-to-gross domestic product growth ratio and size variables had negative correlations with profitability, with these

relationships being stronger compared to the other variables examined (Yüksel, Mukhtarov, Mammadov, & Özsarı, 2018).

Dietrich and Wanzenried (2014) found that gross domestic product (GDP) development, GDP per capita, taxation, and market characteristics (e.g., market concentration) significantly influence bank profitability. Most studies they reviewed showed a positive correlation between inflation and gross domestic product growth with bank performance, while a higher tax burden generally had a negative impact on bank performance (Dietrich & Wanzenried, 2014).

Hasanov, Bayramli, and Al-Musehel (2018) conducted a pioneering study on bank profitability in Azerbaijan. They found that the negative impacts of gross domestic product and inflation on bank performance were statistically insignificant and significant, respectively. The negative effect of gross domestic product on banks' profitability was noted as inconsistent with the broader literature. The study's findings may be influenced by certain shortcomings, such as not checking the non-stationarity properties of the employed variables, with Azerbaijani GDP appearing to be non-stationary over time (Hasanov, Bayramli, & Al-Musehel, 2018).

Le and Ngo (2020) found that bank performance may be influenced by external factor (INF), as inflation plays a decisive role in the structure of interest rates. A higher inflation rate leads to higher interest rates on loans, which can increase bank performance. However, increased interest rates may also raise the risk of loan repayment because higher inflation impacts borrowers' budgets, threatening their liquidity and reducing their ability to service debts (Le & Ngo, 2020). On other hand Ozili and Ndah (2024) found a positive and significant correlation between inflation and the performane of banks in Nigeria (Ozili & Ndah, 2024).

Saif-Alyousfi (2022) found that in financially developed economies, higher inflation rates and high interest rates tend to offer better profits for banks. This suggests that in such environments, banks can benefit from the increased income generated from higher interest rates, which can outweigh the potential risks associated with inflation (Saif-Alyousfi, 2022). On other hand Derbali (2021) found that macroeconomic determinants such as economic growth and inflation levels do not have a significant impact, according to their empirical study (Derbali, 2021).

Isayas (2022) found that Inflation refers to the sustained decline in the purchasing power of a unit of local currency over time, typically measured either as a continuously compounded rate or as an annual percentage increase, as reflected in the Consumer Price Index (CPI). Inflation can negatively impact real economic growth and overall economic performance, especially at the aggregate level. In the context of financial institutions, inflation can lead to a decrease in performance, not necessarily due to poor management, but as a direct consequence of inflation itself. Inflation tends to increase the required real rate of return on equity for investors while reducing real capital income due to tax-related factors. This creates a strong negative correlation between inflation, real income, and both real and nominal stock prices (Isayas, 2022).

Jadah et al. (2020) found that the inflation rate reflects changes in the overall price level over the last period, with the price level serving as an index of all prices in the economy. This makes it a common tool for measuring inflation. Additionally, the Consumer Price Index (CPI) measures the prices of a fixed basket of consumer goods, weighted by the proportion of each component in average consumer spending. The impact of inflation on bank performance depends on whether the inflation rate is anticipated or unanticipated. If inflation is expected, banks can adjust interest rates accordingly, leading to revenue increases that outpace costs, positively affecting profitability. Conversely, if inflation is unanticipated, banks may not adjust interest rates quickly, causing expenses to rise faster than returns and negatively impacting profitability (Jadah et al., 2020).

Horobet et al. (2021) found that inflation has a significant and positive impact on net interest margins (NIM) but a negative impact on return on equity (ROE). Higher inflation rates are associated with increased NIM for banks, as they tend to incorporate a higher inflation premium in lending rates compared to deposit rates. Interestingly, during periods of low inflation or deflation (such as from 2011 to 2016, though this varies by country), NIM did not decline significantly in most countries in the region. This suggests that banks in Central and Eastern European (CEE) countries have considerable influence in financing the economy, even though banking market penetration, measured by banking assets per GDP, remained low across most of these countries during the analysis period. The underdevelopment of banking and financial markets in the region may explain the positive impact of inflation on NIM (Horobet et al., 2021). Table 1 shows a summary of the research hypotheses.

The remainder of this study is organized as follows: Chapter 1 provides a brief overview of relevant empirical studies on the relationship between technology in banking services and bank profitability, along with the study problem, research questions, and significance of the study. Chapter 2 covers the methodology, data, study design, and research model. Chapter 3 discusses the main findings, while Chapter 4 presents the discussions and conclusions.

Table 1

Summary of the research hypotheses

No.	Hypotheses
H_1	There is effect of Fintech index on the profitability of Arab Emerging Markets.

Chapter Two

Methodology and data

2.1 Methodology

This chapter outlines the strategic approaches used to achieve the study's primary objective: determining the impact of financial technology (fintech) on the profitability of publicly listed banks. It specifically focuses on the study design, data collection methodologies, and comprehensive analysis of the gathered information. The research sample includes banks located in the GCC countries, Jordan, and Palestine, covering the period from 2015 to 2022, using panel data quantitative methods.

The study sample consists of 55 banks: 13 Jordanian, 7 Palestinian, 6 Saudi, 7 Kuwaiti, 5 Bahraini, 6 Qatari, 7 Omani, and 4 Emirati banks. Among these, there are 20 Islamic banks: 2 Jordanian, 3 Palestinian, 6 Saudi, 3 Kuwaiti, 1 Bahraini, 2 Qatari, 1 Omani, and 2 Emirati banks.

Table 2

Additional Divisions of Banks in Jordan, Palestine, and the Gulf Cooperation Council (GCC)

Countries	Population	Sample	Commercial bank	Islamic bank
Jordan	14	13	11	2
Palestine	7	7	4	3
Saudi	10	6	0	6
Kuwait	9	7	4	3
Bahrain	9	5	4	1
Qatar	9	6	4	2
Oman	7	7	6	1
Emirates	9	4	2	2
Total 8 Countries	74	55	35	20

2.2 Data

The dataset presented encompasses a diverse array of crucial financial metrics, including Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM), alongside a comprehensive set of variables related to fintech adoption index, such as mobile banking, internet banking, and digital payment solutions automation. Additionally, it includes variables such as size, liquidity, solvency ratio, management efficiency, and external factors like Gross Domestic Product (GDP) and inflation. This extensive dataset provides a holistic view of the factors influencing financial performance within the banking sector. It offers researchers an invaluable opportunity to explore the

intricate relationships between fintech adoption index, financial performance metrics, and broader economic conditions, shedding light on the evolving landscape of the banking industry in the digital era. The information was extracted from annual financial reports at the end of each year from 2015 to 2022.

Table 3

Shows the measurement of all variables

Variable	Measurement	References
Dependent variables		
ROA (return on asset)	Net income to total asset	(Isayas, 2022)
ROE (return on equity)	Net income to total equity	(Neves et al., 2020)
NIM (net interest margin)	Net interest income to total asset	(Katusiime, 2021)
In dependent variable		
Fintech adoption index 1	Index $fintech_1$	**(Cheng & Qu, 2020)**
Fintech adoption index 2	Index $fintech_2$	(Khan et al., 2023)
(FIN) fintech	Dummy 0 for bank use fintech and 1 otherwise	
Control variables		
(LIQ) liquidity	Current asset to current liability	(Jadah et al., 2020; Neves et al., 2020; Rahman et al., 2020; Saif-Alyousfi & Saha, 2021)
(SOLV) solvency	Total net worth to total asset	(Bal & Sönmezer, 2022; Mohanty & Krishnankutty, 2018; Syarifah, 2021; Yao et al., 2018; Yenni et al., 2021)
(ME) management efficiency	Total operating expenses to total asset	(Ahmed et al., 2021; Al-Homaidi et al., 2020; Derbali, 2021; Gupta & Mahakud, 2020; Khan, 2022; Sugianto et al., 2020)
(GDP) gross domestic product	World bank indicators	(Dietrich & Wanzenried, 2014; Hasanov et al., 2018; Owoputi et al., 2014; Yüksel et al., 2018)
(INF) inflation	World bank indicators	(Derbali, 2021; Isayas, 2022; Jadah et al., 2020; Ozili & Ndah, 2024)
(Size) size of banks	Natural logarithm of total asset	(Dao, 2020; Elekdag et al., 2020; Ercegovac et al., 2020; Katırcıoglu et al., 2020; Serly et al., 2022; Teixeira et al., 2020; Torre Olmo et al., 2021)
(IB) Islamic banks	Dummy 0 for Islamic bank and 1 otherwise (interaction variable)	
(COV_19) coved_19	Dummy 0 for coved_ 19 and 1 otherwise	

1. Profitability: three metrics are used for profitability: (ROA) return on asset is a typical profitability metric, calculated by dividing net income by total asset. (ROE) return on equity is a metric calculated by dividing total income by total assets. (NIM) net interest margin is a metric calculated by dividing net interest income by total asset.
2. Fintech index-1: We adopted a methodology known as "word frequency statistics from text mining," which has been utilized by Khan, Khan, and Ghafoor (2023), Funga et al. (2020), as well as Cheng and Qu (2020), to formulate a fintech adoption index. Two methods that will be used first Cheng, and Qi (2020) to measure fintech index (Cheng & Qu, 2020).

Firstly, we structure the initial search items into three parts. The first part denotes the year, the second signifies the bank name, and the last comprises our keywords. This configuration is chosen to emphasize the application of bank fintech at the bank-year level. We categorize banks in GCC countries, Palestine, and Jordan into nine primary classifications: Digital Presence, Mobile Banking, Support for Open APIs, Fintech Partnerships, Digital Payment Solutions, Automation and Artificial Intelligence, Innovation Initiatives, Electronic Services, and Embracing New Technologies. The original keywords for these nine main categories are established in a table 5. This approach enables effective categorization of bank fintech types and encompasses all pertinent terminology associated with bank fintech (Cheng & Qu, 2020).

Secondly, we proceed to calculate the frequency of the original keywords utilizing either the Baidu database or manual calculation through keyword frequency search engines. Initially, we utilize annual reports that contain the original keywords listed in the table 4 in appendix G as annual reports. Subsequently, we employ the manual calculation through keyword to determine the number of target articles released for each bank from 2015 to 2022. We then aggregate the total number of news annual reports each year and compute the frequency of the original keywords at the bank-year level. This methodology is founded on the premise that the quantity of annual reports correlates significantly with various socioeconomic phenomena. Specifically, the volume of bank fintech news is positively associated with the input and development of bank fintech. Therefore, in an era where the internet serves as the primary medium for information dissemination, an increase in the quantity of online news containing the original keywords listed in the table

corresponds to advancements in bank fintech development. Finally, we opt for the factor analysis method to formulate the FinTech index (FT). Through the preceding two steps, we acquire new numerical data for 55 banks over a span of 8 years (Cheng & Qu, 2020).

We initiate by constructing successive indices for various dimensions: Digital Presence index ($FTDP_{i,t}$), Mobile Banking Capabilities index ($FTMB_{i,t}$), Support for Open APIs index ($FTAP_{i,t}$), Fintech Partnerships index ($FTFP_{i,t}$), Digital Payment Solutions index ($FTDP_{i,t}$), Automation and Artificial index ($FTAA_{i,t}$), Innovation Initiatives index ($FTII_{i,t}$), Electronic index ($FTE_{i,t}$), and Embracing New Technologies index ($FTEN_{i,t}$). Preliminary assessments are conducted to ascertain the existence of shared elements among the original keywords within each dimension. The Kaiser-Meyer-Olkin (KMO) tests and the approximate chi-square values from the Bartlett test of sphericity decisively reject the null hypothesis, indicating that there are shared factors among the original keywords suitable for factor analysis. Subsequently, common factors are extracted, guided by the criterion that eigenvalues should exceed 1. Finally, to ensure positivity of the indices, a maximum-minimum processing technique is employed to standardize data between 0 and 1, yielding the indices $FTDP_{i,t}$, $FTMB_{i,t}$, $FTAP_{i,t}$, $FTFP_{i,t}$, $FTDP_{i,t}$, $FTAA_{i,t}$, $FTII_{i,t}$, $FTE_{i,t}$, and $FTEN_{i,t}$. The following equation is to measure Fintech index:

$$FT = \frac{\text{FTDP+ FTMB+FTAP+FTFP+FTDP+FTAA+FTII+FTE+FTEN}}{9} \quad \text{.....(1)}$$

3. Fintech index 2: Quantifying fintech adoption is challenging due to the diverse and evolving nature of fintech technologies and business models, making it difficult to create a standardized measure. Additionally, data availability and quality vary across regions and countries, complicating precise assessments. Fintech adoption often blends traditional financial services with new methods, making it hard to distinguish between them. The varying pace of fintech adoption across sectors and institutions further complicates comparisons. Rapidly changing consumer behaviors and preferences also affect the estimation of fintech usage and adoption extent. Despite these limitations, we endeavored to define fintech in the banking sector and constructed a bank-year indicator of fintech adoption for the GCC countries, Jordan, and Palestine from 2015 to 2022.

First, we identified at least nine attributes of fintech adoption: banks' digital presence, mobile banking capabilities, support for open APIs, fintech partnerships, digital payment solutions, automation and artificial intelligence integration, innovation initiatives, user electronics, and embracing new technologies. These attributes align closely with the operations of banking institutions. See Table 4 in appendix G for an explanation of each attribute. We chose these attributes for the following reasons (Khan et al., 2023):

First, Banks' Digital Presence: Reflects the online footprint and digital accessibility of the bank, crucial for customer engagement and service delivery. secound, Mobile Banking Capabilities: Indicates the extent to which banks offer mobile banking services, essential for modern customer convenience and access. Third, Support for Open APIs: Demonstrates the bank's ability to integrate and collaborate with external fintech providers, enhancing service offerings and innovation. Fourth, Fintech Partnerships: Represents strategic alliances with fintech companies, facilitating the adoption of advanced technologies and services. Fifth, Digital Payment Solutions: Covers the range and sophistication of digital payment options provided by the bank, important for transaction efficiency and customer satisfaction. Sixth, Automation and Artificial Intelligence Integration: Shows the implementation of AI and automation in banking processes, improving efficiency, decision-making, and customer service. Seventh, Innovation Initiatives: Reflects the bank's efforts to foster and implement new technological solutions, driving continuous improvement and competitiveness. eigth,User Electronics: Pertains to the adoption of electronic devices and interfaces for user interactions, enhancing accessibility and user experience. Ninth, Embracing New Technologies: Indicates the bank's commitment to integrating emerging technologies into their operations, crucial for staying competitive in a rapidly evolving industry. These attributes were selected to provide a comprehensive view of fintech adoption in the banking sector, capturing both technological capabilities and strategic initiatives (Khan et al., 2023).

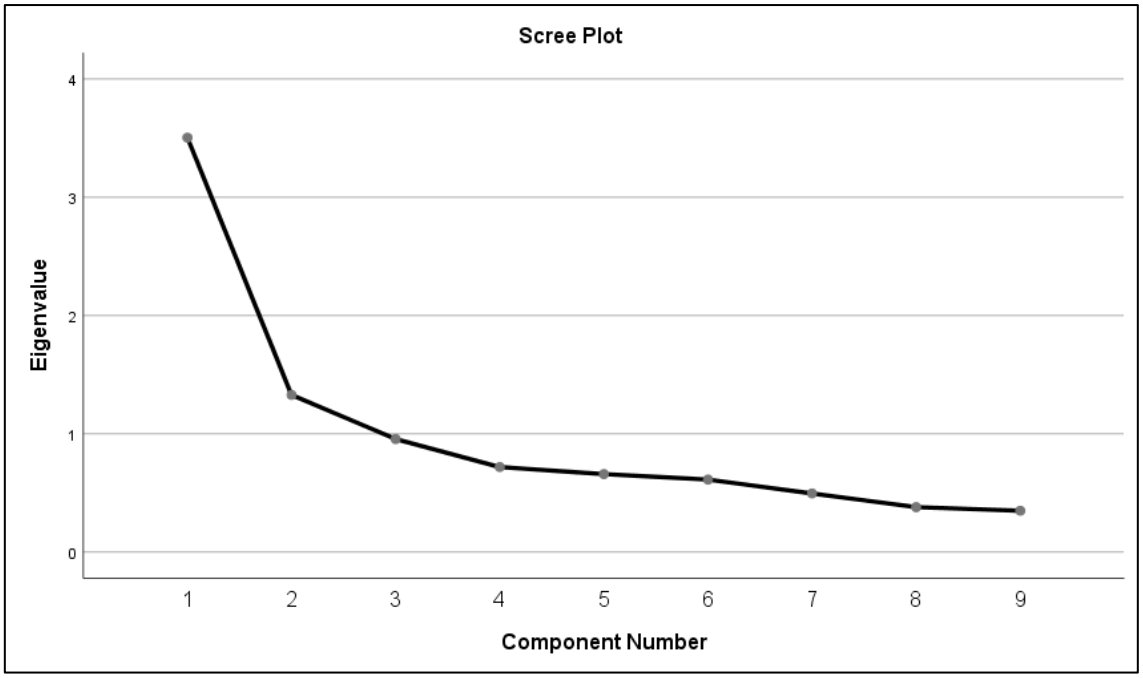
In the second step, we employed the Google search engine to locate annual reports by inputting each bank's name, year, and relevant keywords. Following this, we computed the number of annual reports and the occurrence of key terms for each bank and year. In the third phase, factor analysis was conducted using SPSS to identify key factors associated with various fintech attributes. In the final stage, we confirmed whether a bank

had introduced services related to specific fintech attributes. This verification was done through text mining, which involved analyzing the content of each bank's website to determine if a particular service was offered in a given year. A variable weight of 1/9 was assigned to each service introduced within that year. The final index was calculated as the weighted average of the scores obtained in the third phase (Khan et al., 2023). Figure 1 presents the scree plot of the 9 factors associated with banking fintech.

Factor analysis using SPSS: first analyze, dimension reduction, then click factor. Second Transfer all data to variables. Third click descriptives just initial solution. Fourth click extraction, then click principle components method, then click unrolated factor solution, then click fixed number of factors choose number 1. Fifth click rotation, then click varimax, then click rotated solution. Sixth click scores, then click regression. Seventh click options, then click ecclude case listwise. Finally click ok.

Figure 1

Scree plot of 9 Factors Related to Banking Fintech



4. Liquidity: independent variables calculated by dividing current asset by current liability.
5. Solvency ratio: independent variables calculated by dividing total net worth by total asset.

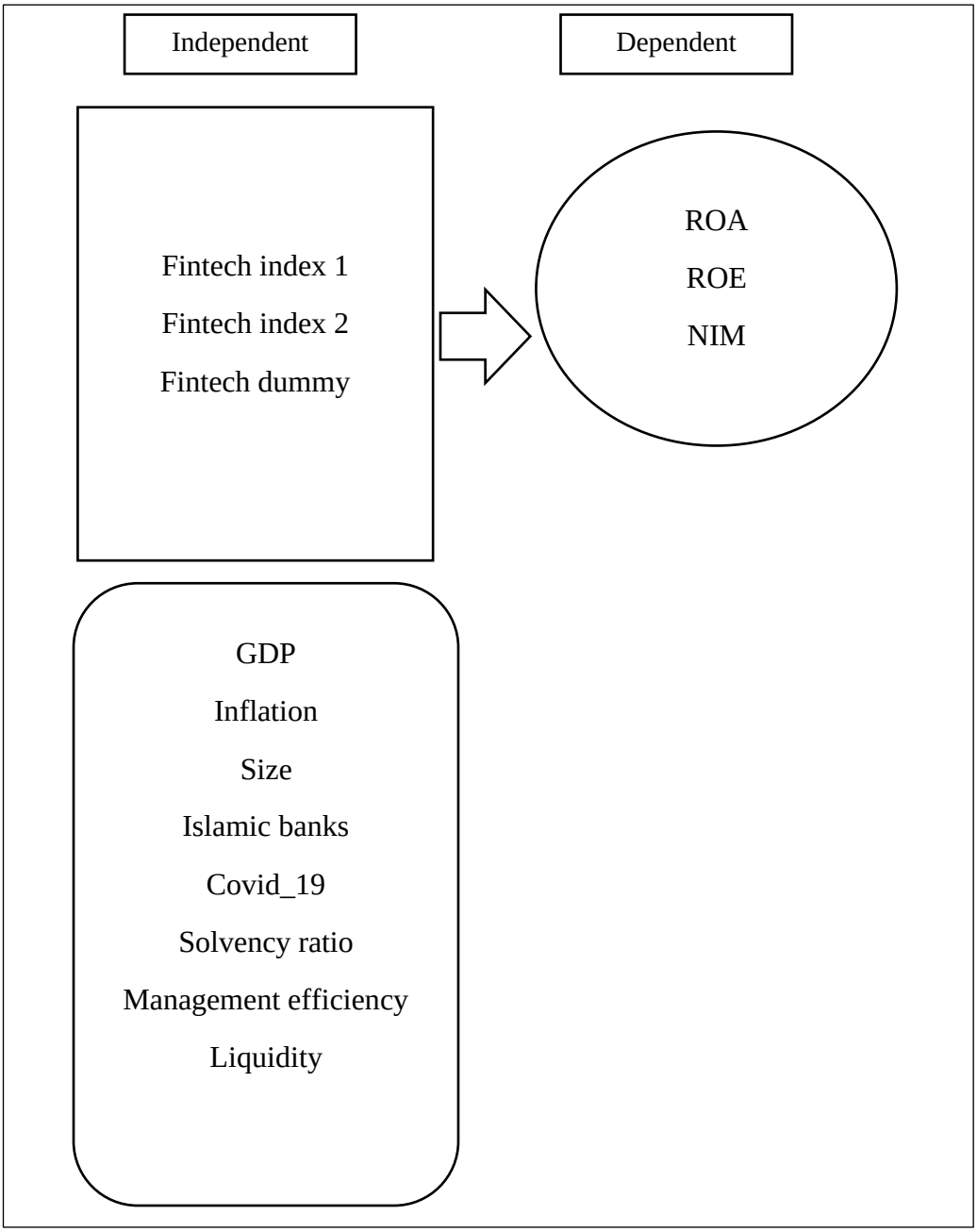
6. Management efficiency: independent variables calculated by dividing total operating expenses by total asset.
7. Gross domestic product: external factors, World Bank indicators.
8. Inflation: external factors, World Bank indicators.
9. Size: control variable calculate by natural logarithm of total asset.
10. Islamic banks: dummy 0 for Islamic bank and 1 otherwise.
11. Coved_19: dummy 0 for coved_ 19 and 1 otherwise.
12. Fintech: dummy 0 for bank use fintech and 1 otherwise.

2.3 Study model

The study model consists of three parts. The first part includes the independent variables: Fintech Index 1, Fintech Index 2, and dummy fintech. The second part involves the dependent variables: Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM). The third part encompasses external factors and control variables, including GDP, Inflation, Size, Islamic Banks, COVID-19, Liquidity, Solvency Ratio, and Management Efficiency, the figure two show the model.

Figure 2

Study model



2.4 Research Model

The following linear model was estimated to test the hypothesis of this paper, with firm and year subscripts omitted for clarity. The model was estimated separately for all countries combined, Palestine, Jordan, GCC countries:

$$\text{profitability}_{\square} = \beta_0 + \beta_{fintech1} + \beta_{LIQ} + \beta_{SOLV} + \beta_{ME} + \beta_{GDP} + \beta_{INF} + \beta_{SIZE} + \beta_{IB} + \beta_{COVED} + \epsilon \quad \text{……..(2)}$$

$$\text{profitability}_{\square} = \beta_0 + \beta_{fintech2} + \beta_{LIQ} + \beta_{SOLV} + \beta_{ME} + \beta_{GDP} + \beta_{INF} + \beta_{SIZE} + \beta_{IB} + \beta_{COVED} + \epsilon \quad \text{……..(3)}$$

$$\text{profitability}_{\square} = \beta_0 + \beta_{FINTD} + \beta_{LIQ} + \beta_{SOLV} + \beta_{ME} + \beta_{GDP} + \beta_{INF} + \beta_{SIZE} + \beta_{IB} + \beta_{COVED} + \epsilon \quad \text{……..(4)}$$

Where:

β_0 = profitability, return on asset, return on equity, and net interest margin. ϵ= error term.

$\beta_{fintech1}$ = index fintech 1.

$\beta_{fintech2}$= index fintech 2.

β_{FINTD} = fintech dummy variable.

β_{LIQ}= liquidity.

β_{SOLV} = solvency ratio.

β_{ME} = Management efficiency.

β_{GDP} = gross domestic product.

β_{INF}= inflation.

β_{SIZE} = banks size.

β_{IB}= Islamic banks dummy variable.

β_{COVED}= covid_19 dummy variable.

Chapter Three

Result

The findings of this study are presented in this section. Firstly, the results of all countries, second Palestine presented, third Jordan presented, third GCC.

3.1 All countries result

The findings of this study are presented in this section. Firstly, the results of descriptive statistics and correlation analysis are provided, followed by a discussion of the model estimation.

3.1.1 Descriptive Statistics

The descriptive statistical indicators (Abdeljawad & Farhood, 2024; Asmar & Farhood, 2024) (mean, median, maximum, minimum, and standard deviation) for the dependent variables (ROA, ROE, NIM) and independent variables (Fintech index 1, Fintech index 2, dummy fintech) control variables (Liquidity, Solvency ratio, Management efficiency, GDP, and inflation) are shown in Table 5.

Table 5

The descriptive statistical indicators for the dependent variables and independent variables

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
ROA	-0.002	0.011	0.048	-4.362	0.212	431
ROE	0.081	0.083	1.681	-0.397	0.103	431
NIM	0.026	0.025	0.263	-0.015	0.016	431
FINTECH	0.362	0.358	0.696	0.168	0.086	431
FINTECH_INDEX_2	0.062	-0.177	3.935	-1.148	0.919	431
DUMMY_FINTECH	0.613	1.000	1.000	0.000	0.488	431
SOLV	0.053	0.133	1.010	-12.661	0.923	431
SIZE	18.219	18.419	22.858	9.176	2.873	431
ME	0.023	0.019	0.279	0.007	0.024	431
LIQ	1.185	0.949	17.082	0.074	1.428	431
COVID_19	0.624	1.000	1.000	0.000	0.485	431
IB	0.631	1.000	1.000	0.000	0.483	431
GDP	0.038	0.043	0.315	-0.296	0.127	431
INF	0.014	0.014	0.050	-0.025	0.018	431

For Table 5, the ROA for banks in all countries ranges from a minimum of -4.362 to a maximum of 4.68%. The ROE ranges from a minimum of -39.7% to a maximum of 1.681. The NIM ranges from a minimum of -1.5 % to a maximum of 26.3%. The mean values are -0.2% for ROA, 8.1% for ROE, and 2.6% for NIM. The standard deviations are 21.2% for ROA, 10.3% for ROE, and 1.6% for NIM (Alarussi & Gao, 2023; Belcaid & Al-Faryan, 2023; Bolarinwa et al., 2021). The fintech index 1, the minimum of 16.8% to a maximum of 69.6% (Cheng & Qu, 2020). The fintech index 2, the minimum of 70.4% to a maximum of 34.999 (Khan et al., 2023).

3.1.2 Correlation Analysis

The correlation coefficient, as shown in Table 6, represents the connection between each pair of variables. From Table 6, ROA has a positive relationship with fintech index_1, dummy fintech, solvency ratio, liquidity, size, and covi-19. It also has a negative relationship with fintech index_2, management efficiency, inflation, GDP, and Islamic banks.

Table 6

The correlation coefficient

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
ROA (1)	1.000													
ROE (2)	-0.708	1.000												
NIM (3)	-0.674	0.652	1.000											
FINTECH (4)	0.066	-0.005	-0.091	1.000										
FINTECH_INDEX_2 (5)	0.058	-0.052	-0.015	0.331	1.000									
DUMMY_FINTECH (6)	-0.048	0.004	0.023	-0.388	-0.549	1.000								
SOLV (7)	0.207	-0.066	0.042	-0.007	0.109	-0.068	1.000							
SIZE (8)	0.151	-0.011	0.007	-0.134	0.113	0.011	0.281	1.000						
ME (9)	-0.278	0.035	0.166	-0.080	-0.157	0.126	-0.792	-0.135	1.000					
LIQ (10)	0.024	-0.113	0.000	-0.119	-0.073	0.070	0.083	-0.062	-0.036	1.000				
COVID_19 (11)	-0.027	0.120	0.102	-0.207	-0.400	0.415	0.094	-0.026	-0.013	-0.045	1.000			
IB (12)	-0.043	0.004	0.147	0.023	0.009	-0.006	-0.075	-0.005	0.154	-0.249	0.002	1.000		
GDP (13)	-0.004	0.064	-0.028	0.095	0.213	-0.223	-0.015	0.025	-0.045	0.046	-0.242	-0.023	1.000	
INF (14)	-0.007	0.080	0.066	0.077	0.082	-0.081	0.026	-0.001	-0.064	-0.029	-0.161	-0.021	0.314	1.000

ROE has a positive relationship with management efficiency, fintech index_1, fintech index_2, inflation, GDP, covid-19, and Islamic banks. It also has a negative relationship with Fintech dummy, solvency ratio, size, and liquidity.

NIM has a positive relationship with Fintech index_2, solvency ratio, size, management efficiency, liquidity, inflation, GDP, and Islamic banks. It also has a negative relationship with Fintech index_1, Fintech dummy, and covid-19. The relationships between independent variables are generally low, indicating no multicollinearity problems in subsequent regressions.

3.1.3 Estimation Results

The regression findings from various specifications of the study model are shown in Table 7 in appendix G. Nine specifications are presented: Model 1to model 3 for return on assets (ROA), Model 4 to model 6 for return on equity (ROE), and Model 7 to model 9 for net interest margin (NIM). According to the R-squared values, the models explain approximately 9.8% to 14.0% of the total variability in profitability. Additionally, the Durbin-Watson statistic for the models ranges from 1.652 to 2.519.

There have a negative relationship between fintech index_1 and profitability but not significant. Consistent with the findings of Khan, Khan, and Ghafoor (2023) found that the negative effects of fintech adoption on financial stability are less pronounced for large and well-capitalized banks. Additionally, the financial stability of Islamic, foreign, and government banks is less impacted by fintech adoption compared to other banks (Khan et al., 2023).

On other hand, there have a positive relationship between fintech index _2 and profitability but not significant. Consistent with the findings of Cheng and Qu (2020). Found that Fintech applications have recently become prominent in global financial markets, particularly in China, significantly impacting the banking industry. This trend is garnering substantial academic attention. Their study utilizes the two-step system Generalized Method of Moments (GMM) approach to estimate regressions, treating all bank variables as endogenous (Cheng & Qu, 2020).

Also, solvency ratio has a positive relationship and significant with profitability Consistent with the findings of Mohanty and Krishnankutty (2018). Higher solvency indicates greater financial stability, which enhances financial independence and security

for enterprises. This stability allows enterprises to improve productivity and efficiency, thereby achieving greater profitability (Mohanty & Krishnankutty, 2018).

Firm size has a positive relationship and significant with profitability Consistent with the findings of Ercegovac, Klinac, and Zdrilić (2020).

On the other hand, management efficiency has a positive and significant relationship with NIM, which is consistent with the findings of Ngumo, Collins, and David (2020). Operational efficiency is typically assessed using the operating efficiency ratio, where a lower ratio is preferred because it signifies that operating expenses are lower relative to operating revenues.

On the other hand, liquidity has a negative relationship and significant with profitability which is consistent with the findings of Saif-Alyousfi and Saha (2021) found a relationship between liquidity and profitability before, during, and after the financial crisis, with notable differences between Islamic and conventional banks (Saif-Alyousfi & Saha, 2021).

Additionally GDP has a negative relationship but not significant with profitability. Inflation have a positive relationship and significant with profitability. On other hand. Also dummy fintech has a negative relationship with profitability but not significant.

3.2 Palestine result

The findings of this study are presented in this section. Firstly, the results of descriptive statistics and correlation analysis are provided, followed by a discussion of the model estimation.

3.2.1 Descriptive Statistics

The descriptive statistical indicators (Abdeljawad & Farhood, 2024; Asmar & Farhood, 2024) (mean, median, maximum, minimum, and standard deviation) for the dependent variables (ROA, ROE, NIM) and independent variables (Fintech index 1, Fintech index 2, dummy fintech) control variables (Liquidity, Solvency ratio, Management efficiency, GDP, and inflation) are shown in Table 8.

Table 8

The descriptive statistical indicators for the dependent variables and independent variables

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
ROA	0.006	0.008	0.016	-0.025	0.009	55
ROE	0.073	0.090	0.141	-0.079	0.054	55
NIM	0.027	0.027	0.049	0.002	0.009	55
FINTECH	0.320	0.308	0.595	0.169	0.095	55
FINTECH_INDEX_2	-0.281	-0.488	2.978	-1.141	0.857	55
DUMMY_FINTECH	0.709	1.000	1.000	0.000	0.458	55
SOLV	0.140	0.098	0.837	0.065	0.127	55
SIZE	20.791	20.800	22.596	18.282	0.953	55
ME	0.031	0.031	0.042	0.022	0.005	55
LIQ	1.895	1.115	7.706	0.970	1.262	55
COVID_19	0.618	1.000	1.000	0.000	0.490	55
IB	0.582	1.000	1.000	0.000	0.498	55
GDP	0.043	0.053	0.166	-0.093	0.072	55
INF	0.009	0.002	0.037	-0.007	0.014	55

For Table 8, the ROA for banks in Palestine ranges from a minimum of -2.5% to a maximum of 1.6%. The ROE ranges from a minimum of -7.9% to a maximum of 14.1%. The NIM ranges from a minimum of 0.2% to a maximum of 4.9%. The mean values are 0.6% for ROA, 7.3% for ROE, and 2.7% for NIM. The standard deviations are 0.9% for ROA, 5.4% for ROE, and 0.9% for NIM (Alarussi & Gao, 2023; Belcaid & Al-Faryan, 2023; Bolarinwa et al., 2021). The fintech index 1, the minimum of 9.5% to a maximum of 16.9% (Cheng & Qu, 2020). The fintech index 2, the minimum of 5.112 to a maximum of 2.201 (Khan et al., 2023).

3.2.2 Correlation Analysis

The correlation coefficient, as shown in Table 9, represents the connection between each pair of variables. From Table 9, ROA has a positive relationship with fintech index_1, fintech index_2, size, inflation, GDP, Islamic banks, and covid-19. It also has a negative relationship with solvency ratio, dummy fintech, management efficiency, and liquidity.

Table 9

The correlation coefficient

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
ROA (1)	1.000													
ROE (2)	0.882	1.000												
NIM (3)	0.649	0.543	1.000											
FINTECH (4)	0.426	0.507	0.193	1.000										
FINTECH_INDEX_2 (5)	0.097	0.263	-0.080	0.617	1.000									
DUMMY_FINTECH (6)	-0.212	-0.351	-0.206	-0.563	-0.717	1.000								
SOLV (7)	-0.781	-0.621	-0.423	-0.402	-0.236	0.274	1.000							
SIZE (8)	0.624	0.698	0.110	0.601	0.632	-0.513	-0.726	1.000						
ME (9)	-0.095	-0.063	0.217	-0.120	-0.055	-0.192	0.158	-0.195	1.000					
LIQ (10)	-0.569	-0.413	-0.172	-0.152	-0.234	0.191	0.602	-0.550	-0.115	1.000				
COVID_19 (11)	0.024	0.089	-0.027	-0.375	-0.427	0.485	0.225	-0.237	0.146	-0.006	1.000			
IB (12)	0.352	0.246	-0.068	0.053	0.241	-0.137	-0.242	0.390	0.175	-0.809	0.017	1.000		
GDP (13)	0.088	0.158	0.197	0.078	0.097	-0.078	0.070	-0.021	-0.089	0.096	0.005	-0.013	1.000	
INF (14)	0.177	0.172	0.238	0.301	0.269	-0.355	-0.147	0.108	0.017	0.002	-0.314	0.009	0.332	1.000

ROE has a positive relationship with fintech index_1, fintech index_2, size, inflation, GDP, Islamic banks, covid-19. It also has a negative relationship with dummy fintech, solvency ratio, management efficiency, and liquidity.

NIM has a positive relationship with fintech index_1, size, management efficiency, inflation, and GDP. It also has a negative relationship with fintech index_2, dummy fintech, solvency ratio liquidity, Islamic banks, and covid-19. The relationships between independent variables are generally low, indicating no multicollinearity problems in subsequent regressions.

3.2.3 Estimation Results

The regression findings from various specifications of the study model are shown in Table 10 in appendix G. Nine specifications are presented: Model 1to model 3 for return on assets (ROA), Model 4 to model 6 for return on equity (ROE), and Model 7 to model 9 for net interest margin (NIM). According to the R-squared values, the models explain approximately 37.9% to 70.6% of the total variability in profitability. Additionally, the Durbin-Watson statistic for the models ranges from 0.742 to 1.014.

There have a negative relationship between fintech index_2 and profitability and significant. Consistent with the findings of Khan, Khan, and Ghafoor (2023) found that the negative effects of fintech adoption on financial stability are less pronounced for large and well-capitalized banks. Additionally, the financial stability of Islamic, foreign, and government banks is less impacted by fintech adoption compared to other banks (Khan et al., 2023).

On other hand, there have a positive relationship between fintech index _1and profitability and significant. Consistent with the findings of Cheng and Qu (2020). Found that Fintech applications have recently become prominent in global financial markets, particularly in China, significantly impacting the banking industry. This trend is garnering substantial academic attention. Their study utilizes the two-step system Generalized Method of Moments (GMM) approach to estimate regressions, treating all bank variables as endogenous (Cheng & Qu, 2020).

The positive relationships between management efficiency and both profitability are consistent with the findings of Gupta and Mahakud (2020). Furthermore, Moreover, the negative and significant link between liquidity and profitability aligns with the findings of Neves, Proença, and Dias (2020).

Conversely, there is a positive and significant relationship between Islamic banks and profitability. Similarly, COVID-19 has shown a positive relationship with ROA, ROE, and NIM. Additionally, there is a negative and significant relationship between the fintech dummy and NIM. The positive relationship and significant between GDP and profitability is consistent with the findings of Yüksel, Mukhtarov, Mammadov, and Özsarı (2018). Furthermore, the significant positive relationship and significant between size and profitability aligns with the research by Teixeira, Silva, Costa, Martins, and Batista (2020). Lastly, the solvency ratio's negative and significant relationship with profitability.

3.3 Jordan result

The findings of this study are presented in this section. Firstly, the results of descriptive statistics and correlation analysis are provided, followed by a discussion of the model estimation.

3.3.1 Descriptive Statistics

The descriptive statistical indicators (Abdeljawad & Farhood, 2024; Asmar & Farhood, 2024) (mean, median, maximum, minimum, and standard deviation) for the dependent variables (ROA, ROE, NIM) and independent variables (Fintech index 1, Fintech index 2, dummy fintech) control variables (Liquidity, Solvency ratio, Management efficiency, GDP, and inflation) are shown in Table 11.

Table 11

The descriptive statistical indicators for the dependent and independent variables

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
ROA	0.010	0.010	0.018	-0.002	0.004	104
ROE	0.077	0.078	0.158	-0.010	0.033	104
NIM	0.030	0.030	0.043	0.017	0.006	104
FINTECH	0.351	0.332	0.696	0.168	0.105	104
FINTECH_INDEX_2	0.141	-0.079	3.131	-1.054	0.872	104
DUMMY_FINTECH	0.673	1.000	1.000	0.000	0.471	104
SOLV	0.129	0.126	0.183	0.066	0.030	104
SIZE	21.329	21.645	22.858	17.675	1.184	104
ME	0.025	0.025	0.040	0.011	0.006	104
LIQ	0.975	0.404	5.231	0.099	1.228	104
COVID_19	0.625	1.000	1.000	0.000	0.486	104
IB	0.846	1.000	1.000	0.000	0.363	104
GDP	0.036	0.043	0.059	-0.018	0.022	104
INF	0.016	0.011	0.045	-0.009	0.020	104

For Table 11, the ROA for banks in Jordan ranges from a minimum of -0.2% to a maximum of 1.8%. The ROE ranges from a minimum of -1.0% to a maximum of 15.8%. The NIM ranges from a minimum of 1.7% to a maximum of 4.3%. The mean values are -1.0% for ROA, 7.7% for ROE, and 3.0% for NIM. The standard deviations are 0.4% for ROA, 3.3% for ROE, and 0.6% for NIM (Alarussi & Gao, 2023; Belcaid & Al-Faryan, 2023; Bolarinwa et al., 2021). The fintech index 1, the minimum of 16.8% to a maximum of 69.6% (Cheng & Qu, 2020). The fintech index 2, the minimum of 90.8% to a maximum of 21.680 (Khan et al., 2023).

3.3.2 Correlation Analysis

The correlation coefficient, as shown in Table 12, represents the connection between each pair of variables. From Table 12, ROA has a positive relationship with fintech index_1, dummy fintech, solvency ratio, size, GDP, covid-19, and Islamic banks. It also has a negative relationship with fintech index_2, Management efficiency, liquidity, and inflation.

Table 12

The correlation coefficient

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
ROA (1)	1.000													
ROE (2)	0.823	1.000												
NIM (3)	0.565	0.302	1.000											
FINTECH (4)	0.033	-0.144	0.231	1.00000										
FINTECH_INDEX_2 (5)	-0.350	-0.344	-0.060	0.47758	1.000									
DUMMY_FINTECH (6)	0.115	0.124	0.210	-0.48818	-0.562	1.000								
SOLV (7)	0.384	-0.167	0.452	0.31149	-0.160	0.055	1.000							
SIZE (8)	0.047	0.286	0.389	-0.09113	0.006	0.061	-0.442	1.000						
ME (9)	-0.202	-0.509	0.519	0.30040	0.233	0.078	0.446	-0.002	1.000					
LIQ (10)	-0.178	0.058	-0.379	-0.06365	-0.152	0.052	-0.275	0.045	-0.449	1.000				
COVID_19 (11)	0.400	0.317	0.211	-0.22888	-0.378	0.307	0.182	-0.093	-0.023	0.013	1.000			
IB (12)	0.068	-0.253	0.338	0.06258	0.175	-0.070	0.384	-0.111	0.567	-0.946	0.000	1.000		
GDP (13)	0.320	0.327	0.026	-0.04315	-0.059	0.053	0.019	0.000	-0.267	-0.002	0.167	0.000	1.000	
INF (14)	-0.044	-0.040	-0.097	0.11406	0.213	-0.186	-0.067	0.050	-0.064	-0.025	-0.143	0.000	0.328	1.000

ROE has a positive relationship with dummy fintech, size, liquidity, GDP, and covid-19. It also has a negative relationship with fintech index_1, fintech index_2, solvency ratio, management efficiency, inflation, and Islamic banks.

NIM has a positive relationship with fintech index_1, dummy fintech, solvency ratio, size, management efficiency, GDP, and Islamic banks. It also has a negative relationship with fintech index_2, liquidity, and inflation. The relationships between independent variables are generally low, indicating no multicollinearity problems in subsequent regressions.

3.3.3 Estimation Results

The regression findings from various specifications of the study model are shown in Table 13 in appendix G. Nine specifications are presented: Model 1to model 3 for return on assets (ROA), Model 4 to model 6 for return on equity (ROE), and Model 7 to model 9 for net interest margin (NIM). According to the R-squared values, the models explain approximately 69.8% to 83.0% of the total variability in profitability. Additionally, the Durbin-Watson statistic for the models ranges from 0.939 to 1.021.

There have a negative relationship between fintech index_2 and profitability but not significant. Consistent with the findings of Khan, Khan, and Ghafoor (2023) found that the negative effects of fintech adoption on financial stability are less pronounced for large and well-capitalized banks. Additionally, the financial stability of Islamic, foreign, and government banks is less impacted by fintech adoption compared to other banks (Khan et al., 2023).

On other hand, there have a positive relationship between fintech index _1and profitability but not significant. Consistent with the findings of Cheng and Qu (2020). Found that Fintech applications have recently become prominent in global financial markets, particularly in China, significantly impacting the banking industry. This trend is garnering substantial academic attention. Their study utilizes the two-step system Generalized Method of Moments (GMM) approach to estimate regressions, treating all bank variables as endogenous (Cheng & Qu, 2020).

The positive relationships between management efficiency and both profitability are consistent with the findings of Gupta and Mahakud (2020).Moreover, the negative and significant link between liquidity and profitability aligns with the findings of Neves, Proença, and Dias (2020).

Conversely, there is a positive and significant relationship between Islamic banks and profitability. Similarly, COVID-19 has shown a positive relationship with ROA, ROE, and NIM. Additionally, there is a negative and significant relationship between the fintech dummy and NIM. The positive relationship and significant between GDP and profitability is consistent with the findings of Yüksel, Mukhtarov, Mammadov, and Özsarı (2018). Furthermore, the significant positive relationship and significant between size and profitability aligns with the research by Teixeira, Silva, Costa, Martins, and Batista (2020). Lastly, the solvency ratio's negative and significant relationship with profitability.

3.4 GCC countries result

The findings of this study are presented in this section. Firstly, the results of descriptive statistics and correlation analysis are provided, followed by a discussion of the model estimation.

3.4.1 Descriptive Statistics

The descriptive statistical indicators (Abdeljawad & Farhood, 2024; Asmar & Farhood, 2024) (mean, median, maximum, minimum, and standard deviation) for the dependent variables (ROA, ROE, NIM) and independent variables (Fintech index 1, Fintech index 2, dummy fintech) control variables (Liquidity, Solvency ratio, Management efficiency, GDP, and inflation) are shown in Table 14.

Table 14

The descriptive statistical indicators

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
ROA	-0.008	0.012	0.048	-4.362	0.266	272
ROE	0.085	0.085	1.681	-0.397	0.125	272
NIM	0.025	0.024	0.263	-0.015	0.020	272
FINTECH	0.375	0.372	0.570	0.192	0.073	272
INDEX_FINTEX_2	0.101	-0.166	3.935	-1.148	0.936	272
DUMMY_FINTECH	0.570	1.000	1.000	0.000	0.496	272
SOLV	0.006	0.138	1.010	-12.661	1.158	272
SIZE	16.510	16.527	20.586	9.176	2.098	272
ME	0.021	0.016	0.279	0.007	0.029	272
LIQ	1.121	0.968	17.082	0.074	1.490	272
COVID_19	0.625	1.000	1.000	0.000	0.485	272
IB	0.559	1.000	1.000	0.000	0.497	272
GDP	0.038	0.048	0.315	-0.296	0.157	272
INF	0.015	0.016	0.050	-0.025	0.018	272

For Table 14, the ROA for banks in GCC countries ranges from a minimum of -4.362 to a maximum of 4.8%. The ROE ranges from a minimum of -39.7% to a maximum of 1.681. The NIM ranges from a minimum of -1.5% to a maximum of 26.3%. The mean values are -0.8% for ROA, 8.1% for ROE, and 2.6% for NIM. The standard deviations are 21.2% for ROA, 10.3% for ROE, and 1.06% for NIM (Alarussi & Gao, 2023; Belcaid & Al-Faryan, 2023; Bolarinwa et al., 2021). The fintech index 1, the minimum of 16.8% to a maximum of 69.6% (Cheng & Qu, 2020). The fintech index 2, the minimum of 70.4% to a maximum of 34.999 (Khan et al., 2023).

3.4.2 Correlation Analysis

The correlation coefficient, as shown in Table 15 in appendix G, represents the connection between each pair of variables. From Table 15, ROA has a positive relationship with fintech index_1, fintech index_2, solvency ratio, Management efficiency, liquidity, and

inflation. It also has a negative relationship with dummy fintech, size, GDP, Islamic banks, and covid-19.

ROE has a positive relationship with fintech index-2, dummy fintech, size, inflation, GDP, covid-19, and Islamic banks. It also has a negative relationship with fintech index-1, solvency ratio management efficiency, solvency, and liquidity.

NIM has a positive relationship with fintech index_1, dummy fintech, solvency ratio, GDP, Islamic banks, and covid-19. It also has a negative relationship with fintech index_2, size, management efficiency, liquidity, and inflation. The relationships between independent variables are generally low, indicating no multicollinearity problems in subsequent regressions.

3.4.3 Estimation Results

The regression findings from various specifications of the study model are shown in Table 16 in appendix G. Nine specifications are presented: Model 1to model 3 for return on assets (ROA), Model 4 to model 6 for return on equity (ROE), and Model 7 to model 9 for net interest margin (NIM). According to the R-squared values, the models explain approximately 4.8% to 19.3% of the total variability in profitability. Additionally, the Durbin-Watson statistic for the models ranges from 1.747 to 2.546.

There have a negative relationship between fintech index-1 and profitability and significant. Consistent with the findings of Khan, Khan, and Ghafoor (2023) found that the negative effects of fintech adoption on financial stability are less pronounced for large and well-capitalized banks. Additionally, the financial stability of Islamic, foreign, and government banks is less impacted by fintech adoption compared to other banks (Khan et al., 2023).

On other hand, there have a positive relationship between fintech index-2 and profitability and significant. Consistent with the findings of Cheng and Qu (2020). Found that Fintech applications have recently become prominent in global financial markets, particularly in China, significantly impacting the banking industry. This trend is garnering substantial academic attention. Their study utilizes the two-step system Generalized Method of Moments (GMM) approach to estimate regressions, treating all bank variables as endogenous (Cheng & Qu, 2020).

Conversely, the solvency ratio's positive and significant relationship with NIM is consistent with the findings of Nguyen and Nguyen (2020). Additionally, management efficiency has a positive and significant relationship with ROE and NIM. COVID-19 also has a positive and significant relationship with ROE. Furthermore, size has a positive and significant relationship with ROA.

Dummy fintech have a negative and significant relationship with profitability. On the other hand, Islamic banks, inflation, and liquidity have a positive but not significant relationship with profitability.

3.5. Discussions result

The first fintech index in Palestine showed a positive and significant relationship with profitability, while the second fintech index exhibited a negative and significant relationship. In Jordan, the second fintech index had a negative and significant relationship with profitability. Similarly, in GCC countries, the second fintech index also demonstrated a negative and significant relationship with performance. Conversely, the first fintech index in Jordan and GCC countries had a positive but not significant relationship with profitability.

Concurrently, advancements in information technology and financial technology (Fintech) have spurred the demand for innovative solutions within the banking industry. Fintech has become an integral component of the sector, representing profound and cutting-edge technological innovations in finance. The technological revolution, particularly in Fintech, has driven global financial market integration, enabling businesses to expand beyond borders and providing customers with convenient payment solutions.

Fintech focuses on leveraging the latest digital technologies to enhance and automate the delivery of financial services to consumers. In today’s global business environment, Fintech supports various industries, including real estate, retail, education, fundraising, and investment management. It involves the use of specialized algorithm-based software and applications that help banks and other businesses manage their financial processes and operations efficiently.

Business enablers significantly impact Fintech progress. Positive economic indicators, such as strong money flow, high technological adoption rates, and robust technological

infrastructure, are crucial for Fintech development. Conversely, organizational reluctance to adopt Fintech can hinder progress. Thus, business enablers are essential for Fintech advancement. Additionally, the study indicates that Fintech enhances bank performance by improving customer satisfaction and enabling organizations to adopt more environmentally friendly processes.

The solvency ratio signifies the residual claim by shareholders over assets and represents the capitalization position of a bank. Banks with higher equity relative to liabilities enjoy greater profitability as they tend to borrow less, reducing funding costs. A higher equity-to-assets ratio promotes prudent lending and leads to higher profitability due to the cushion available for risky investments. Conversely, a lower solvency ratio increases bankruptcy costs, while a higher equity ratio can lower interest costs.

Management efficiency demonstrated a positive and significant relationship with the performance of banks in all countries. Conversely, it showed a negative and significant relationship with bank profitability. Given that banks primarily act as intermediaries by collecting and distributing third-party funds, their operational costs and revenues are largely influenced by interest expenses and interest yields. An increase in operating costs directly reduces profit before tax, ultimately decreasing the bank's overall profitability.

Liquidity showed a negative and significant relationship with the performance of banks in Jordan. Banks with fewer deposits relative to their assets can expect higher overall performance, as they incur lower costs from maintaining expensive customer deposits. The study also reveals that banks that increase their holdings of short-term liquid assets experience higher performance, aligning with prior findings. The rationale is that funding markets tend to reward banks for holding liquid assets, which mitigates liquidity risk. However, this advantage is eventually offset by the opportunity cost of holding such assets.

Chapter Four

Conclusions and Recommendations

4.1 Conclusion

This study aimed to explore the relationship between Fintech adoption and bank profitability in Palestine, Jordan, and GCC countries. By utilizing two distinct financial technology index (Fintech Index 1 and Fintech Index 2) as independent variables, along with a dummy variable for Fintech adoption, we analyzed both internal and external factors impacting profitability. Internal factors included solvency ratio, management efficiency, liquidity, bank size, and the presence of Islamic banking, while external factors covered inflation, the COVID-19 pandemic, and GDP growth. The findings offer valuable insights into the complex interplay between technological advancements and banking sector performance in these regions.

The results indicate that Fintech Index 1 is inversely related to bank profitability, suggesting that a higher adoption of certain financial technologies may initially exert pressure on profit margins, likely due to implementation costs or operational challenges. In contrast, Fintech Index 2 showed a positive relationship with profitability, indicating that certain fintech solutions might enhance revenue generation or operational efficiency, positively impacting the bottom line. This divergence in the two indices highlights the nuanced role of fintech innovations and their varying effects on profitability.

Internal factors such as solvency ratio, bank size, management efficiency, inflation, and the COVID-19 pandemic were found to have a positive and significant relationship with profitability. Liquidity, however, exhibited a negative and significant impact on profitability, suggesting that higher liquidity might not necessarily translate into better financial performance. These results underline the importance of robust internal management and adaptive responses to external shocks in sustaining profitability amidst changing financial landscapes.

Islamic banking, though positively correlated with profitability, did not demonstrate significant effects, while GDP growth was negatively related to profitability but also not significant. These findings suggest that while the Islamic banking model may contribute to profitability, their impact might not be as profound as other variables. Additionally, the

negative yet insignificant relationship with GDP growth could reflect the broader economic challenges faced by banks in the region, where economic expansion does not directly correlate with increased profitability. Overall, the study underscores the importance of both fintech adoption and traditional banking factors in shaping profitability outcomes in the region.

4.2 Recommendations

1. Investigate Internal Factors: Researchers should explore additional internal factors that impact bank profitability to gain a more comprehensive understanding.
2. Examine External Factors: Researchers are encouraged to identify and analyze external factors influencing bank profitability.
3. Focus on Statistically Significant Factors: Further research should delve into the statistically significant factors that affect bank profitability to uncover deeper insights.
4. Identify Universal Fintech Indicators: Researchers should seek to identify key indicators of financial technology that are applicable across all emerging countries.
5. Explore Fintech and the Pandemic: Additional studies should investigate the intersection of financial technology, the COVID-19 pandemic, and its effects on bank profitability.
6. Apply Fintech Indicators to Other Financial Sectors: Researchers are advised to apply financial technology indicators to sectors beyond banking to assess broader impacts.
7. Assess Financial Solvency in Fintech: Future research should evaluate the relationship between financial solvency and fintech indicators in relation to bank profitability.
8. Expand Research to Other Emerging Countries: Researchers should consider studying other emerging countries to understand the impact of financial technology on bank profitability in different contexts.

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Appendices

Appendix A

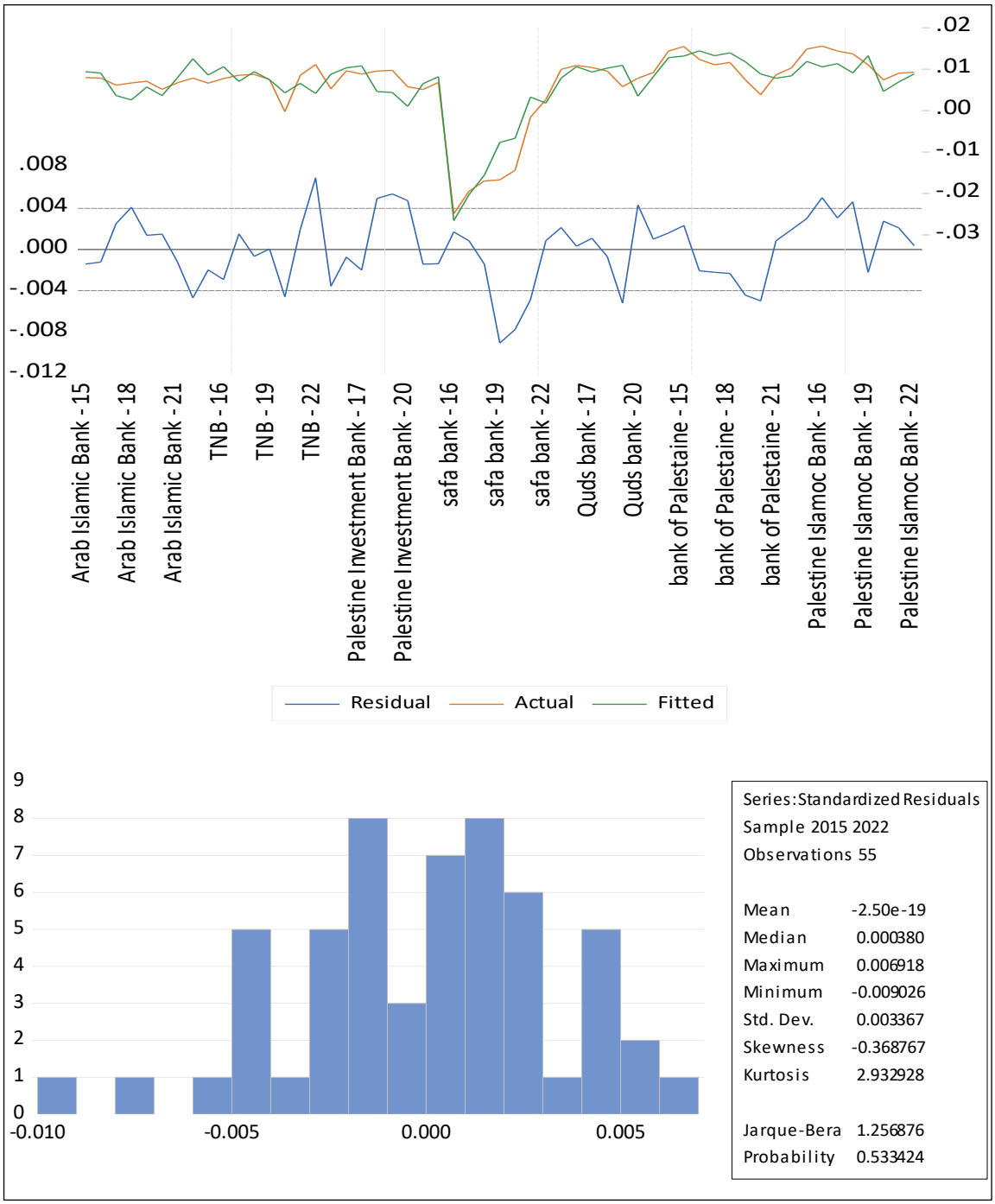
Divisions of Banks in Jordan, Palestine, and the Gulf Cooperation Council (GCC)

Name of banks	Countries	Islamic bank or commercial bank
Jordan Dubai Islamic Bank	Jordan	Islamic bank
Jordan Islamic Bank	Jordan	Islamic bank
Jordan Kuwait Bank's	Jordan	commercial bank
InvestBank's	Jordan	commercial bank
Jordan ahli bank	Jordan	commercial bank
Jordan Commercial Bank's	Jordan	commercial bank
Arab Bank Group	Jordan	commercial bank
Bank al Etihad	Jordan	commercial bank
BANK OF JORDAN	Jordan	commercial bank
AJIB	Jordan	commercial bank
The Housing Bank for Trade and Finance	Jordan	commercial bank
Cairo Amman Bank	Jordan	commercial bank
bank ABC in Jordan	Jordan	commercial bank
Arab Islamic Bank	Palestine	Islamic bank
TNB	Palestine	commercial bank
Palestine Investment Bank	Palestine	commercial bank
safa bank	Palestine	Islamic bank
Quds bank	Palestine	commercial bank
bank of Palestine	Palestine	commercial bank
Palestine Islamic Bank	Palestine	Islamic bank
Alinma Bank	Saudi	Islamic bank
Bank AlJazira	Saudi	Islamic bank
Riyad Bank	Saudi	Islamic bank
Saudi Hollandi Bank	Saudi	Islamic bank
The Saudi Investment Bank	Saudi	Islamic bank
BANQUE SAUDI FRANSI	Saudi	Islamic bank
Al Ahli Bank of Kuwait	Kuwait	commercial bank

Kuwait Finance House	Kuwait	Islamic bank
NBK	Kuwait	commercial bank
Central Bank of Kuwait	Kuwait	commercial bank
Boubyan Bank	Kuwait	Islamic bank
Warba bank	Kuwait	Islamic bank
Burgan Bank	Kuwait	commercial bank
BBK	Bahrain	commercial bank
Bahrain Islamic Bank	Bahrain	Islamic bank
BAHRAIN MIDDLE EAST BANK	Bahrain	commercial bank
National Bank of Bahrain	Bahrain	commercial bank
Gulf International Bank	Bahrain	commercial bank
QIB	Qatar	Islamic bank
AHLIBANK	Qatar	commercial bank
Commercial Bank Qatar	Qatar	commercial bank
Doha Bank	Qatar	commercial bank
RAYAN	Qatar	Islamic bank
QFB	Qatar	commercial bank
NBO	Oman	commercial bank
Bank Sohar	Oman	commercial bank
Bank Dhofar	Oman	commercial bank
Oman Arab Bank	Oman	commercial bank
Bank muscat	Oman	commercial bank
Bank Nizwa	Oman	Islamic bank
Al Ahli Bank of Oman	Oman	commercial bank
Emirates Islamic	Emirates	Islamic bank
emirates investment bank	Emirates	commercial bank
Salam Bank	Emirates	Islamic bank
Commercial Bank of Dubai	Emirates	commercial bank

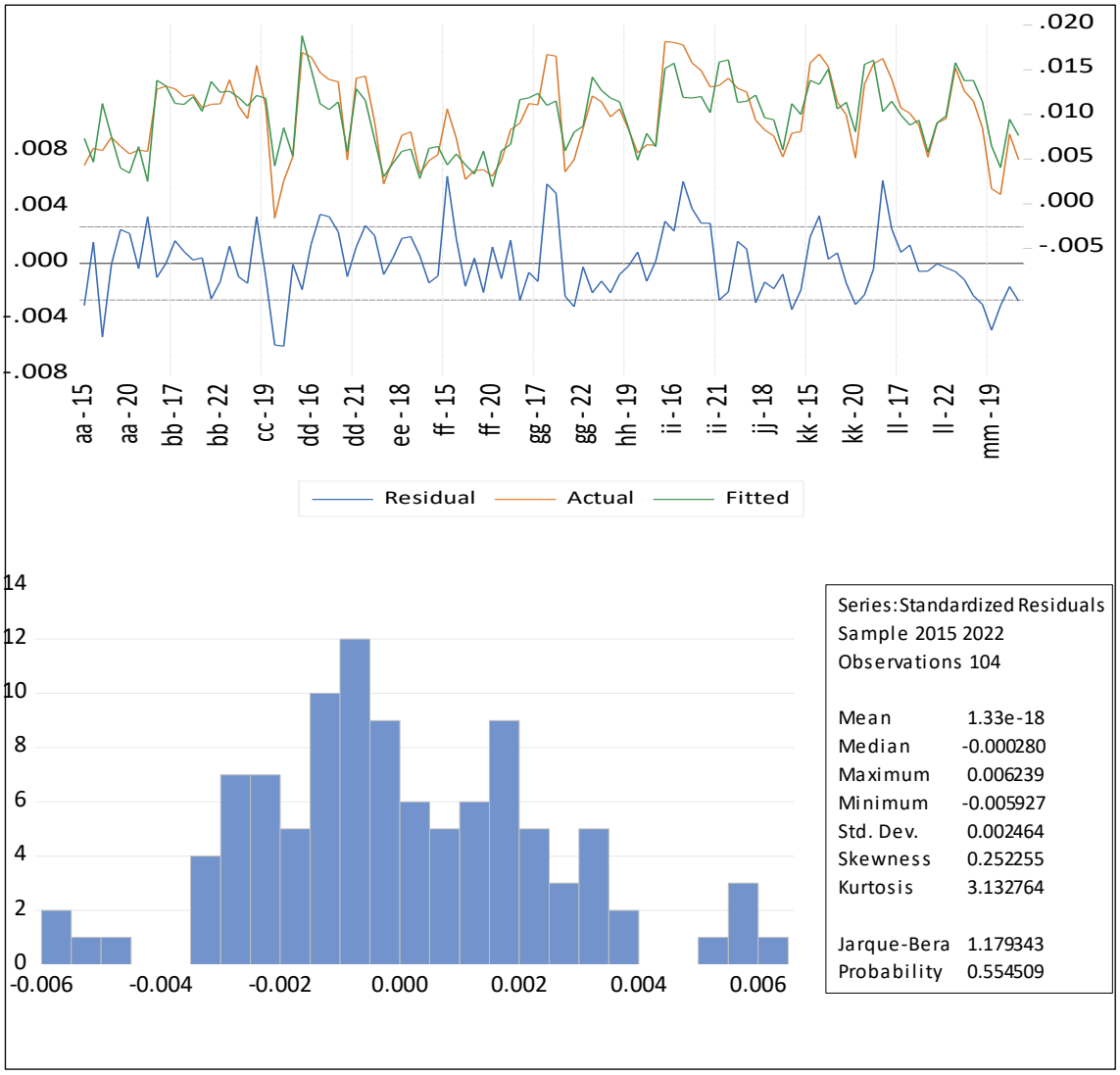
Appendix B

Histogram – normality test of Palestine



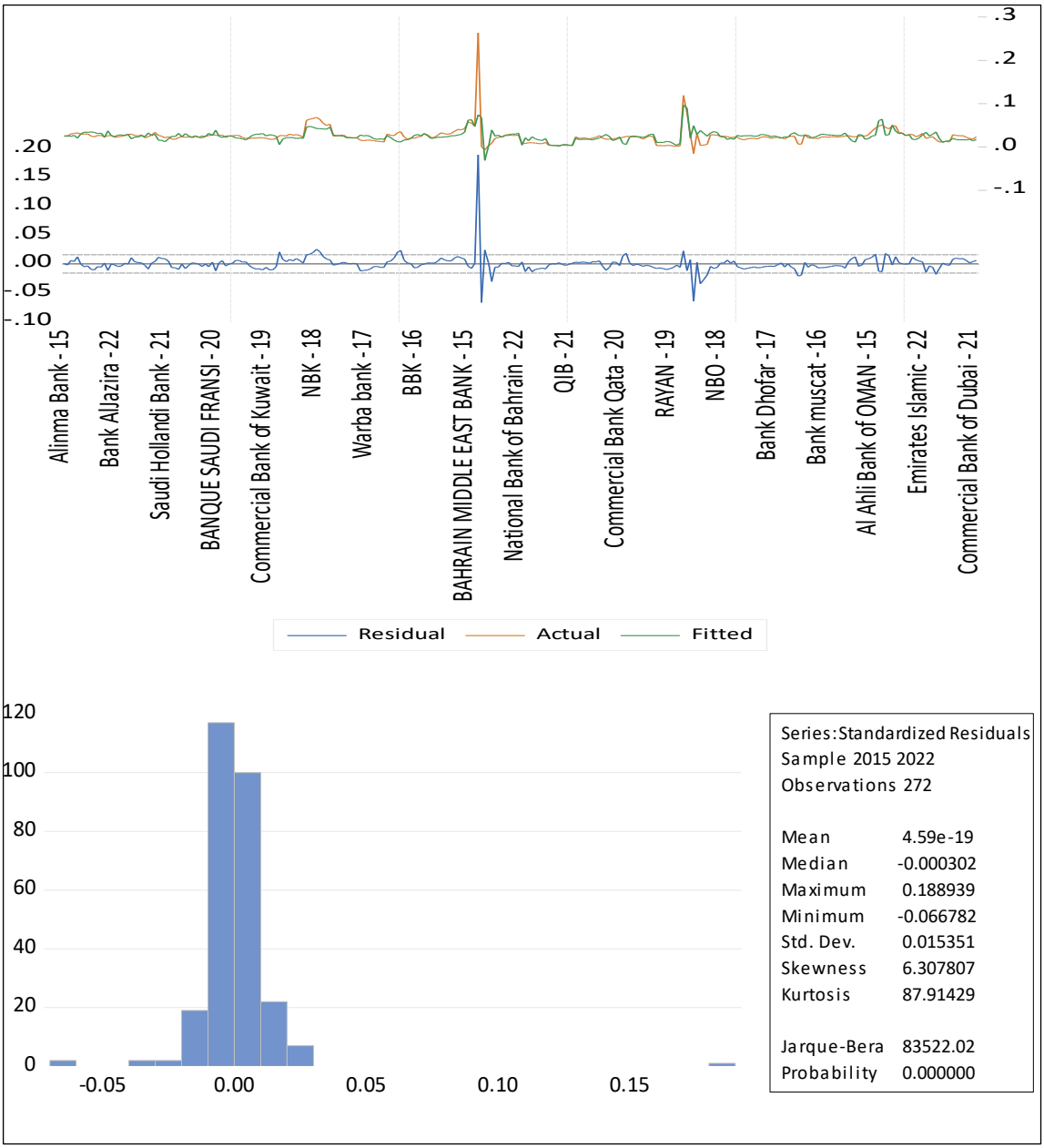
Appendix C

Histogram – normality test of Jordan



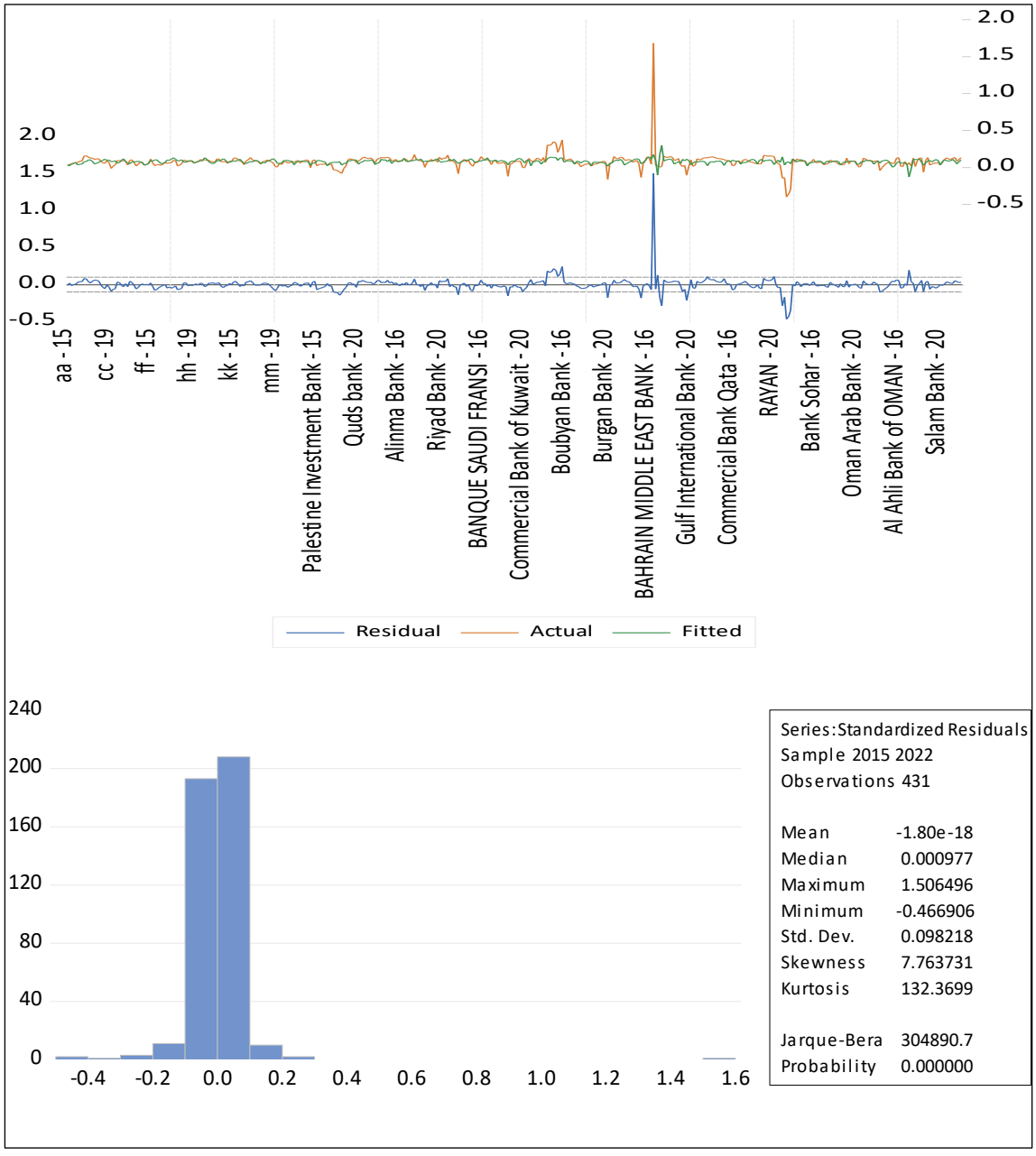
Appendix D

Histogram – normality test of GCC countries



Appendix E

Histogram – normality test of all countries



Appendix F

Summary of the hypotheses result

hypotheses	Jordan	Palestine	GCC countries	All countries
H_1: there is effect of Fintech index on the profitability of Arab Emerging Markets	Negative and significant	Positive of fintech one and negative and significant of fintech two	Negative and significant	Negative
There is effect of liquidity on the profitability of Arab Emerging Markets.	Negative and significant	Negative	Positive	Positive
There is effect of solvency ratio on the profitability of Arab Emerging Markets.	Positive and significant	Negative and significant	Positive and significant	Positive and significant
There is effect of size on the profitability of Arab Emerging Markets.	Positive and significant	Positive	Positive and significant	Positive and significant
There is effect of management efficiency on the profitability of Arab Emerging Markets.	Negative and significant	Positive and significant	Positive and significant	Positive and significant
There is effect of gross domestic product on the profitability of Arab Emerging Markets.	Positive and significant	Positive	Negative	Negative
there is effect of inflation on the profitability of Arab Emerging Markets	Negative and significant	Positive	Positive	Positive

Example measurement of fintech two

name	year	Digital Presence	Mobile Banking Capabilities	Support for Open APIs	Fintech Partnerships	Digital Payment Solutions	Automation and Artificial	Innovation Initiatives	Electronic	Embracing New Technologies	Wight	Index
Jordan Dubai Islamic Bank	2015	yes	yes	yes	no	yes	no	yes	no	yes	0.667	-0.41569
Jordan Dubai Islamic Bank	2016	yes	yes	yes	no	yes	yes	yes	no	yes	0.778	-0.51645
Jordan Dubai Islamic Bank	2017	yes	yes	yes	no	yes	yes	yes	no	yes	0.778	-0.33085
Jordan Dubai Islamic Bank	2018	yes	yes	yes	no	yes	yes	yes	yes	yes	0.889	0.095067
Jordan Dubai Islamic Bank	2019	yes	yes	yes	yes	yes	yes	yes	yes	yes	1.000	0.27551
Jordan Dubai Islamic Bank	2020	yes	yes	yes	yes	yes	yes	yes	yes	yes	1.000	0.4513
Jordan Dubai Islamic Bank	2021	yes	yes	yes	yes	yes	yes	yes	yes	yes	1.000	0.09378
Jordan Dubai Islamic Bank	2022	yes	yes	yes	yes	yes	yes	yes	yes	yes	1.000	1.42549

Appendix G

Tables

Table 4

Show the keywords and definitions

Factors Related to Banking Fintech	Explanation	Keyword Synonyms
1. Digital Presence	Banks that have integrated fintech solutions generally boast a robust digital footprint. This includes the provision of user-friendly websites and mobile applications, facilitating convenient access to banking services and online transactions for customers. Key features that we seek in such institutions encompass online account opening, digital payment capabilities, and real-time access to account information (Khan et al., 2023).	Digital presence, Website, and platforms.
2. Mobile Banking Capabilities	Banks oriented towards fintech innovation provide comprehensive mobile banking services, encompassing features like mobile check deposits, fund transfers, bill payments, and customized notifications. Furthermore, these institutions often incorporate cutting-edge technologies like biometric authentication methods such as fingerprint or facial recognition to bolster security measures and ensure a seamless user experience (Khan et al., 2023).	Mobile banking, apps banking, and phone banking
3. Support for Open APIs	Fintech-oriented banks emphasize the use of open APIs, granting third-party developers access to their banking infrastructure to build new applications and services. These APIs enable smooth integration with external fintech platforms, encouraging the creation of innovative solutions that enhance service offerings and elevate the overall customer experience (Khan et al., 2023).	APIs, applications, and services leveraging
4. Fintech Partnerships	Banks with a focus on fintech often forge partnerships with startups or collaborate with established fintech companies. Through these strategic alliances, banks leverage the specialized expertise and cutting-edge technologies of fintech firms, enhancing their product portfolio and boosting operational efficiency (Khan et al., 2023).	Fintech, and financial technologies

5.	Digital Payment Solutions	Banks committed to digital innovation provide a wide array of payment solutions that go beyond conventional methods. These include support for mobile wallets, peer-to-peer transfers, contactless payments via NFC technology, and smooth integration with leading digital platforms like PayPal and Apple Pay (Khan et al., 2023).	Digital Payment, ATMs, master card, and visa card.
6.	Automation and Artificial	Fintech-oriented banks frequently harness the power of automation and artificial intelligence (AI) technologies to optimize processes and elevate customer service standards. This could entail deploying AI chatbots for responsive customer support, implementing machine-learning algorithms for proactive fraud detection, or leveraging data analytics to deliver tailored financial guidance and recommendations to customers (Khan et al., 2023).	Automation and Artificial
7.	Innovation Initiatives	Banks deeply involved in fintech typically cultivate a culture of innovation and ongoing enhancement. This might manifest through dedicated innovation labs or programs, active participation in fintech conferences, and investments in research and development initiatives. By staying attuned to emerging technologies and trends within the financial sector, these banks are poised to adapt swiftly and deliver cutting-edge solutions to their customers (Khan et al., 2023).	Innovation, Initiatives
8.	User electronic	Fintech-oriented banks place a premium on providing an outstanding user experience. They commit resources to user-centric design principles to ensure banking services are intuitive, efficient, and personalized. Key features we seek include streamlined onboarding processes, tailored financial insights, and user-friendly interfaces, all aimed at enhancing the overall banking experience for customers (Khan et al., 2023).	electronic
9.	Embracing New Technologies	Banks that have integrated fintech into their operations often adopt emerging technology like blockchain, cryptocurrency, robo advisory services, and digital lending platforms. These institutions may provide services directly related to these technology or explore their potential to enhance existing banking processes. By leveraging these innovations, fintech forward banks strive to improve efficiency, security, and accessibility, while remaining at the cutting edge of financial innovation (Khan et al., 2023).	New Technologies, blockchain, cryptocurrency, robo advisory services, and digital lending

Table 7

The regression findings from various specifications of the study model

	model 1	model 2	model 3	model 4	model 5	model 6	model 7	model 8	model 9
dependent variable	ROA	ROA	ROA	ROE	ROE	ROE	NIM	NIM	NIM
Variable	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
FINTECH	0.157*			-0.001			-0.009		
	(1.317)			(-0.009)			(-1.053)		
FINTECH_2		0.000			-0.002			0.001**	
		(-0.025)			(-0.374)			(1.615)	
DUMMY_FINTECH			-0.006			-0.009			-0.002
			(-0.280)			(-0.764)			(-0.891)
SOLV	-0.023	-0.024	-0.024	-0.012	-0.012	-0.012	0.008***	0.008***	0.008***
	(-1.247)	(-1.280)	(-1.292)	(-1.295)	(-1.284)	(-1.328)	(5.778)	(2.817)	(5.763)
SIZE	0.011***	0.010***	0.010***	0.000	0.000	0.000	0.000	0.000	0.000
	(2.933)	(2.755)	(2.773)	(0.191)	(0.220)	(0.245)	(-1.195)	(-0.559)	(-0.985)
ME	-3.01***	-3.01***	-3.08***	-0.171	-0.181	-0.156	0.352***	0.362*	0.360***
	(-4.256)	(-4.369)	(-4.358)	(-0.484)	(-0.514)	(-0.442)	(6.583)	(1.745)	(6.739)
LIQ	0.006	0.005	0.005	-0.008	-0.008**	-0.007**	0.000	0.000	0.000
	(0.805)	(0.623)	(0.658)	(-2.076)	(-2.122)	(-1.993)	(0.079)	(0.226)	(0.327)

COVID_19	-0.006	-0.012	-0.009	0.033***	0.031***	0.037***	0.002	0.003***	0.003**
	(-0.276)	(-0.514)	(-0.390)	(3.074)	(2.758)	(3.185)	(1.417)	(2.451)	(1.875)
IB	0.004	0.004	0.004	-0.004	-0.004	-0.004	0.004**	0.004***	0.004**
	(0.186)	(0.196)	(0.196)	(-0.414)	(-0.411)	(-0.415)	(2.248)	(2.971)	(2.238)
GDP	-0.048	-0.043	-0.047	0.063	0.065	0.058	-0.001	-0.002	-0.002
	(-0.578)	(-0.513)	(-0.557)	(1.525)	(1.562)	(1.398)	(-0.114)	(-0.336)	(-0.288)
INF	-0.260	-0.246	-0.239	0.441	0.438	0.450	0.095**	0.096***	0.096**
	(-0.453)	(-0.428)	(-0.416)	(1.542)	(1.529)	(1.573)	(2.198)	(2.779)	(2.212)
C	-0.183**	-0.107	-0.106	0.062	0.063*	0.063*	0.022***	0.017***	0.018***
	(-1.985)	(-1.482)	(-1.477)	(1.352)	(1.750)	(1.756)	(3.179)	(2.603)	(3.262)
R-squared	0.100	0.097	0.097	0.047	0.048	0.049	0.138	0.138	0.137
Adjusted R-squared	0.081	0.077	0.077	0.027	0.027	0.028	0.119	0.120	0.119
F-statistic	5.213	5.000	5.009	2.328	2.344	2.396	7.482	7.505	7.442
Prob(F-statistic)	0.000	0.000	0.000	0.014	0.014	0.012	0.000	0.000	0.000
Durbin-Watson stat	2.514	2.507	2.507	1.646	1.646	1.647	1.711	1.719	1.716
observations:	431	431	431	431	431	431	431	431	431

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10

The regression findings from various specifications of the study model

	model 1	model 2	model 3	model 4	model 5	model 6	model 7	model 8	model 9
dependent variable	ROA	ROA	ROA	ROE	ROE	ROE	NIM	NIM	NIM
Variable	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
FINTECH	0.022**			0.129**			0.016		
	(2.293)			(1.918)			(1.115)		
FINTECH_2		-0.003**			-0.012*			-0.001	
		(-2.030)			(-1.338)			(-0.618)	
DUMMY_FINTECH			-0.001			-0.020			-0.004
			(-0.564)			(-1.209)			(-1.186)
SOLV	-0.06***	-0.05***	-0.06***	-0.158**	-0.096	-0.172**	-0.05***	-0.04***	-0.05***
	(-5.555)	(-3.758)	(-5.054)	(-2.244)	(-1.186)	(-2.300)	(-3.196)	(-2.439)	(-3.326)
SIZE	-0.001	0.003**	0.000	0.025***	0.044***	0.027***	-0.004**	-0.001	-0.004**
	(-0.715)	(1.872)	(0.137)	(2.721)	(4.033)	(2.783)	(-1.912)	(-0.648)	(-1.958)
ME	-0.040	0.022	-0.056	0.692	1.008	0.240	0.489***	0.523***	0.387*
	(-0.303)	(0.162)	(-0.356)	(0.753)	(1.071)	(0.226)	(2.545)	(2.683)	(1.787)
LIQ	0.001	0.001	0.001	0.006	0.004	0.007	-0.001	-0.001	-0.001
	(0.650)	(0.399)	(0.710)	(0.626)	(0.457)	(0.780)	(-0.520)	(-0.578)	(-0.357)

COVID_19	0.005***	0.003*	0.005***	0.041***	0.030***	0.043***	0.001	0.000	0.002
	(3.361)	(1.794)	(2.708)	(3.827)	(2.561)	(3.570)	(0.621)	(0.090)	(0.906)
IB	0.005*	0.003	0.004	0.007	-0.001	0.007	-0.004	-0.005	-0.004
	(1.737)	(1.178)	(1.472)	(0.364)	(-0.048)	(0.367)	(-1.102)	(-1.309)	(-0.982)
GDP	0.011	0.014	0.012	0.108	0.120*	0.106	0.028**	0.030**	0.028**
	(1.159)	(1.395)	(1.135)	(1.571)	(1.717)	(1.505)	(1.973)	(2.042)	(1.919)
INF	0.032	0.082	0.050	0.264	0.525	0.296	0.045	0.074	0.039
	(0.571)	(1.443)	(0.840)	(0.677)	(1.323)	(0.734)	(0.552)	(0.901)	(0.478)
C	0.019	-0.06***	0.004	-0.524	-0.904	-0.508	0.091	0.050	0.106
	(0.708)	(-1.643)	(0.127)	(-2.805)	(-3.765)	(-2.270)	(2.324)	(1.015)	(2.332)
R-squared	0.740	0.734	0.712	0.676***	0.662***	0.660**	0.452**	0.442	0.454**
Adjusted R-squared	0.688	0.681	0.654	0.611	0.595	0.592	0.343	0.330	0.345
F-statistic	14.252	13.816	12.360	10.412	9.814	9.710	4.128	3.958	4.160
Prob(F-statistic)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Durbin-Watson stat	0.772	0.709	0.666	0.911	0.975	0.938	0.963	0.827	0.916
observations:	55	55	55	55	55	55	55	55	55

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 13

The regression findings from various specifications of the study model

	model 1	model 2	model 3	model 4	model 5	model 6	model 7	model 8	model 9
dependent variable	ROA	ROA	ROA	ROE	ROE	ROE	NIM	NIM	NIM
Variable	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
FINTECH	0.001			0.001			0.001		
	(0.443)			(0.059)			(0.478)		
FINTECH_2		0.000			-0.002			0.000**	
		(-0.050)			(-0.839)			(1.505)	
DUMMY_FINTECH			0.000			-0.002			0.000
			(-0.677)			(-0.487)			(0.364)
SOLV	0.112***	0.113***	0.113***	0.289***	0.267***	0.291***	0.116***	0.123***	0.118***
	(9.249)	(9.257)	(9.824)	(3.299)	(3.025)	(3.478)	(10.26)	(10.88)	(10.85)
SIZE	0.001***	0.001***	0.001***	0.009***	0.009***	0.009***	0.003***	0.003***	0.003***
	(5.091)	(4.982)	(5.114)	(5.031)	(4.819)	(5.057)	(12.11)	(12.31)	(12.06)
ME	-0.30***	-0.29***	-0.29***	-2.03***	-1.92***	-1.99***	0.351***	0.336***	0.355***
	(-4.763)	(-4.647)	(-4.634)	(-4.422)	(-4.226)	(-4.434)	(5.897)	(5.738)	(6.123)
LIQ	-0.01***	-0.01***	-0.01***	-0.04***	-0.04***	-0.04***	-0.01***	-0.01***	-0.01***
	(-6.169)	(-6.382)	(-6.441)	(-7.67)	(-7.830)	(-7.857)	(-7.369)	(-7.781)	(-7.515)

COVID_19	0.002***	0.002***	0.002***	0.017***	0.016***	0.018***	0.002***	0.002***	0.002***
	(4.254)	(4.062)	(4.344)	(4.118)	(3.802)	(4.270)	(3.047)	(3.396)	(2.828)
IB	-0.01***	-0.01***	-0.01***	-0.14***	-0.14***	-0.14***	-0.02***	-0.02***	-0.02***
	(-4.949)	(-5.224)	(-5.294)	(-6.922)	(-7.131)	(-7.173)	(-6.564)	(-7.101)	(-6.759)
GDP	0.035***	0.036***	0.037***	0.318***	0.321***	0.324***	0.032***	0.032***	0.032***
	(2.672)	(2.706)	(2.777)	(3.311)	(3.365)	(3.362)	(2.563)	(2.572)	(2.533)
INF	-0.020	-0.020	-0.022	-0.222**	-0.206**	-0.231**	-0.03***	-0.03***	-0.03***
	(-1.485)	(-1.416)	(-1.553)	(-2.221)	(-2.045)	(-2.280)	(-2.399)	(-2.624)	(-2.255)
C	-0.011*	-0.011*	-0.011*	0.031	0.038	0.032	-0.04***	-0.04***	-0.04***
	(-1.741)	(-1.664)	(-1.675)	(0.654)	(0.790)	(0.686)	(-6.103)	(-6.327)	(-6.112)
R-squared	0.696	0.695	0.697	0.702	0.704	0.703	0.823	0.827	0.823
Adjusted R-squared	0.667	0.666	0.668	0.673	0.676	0.674	0.806	0.810	0.806
F-statistic	23.884	23.813	23.979	24.607	24.868	24.694	48.660	49.937	48.599
Prob(F-statistic)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Durbin-Watson stat	0.929	0.933	0.949	0.946	0.951	0.957	0.963	0.973	0.949
observations:	104	104	104	104	104	104	104	104	104

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 15

The correlation coefficient

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
ROA (1)	1.000													
ROE (2)	-0.734	1.000												
NIM (3)	-0.710	0.677	1.000											
FINTECH (4)	0.105	-0.058	-0.171	1.000										
FINTECH_INDEX_2 (5)	0.076	-0.060	-0.007	0.175	1.000									
DUMMY_FINTECH (6)	-0.064	0.028	0.009	-0.284	-0.516	1.000								
SOLV (7)	0.206	-0.059	0.039	0.016	0.146	-0.101	1.000							
SIZE (8)	0.208	-0.001	-0.187	-0.015	0.264	-0.134	0.407	1.000						
ME (9)	-0.289	0.055	0.149	-0.105	-0.193	0.141	-0.823	-0.393	1.000					
LIQ (10)	0.032	-0.110	0.047	-0.096	0.013	0.043	0.086	-0.168	-0.036	1.000				
COVID_19 (11)	-0.037	0.116	0.113	-0.167	-0.411	0.447	0.113	-0.011	-0.020	-0.070	1.000			
IB (12)	-0.065	0.012	0.129	0.041	-0.090	0.006	-0.105	-0.368	0.137	0.011	0.000	1.000		
GDP (13)	-0.005	0.057	-0.037	0.142	0.267	-0.280	-0.017	0.048	-0.044	0.046	-0.321	-0.023	1.000	
INF (14)	-0.008	0.096	0.081	-0.018	-0.021	0.007	0.040	0.018	-0.063	0.000	-0.150	-0.052	0.369	1.000

Table 16

The regression findings from various specifications of the study model

	model 1	model 2	model 3	model 4	model 5	model 6	model 7	model 8	model 9
dependent variable	ROA	ROA	ROA	ROE	ROE	ROE	NIM	NIM	NIM
Variable	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
FINTECH	0.303*			-0.089			-0.034**		
	(1.554)			(-0.822)			(-2.119)		
FINTECH_2		-0.006			-0.001			0.003**	
		(-0.303)			(-0.079)			(2.214)	
DUMMY_FINTECH			-0.004			-0.008			-0.004*
			(-0.107)			(-0.444)			(-1.503)
SOLV	-0.030*	-0.032	-0.032	-0.007	-0.007	-0.007	0.009***	0.009***	0.009***
	(-1.591)	(-1.295)	(-1.309)	(-0.605)	(-0.548)	(-0.579)	(4.923)	(5.013)	(4.942)
SIZE	0.019**	0.019**	0.018**	0.001	0.001	0.001	-0.01***	-0.01***	-0.01***
	(2.058)	(2.070)	(2.040)	(0.190)	(0.256)	(0.220)	(-2.803)	(-3.045)	(-2.734)
ME	-3.02***	-3.22***	-3.20***	0.025	0.078	0.086	0.326***	0.355***	0.350***
	(-3.390)	(-3.364)	(-3.346)	(0.054)	(0.167)	(0.186)	(4.719)	(5.190)	(5.093)
LIQ	0.012**	0.010	0.010	-0.008	-0.008	-0.008	0.000	0.000	0.000
	(1.857)	(0.899)	(0.903)	(-1.596)	(-1.504)	(-1.456)	(-0.342)	(-0.091)	(0.062)

COVID_19	-0.014	-0.025	-0.019	0.038**	0.040**	0.044***	0.002	0.005	0.005*
	(-0.391)	(-0.659)	(-0.489)	(2.266)	(2.183)	(2.363)	(0.932)	(1.989)	(1.743)
IB	0.009	0.010	0.010	0.005	0.004	0.004	0.002	0.002	0.002
	(0.266)	(0.301)	(0.298)	(0.295)	(0.268)	(0.253)	(0.927)	(0.869)	(0.806)
GDP	-0.081	-0.056	-0.065	0.066	0.062	0.056	0.000	-0.005	-0.004
	(-0.736)	(-0.489)	(-0.570)	(1.206)	(1.109)	(1.001)	(0.033)	(-0.652)	(-0.523)
INF	-0.155	-0.321	-0.255	0.631	0.659	0.699	0.114	0.153**	0.143**
	(-0.235)	(-0.337)	(-0.268)	(1.380)	(1.424)	(1.513)	(1.688)	(2.243)	(2.100)
C	-0.380*	-0.247	-0.241	0.075	0.034	0.038	0.056***	0.044***	0.043***
	(-1.811)	(-1.478)	(-1.438)	(0.796)	(0.422)	(0.473)	(4.055)	(3.651)	(3.576)
R-squared	0.111	0.105	0.105	0.049	0.047	0.047	0.170	0.171	0.163
Adjusted R-squared	0.081	0.074	0.074	0.017	0.014	0.015	0.141	0.143	0.134
F-statistic	3.641	3.422	3.412	1.505	1.427	1.449	5.956	6.010	5.662
Prob(F-statistic)	0.000	0.001	0.001	0.146	0.176	0.167	0.000	0.000	0.000
Durbin-Watson stat	2.545	2.533	2.532	1.747	1.747	1.747	1.879	1.900	1.874
observations:	272	272	272	272	272	272	272	272	272

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

جامعة النجاح الوطنية
كليَّة الدّراسات العليا

أثر اعتماد التكنولوجيا المالية على ربحية البنوك: أدلة من الأسواق العربية الناشئة

إعداد
حسن زهير حسن فرهود

إشراف
د. معاذ الأسمر

قدمت هذه الرسالة استكمالاً لمتطلبات الحصول على شهادة الماجستير في التمويل من كلية الدراسات العليا في جامعة النجاح الوطنية – نابلس.
2024

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الملخص

تبحث هذه الدراسة في العوامل التي تحدد ربحية البنوك في ثلاث دول من عام 2015 الى عام 2022 باستخدام طريقة الحظات المعممة للنظام. تمكن جوهر معضلة البحث في الغموض المستمر الذي يلف العلاقة بين تكنلوجيا الماللية (fintech) وتبني البنوك لربحية البنوك مع خضوع المشهد المالي لتحول عميق مدفوعًا بالابتكار التكنلوجي، يصبح العالم من ضرورة فك تشابك ما إذا كان استيعاب fintech يضخم أو يعوق مقاييس الربحية للمؤسسات المصرفية.

تكتسب هذه الدراسة أهمية من خلال المساهمة في تحليل موحد وعميق للأدلة المتضاربة المحيطة بالتفاعل المعقد بين fintech وتبني ربحية البنوك داخل القطاع المصرفي. من المتوقع أن تساعد النتائج المتوقعة في إعلام عملية صنع القرار الاستراتيجي بين ممارسي البنوك وصناع السياسات والباحثين، وبالتالي تعزيز نهج أكثر استنارة واستراتيجية للمشهد المتطور للتكنولوجيا المالية.

تتكون عينة الدراسة من 55 بنكًا: أردنيًا، وفلسطينية، ودول الخليج (بنوك سعودية، وبنوك كويتية، وبنوك بحرينية، وبنوك قطرية، و بنوك عمانية، وبنوك إماراتية). ومن بين هذه البنوك، يوجد 20 بنكًا إسلاميًا.

وتشير النتائج إلى وجود علاقة قوية بين مؤشر التكنولوجيا المالية وأداء البنوك في دول معينة، مثل دول مجلس التعاون الخليجي. وبالمثل، توجد علاقة قوية بين مؤشر التكنولوجيا المالية وربحية البنوك في الأردن، وعلاقة قوية بين مؤشر التكنولوجيا المالية وربحية البنوك في فلسطين. ومع ذلك، فإن العلاقة بين مؤشر

التكنولوجيا المالية وربحية البنوك وأداء البنوك عبر الدول الثلاث ليست قوية باستمرار. بالإضافة إلى ذلك، تظهر النتائج أن الدرع الضريبي غير المرتبط بالديون له علاقة قوية وإيجابية بربحية البنوك ولكن له علاقة سلبية بأداء البنوك.

بالإضافة إلى ذلك، تدرس الدراسة كفاءة الإدارة. وتشير النتائج إلى وجود علاقة قوية بين كفاءة الإدارة وكل من ربحية البنوك وأدائها، كما توجد علاقة قوية وإيجابية بين جائحة كوفيد-19 وربحية البنوك، وفيما يتعلق بالعوامل الخارجية، وجدت الدراسة وجود علاقة إيجابية بين الناتج المحلي الإجمالي وربحية البنوك، وعلى العكس من ذلك، توجد علاقة سلبية بين التضخم وربحية البنوك.

الكلمات المفتاحية: مؤشر تبني التكنولوجيا المالية؛ العوامل الداخلية؛ العوامل الخارجية؛ ربحية البنوك؛ الأسواق الناشئة العربية.