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Analyzing the relationship between banking performance and CSR in the Tunisian context: a comparative study of conventional and Islamic banks

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Abstract

This study conducts a comparative analysis of the relationship between Corporate Social Responsibility (CSR) and financial performance in Tunisian banks. The research focuses on an extensive sample of Tunisian banks operating between 2018 and 2022. Two models are employed: one based on Return on Equity (ROE) and the other on Return on Assets (ROA). The findings reveal that Islamic banks benefit from robust CSR practices, leading to enhanced ROA and aligning with ethical principles inherent in Islamic finance. In contrast, conventional banks demonstrate no significant correlation between CSR and ROE and exhibit a negative impact of CSR on ROA. These results underscore the sector-specific nuances of CSR and its influence on financial performance, highlighting the necessity for customized CSR strategies. The study offers valuable insights for banking professionals, policymakers, and stakeholders, aiding their comprehension of the role of CSR in shaping financial outcomes in distinct banking sectors.

Keywords: *Corporate Social Responsibility (CSR), - Financial Performance - Tunisian Banks -Islamic Finance*

1. Introduction

The banking sector's role in a country's environmental, social, and economic development is crucial. Banks have evolved beyond their traditional functions of investment and deposits to become socially responsible entities, encouraging savings accounts for environmental and social benefits. However, the global financial crisis severely impacted the banking sector's

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financial performance and eroded shareholder trust, necessitating a reform. To regain this lost trust, banks have turned to corporate social responsibility (CSR) strategies, as suggested by Hajji and Ghazali (2012). Post-crisis, the banking sector has become more accountable to society, strengthening its credibility and trust among stakeholders, as noted in studies by Lauesen (2013) and Esteban-Sanchez, de la Cuesta-Gonzalez, and Paredes-Gazquez (2017).

Furthermore, in line with the 2030 sustainable development goals, all sectors, including banking, are expected to contribute through CSR, supporting low-carbon projects, gender diversity, and good corporate governance. Therefore, this systematic review aims to delve deeper into the relationship between CSR disclosure and the financial performance of banks, as previous studies have addressed various CSR aspects, emphasizing the need for a more comprehensive understanding of this connection within the banking sector.

The differences between conventional and Islamic banks encompass their legal, ethical, and operational aspects. Islamic banks adhere to Shariah principles, including prohibiting interest and certain investments, in contrast to conventional banks. A key distinction is the risk-sharing model prevalent in Islamic banks but not in conventional banks (Zafar and Sulaiman 2019). Islamic banks' Corporate Social Responsibility (CSR) disclosures vary due to their focus on Shariah-compliant ("Halal") investments and the avoidance of non-compliant products like alcohol and gambling. The Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) has established CSR guidelines for Islamic financial institutions, covering areas such as environmental impact assessment, responsible client interactions, compliance with Islamic law in earnings and expenditures, employee welfare, and charitable activities (AAOIFI 2010).

CSR, encompassing environmental, social, and governance (ESG) indicators, wields a substantial influence on banks' financial performance. Semenova and Hassel (2015) have emphasized that the contemporary concept of social responsibility revolves around three key stakeholder relationships: environmental, social, and governance. The financial performance of banks is contingent upon their disclosures in these three domains, with prior studies reporting varying outcomes when assessing CSR in the banking sector through ESG disclosure (Buallay 2019; Jan et al. 2019; Shakil et al. 2019).

From a theoretical perspective, CSR establishes a significant relationship with conventional and Islamic banks. CSR disclosure enables continuous monitoring of how equity holders impact banks' financial performance. According to agency theory, equity holders can influence management decisions based on the profitability or additional costs associated with CSR initiatives (Cherian et al., 2020). The stakeholder theory underscores the importance of creating value for stakeholders alongside profit maximization (Freeman, 1984). CSR concepts prioritize stakeholder needs, leading to enhanced motivation, increased productivity, and positive effects on a bank's financial performance. The Good Management Theory, an extension of the stakeholder theory, supports a positive relationship between corporate social performance and CSR (Platonova et al., 2018).

Furthermore, Quinn and Jones (1995) emphasize the role of stakeholders as influential drivers of an organization's financial performance. Legitimacy theory conceptualizes CSR by emphasizing an organization's responsibility toward society and highlighting the importance of community consideration for actions taken (Forgione, Laguir, and Staglianò, 2020). The Slack Resource Theory posits that businesses with more slack resources are better positioned to generate finances for sustainability practices (Jan et al., 2019). In addition, the Maqasid-Al-Shariah theory, commonly employed in Islamic banking, defines preservation principles, prevention of harmful effects, and maintaining equality (Jan et al., 2019).

Furthermore, while the existing literature has extensively explored the relationship between CSR and banking performance, there is a notable gap in research focusing on the context of Tunisian banks. The specific dynamics, challenges, and opportunities within the Tunisian banking sector have not yet been comprehensively examined within this context. This paper aims to address this research gap by conducting a comparative study of conventional and Islamic banks in Tunisia. In doing so, it will contribute to the existing body of knowledge by shedding light on the unique features and factors that characterize the Tunisian banking landscape regarding CSR and its impact on financial performance. The chosen time frame for this study spans from 2018 to 2022, ensuring a contemporary analysis of these banks considering evolving economic, social, and regulatory conditions.

Our study reveals distinct patterns of CSR-performance relationships in Tunisian banks, which highlight the crucial role of corporate social responsibility in the financial performance of both conventional and Islamic banks. These findings signify the importance of examining the Tunisian context, as they challenge some prevailing assumptions about the impact of CSR on banking performance. Therefore, this research contributes to the knowledge base and provides valuable insights for policymakers, practitioners, and stakeholders in the Tunisian banking sector as they navigate the evolving landscape of corporate social responsibility and its implications for financial performance.

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2. Theoretical framework

In exploring corporate performance and social responsibility, it is imperative to consider various theoretical lenses that offer distinct perspectives and insights. Our analysis is structured around four key theoretical frameworks: Stakeholder Theory, Legitimacy Theory, Slack Resource Theory, and Maqasid-Al-Shariah Theory (Campra et al., 2021). Each framework contributes uniquely to understanding how businesses can navigate the intricate balance between financial success and ethical obligations. The following sections delve into each theory's core principles and implications, shedding light on the intricate interplay between corporate performance and social responsibility.

2.1. Stakeholder theory

A stakeholder-centric perspective on strategic management, as proposed by Freeman (1984), is founded on instrumental principles. This approach advocates that for organizations to attain effectiveness, they should prioritize relationships that can either influence their objectives or be influenced by them. In essence, stakeholder management is inherently pragmatic, as highlighted by Freeman (1994) when he stated, "That is, stakeholder management is fundamentally a pragmatic concept" (p. 234). Nevertheless, it is crucial to note that the endorsement of instrumental stakeholder theory does not equate to a lack of values, merely because it underscores the significance of consequences, as emphasized by Freeman (1994)

Instrumental stakeholder theory, utilizing stakeholder management, emphasizes achieving anticipated outcomes, particularly profitability (Kakabadse et al. 2005). It highlights the link between stakeholder management and overall corporate performance (Donaldson and Preston 1995), suggesting that such an approach can positively impact financial performance (Berman et al. 1999; Donaldson and Preston 1995). Furthermore, Jones (1995) underscores the theory's potential in explaining the connection between corporate social performance and financial performance, emphasizing trust and cooperation between firms and stakeholders.

The positive link between corporate social performance and financial performance, often referred to as 'good management theory,' posits that stronger stakeholder relationships enhance efficiency and performance. Socially responsible firms, through proactive CSR, safeguard their reputation and financial results, potentially gaining a competitive edge (Soana 2011; Barnett and Salomon 2006). This association also suggests that strong financial performance allows for increased allocation of resources to social projects. Moreover, proponents of 'slack theory' propose that channeling surplus resources into CSR initiatives enhances social performance, particularly for financially robust companies (Preston and O'Bannon 1997; Waddock and Graves 1997).

2.2. Legitimacy theory

From the legitimacy theory perspective, a firm's relationship with society can be likened to an implicit "social contract" whose terms are shaped by the collective expectations of various social groups (Deegan, 2002). Within this framework, trade-offs are made based on both societal and economic considerations (Meiseberg & Ehrmann, 2012). A firm's legitimacy is, in part, determined by its capacity to engage in and influence the processes of legitimation that showcase its alignment with societal values (Magness, 2006). Consequently, firms are expected to be attuned to community concerns and take proactive measures to ensure their actions and performance align with the community's expectations.

Legitimacy can be seen as a valuable operational resource, as Suchman (1995) described. This resource must be nurtured and preserved to ensure continued support. Such support can materialize in various forms, including increased capital investments, heightened appreciation from customers and suppliers, active involvement of employees, government approval, and community acceptance. It is often echoed by media recognition, especially when the firm actively upholds its role as a responsible "corporate citizen." Maintaining legitimacy is crucial for securing various forms of support and engendering a positive reputation.

2.3. Slack Resource Theory

Focusing on the "slack resource theory," this perspective offers insights into the causal link between sustainable business practices and a firm's financial performance. According to this theory, sustainable business practices are treated as a dependent variable, while a firm's financial performance is an independent factor. The theory contends that companies equipped with surplus resources, or "slack," are better equipped to allocate additional financial resources to sustainability initiatives. This implies a causality where a firm's financial performance significantly influences its ability to invest in and prioritize sustainable practices (Meiseberg & Ehrmann, 2012).

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In summary, the slack resource theory emphasizes that a firm's financial strength, often characterized by surplus resources, is pivotal in determining its capacity to allocate funds to sustainability initiatives. This theory provides a specific perspective on the relationship between sustainable business practices and financial performance and underscores the influence of financial resources in driving sustainability efforts (Meiseberg & Ehrmann, 2012).

2.4. *Maqasid-Al-Shariah theory*

Islam combines enduring principles with adaptability. While its core tenets, such as creed, worship, and morality, remain constant, their applications in secondary areas like economics and business require flexibility. This is embodied in the Shariah, a comprehensive system of ethics and values that covers all aspects of life and serves as a means of adapting to change. The Shariah, as discussed in the work of Dusuki and Abdullah (2007), cannot be separated from Islam's fundamental beliefs and reflects a holistic view of life, encompassing individual and social aspects in this world and the Hereafter.

To understand the Shariah, one must comprehend its objectives, which allow flexibility and creativity in social policy. According to Imam al-Ghazzali, the objective of the Shariah is to promote the well-being of all mankind by safeguarding their faith, human self, intellect, posterity, and wealth. Anything that ensures the protection of these five elements serves the public interest and is desirable.

In Islam, Corporate Social Responsibility (CSR) assumes a holistic role rooted in taqwa (God-consciousness), where corporations are seen as servants of God, ultimately accountable to Him. This moral and religious perspective prioritizes moral integrity over financial outcomes (Dusuki et Abdullah., 2007; Campra et al., 2021).

Muslims, guided by the Five Pillars of Islam, are inherently concerned for others and the environment. CSR, within this framework, goes beyond profit maximization. It prioritizes the pursuit of ultimate happiness in both this life and the Hereafter, with a focus on the welfare of various stakeholders, including consumers, employees, shareholders, and local communities.

This Islamic CSR perspective promotes moderation, social responsibility, and a spirit of sacrifice, making it a duty for all community members, including corporations, to share their wealth with the needy. This approach is deeply rooted in Islamic values, emphasizing ethical conduct and a sense of duty to others.

2.5. *Historical Development of CSR*

The concept of Corporate Social Responsibility (CSR) was formally introduced by Sheldon in 1924, emphasizing that businesses should not only seek to maximize their interests but also consider the needs of various stakeholders, both within and outside the organization, and contribute to society. Despite nearly a century of theoretical and practical development, a clear and precise definition of CSR remains elusive. From an economic perspective, it is argued that a company's primary responsibility is to pursue profits within the boundaries defined by the law continuously (Friedman et al., 2007). Conversely, from a sociological standpoint, companies are expected to balance their obligations to shareholders and profit generation with active engagement in social welfare initiatives and a focus on improving people's quality of life and ecological sustainability. Howard Bowen, often called the "father of corporate social responsibility," emphasized that managers are responsible for formulating policies, making decisions, and taking actions following established social norms and values. In this context, CSR is seen as an enterprise's obligation to pursue long-term objectives and as an integral component of socially sustainable development (Lu et al., 2018). Furthermore, CSR plays a pivotal role in disclosing non-financial information, mitigating information asymmetry, strengthening internal controls, and preventing insider trading.

2.6. *Diverse Perspectives on CSR and Financial Performance*

The increasing significance of CSR for corporate and societal development has positioned it as a prominent research area within management and accounting (Zhou et al., 2019; Boubaker et al., 2019). Prudent resource management is key, and activities that contribute to CSR are viewed as instrumental in helping companies gain a competitive edge (Muhmad et al., 2018). As highlighted by Hu et al., corporate actions that enhance stakeholder value have emerged as a new benchmark for evaluating financial performance (Hu et al., 2018). Examining the relevant literature, it becomes evident that research on the relationship between CSR and financial performance (FP) has been a consistently significant and widely explored topic since the 1970s (Zhou et al., 2021).

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2.7. *Impact of CSR on Financial Performance*

However, it is worth noting that the outcomes of these studies vary significantly, leading to diverse conclusions about the relationship between CSR and financial performance. These divergent findings can be attributed to various factors, including using different CSR metrics and financial performance indicators, which inevitably yield dissimilar results (McGuir et al., 2021). In the existing body of research, a predominant perspective held by many scholars suggests that CSR can indeed facilitate enhancements in financial performance (Chang et al., 2021; Wei et al., 2020). For instance, a study conducted by Chen and Wang in the Chinese market revealed that fulfilling corporate social responsibility obligations can yield positive impacts on a company's financial performance, not only in the current year but also in subsequent years (Chen et al., 2021). Maqbool and Zameer's investigation demonstrated that CSR initiatives can improve the profitability and stock returns of Indian banks. Cochran and Wood, in their research, found that companies actively engaged in CSR activities throughout their regular production and operational processes exhibit superior financial performance compared to those that do not prioritize CSR integration (Cochran et al., 2021). Stakeholder theory, which outlines the objectives and scope of corporate social responsibility, posits that by engaging in CSR endeavors, companies can mitigate conflicts of interest between various stakeholders and the organization itself (Clarkson et al., 1995). Consequently, this fosters a positive reputation for the company, allowing it to reduce costs and gain differentiated competitive advantages, ultimately leading to enhancements in financial performance (Harrison et al., 1999; Feng et al., 2022).

However, it is essential to acknowledge that not all scholars share the same perspective on the wisdom of investing in fields unrelated to the core operations of an enterprise, considering it a potential misallocation of valuable resources. The Agency Theory, for instance, presents a contrasting viewpoint, positing that CSR activities can sometimes be seen as a form of excessive investment by managers. In this view, managers might divert corporate profits towards improving either their reputation or the organisation's, potentially at the expense of corporate performance (Barnet et al., 2021; Sameer et al., 2021). Consequently, this perspective suggests that enterprises should prioritize enhancing their operational efficiency instead of diverting resources towards social initiatives that may not directly align with their core functions.

Moreover, there is a subset of scholars who contend that there exists either no discernible relationship between CSR and financial performance (Lys et al., 2015), or that the relationship between the two is nonlinear and multifaceted (Ji et al., 2016; Cordeiro et al., 2021). These scholars emphasize the complexity of the CSR-FP nexus and highlight that the extent and way CSR initiatives influence financial performance can vary significantly depending on various contextual factors, including industry, region, and the specific CSR activities undertaken. In essence, the debate surrounding the impact of CSR on financial performance is multifaceted, with contrasting viewpoints reflecting the diverse range of circumstances and perspectives within the academic and business communities. Consequently, the decision to engage in CSR activities remains a complex strategic choice that necessitates careful consideration of an organization's unique context and goals.

Corporate Social Responsibility (CSR) is pivotal in enhancing an organization's financial performance due to its multifaceted impact on various aspects of business operations. One of the fundamental ways CSR contributes to improved financial outcomes is by fostering greater efficiency within the organization. By integrating socially and environmentally responsible practices into their operations, companies can optimize resource utilization, minimize waste, and reduce costs. For instance, implementing energy-efficient technologies reduces a company's carbon footprint and lowers energy bills, directly improving the bottom line. Furthermore, CSR initiatives often align with the overarching objectives of an organization, including profitability. Companies that invest in CSR demonstrate their commitment to societal well-being, which can enhance their reputation and brand value. As consumers and investors become increasingly conscious of environmental and social issues, organizations with strong CSR programs can attract a more loyal customer base and secure long-term financial stability. For example, studies in the banking sector have shown that shareholders place significant importance on CSR efforts (Farrukh et al., 2017; Dakhlallh et al., 2019). By meeting these expectations, banks can build trust and confidence among their investors, leading to increased investments and improved financial performance. Moreover, CSR is a regulatory framework for ethical business conduct, which can indirectly impact financial performance. By adhering to CSR principles and aligning with social norms, organizations can avoid legal and reputational risks resulting from unethical practices. This can save a company substantial amounts in legal fees, fines, and damage control, which can negatively affect profitability. In sum, CSR is not merely a philanthropic endeavor but a strategic investment that enhances efficiency, brand reputation, customer loyalty, and risk management, all contributing significantly to an organization's financial performance. Therefore, our hypothesis is:

H1: Corporate Social Responsibility (CSR) positively affects bank performance

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3. Methodology

This section outlines our research methodology, encompassing data collection, research design, and statistical models. We comprehensively analysed Tunisia's banking sector, focusing on the interplay between Corporate Social Responsibility (CSR) and financial performance.

3.1. Data

Our research methodology involved a comprehensive sample analysis representing a substantial percentage of Tunisia's banking sector. We must note that we excluded five banks, namely BTK, QNB, BFT, BFPME, and Citi Bank, from our study. These exclusions were necessitated by their unavailability on the stock exchange and the absence of publicly accessible annual reports. Additionally, these excluded banks also had a limited number of branches.

Our study covers the period from 2018 to 2022, a timeframe carefully chosen to provide an extensive view of the relationship between corporate social responsibility (CSR) and financial performance within the selected banks over a five-year duration. This duration facilitates a comprehensive and in-depth analysis of evolving trends and patterns over this period, enhancing our comprehension of the dynamics between CSR practices and financial performance in the Tunisian banking sector.

The final sample that emerged after these exclusions comprised a significant proportion of the total number of banks in Tunisia. It includes a mix of conventional and Islamic banks, with approximately 83.3% conventional and 16.7% Islamic. These criteria were established to ensure that our dataset represents the Tunisian banking industry while maintaining a manageable and feasible dataset for our detailed analysis. By examining this dataset, we aim to contribute valuable insights into the interplay between CSR and financial performance in the context of Tunisian banks.

3.2. Research design

In the subsequent sections, we delve into the specifics of our research design, elucidating the financial performance measures, the assessment of corporate social responsibility, and the statistical models employed for our analysis.

3.3. The bank's financial performance measures

The assessment of financial performance in the banking sector employs two main approaches: market-based and accounting-based methods (Pieter van Beurden and Tobias Gossling, 2008). However, this study exclusively concentrates on accounting-based measures of financial performance. Within accounting-based assessments, several profitability ratios serve as pivotal indicators for monitoring bank performance. Among these, the most significant include Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM).

ROA gauges managerial efficiency and their ability to convert the bank's assets into net earnings. On the other hand, NIM reflects the extent to which banks successfully utilize their assets to generate a satisfactory return from loans. Griffin and Mahon (1997) advocate for using multiple measures of financial performance and contend that accounting-based metrics, rather than market-derived metrics, should be preferred. Their rationale is rooted in the possibility that market-derived metrics may capture factors beyond the scope of financial performance.

This study adopts two well-established accounting measures of financial performance recognized across the banking industry, which are considered to accurately mirror banks' financial performance.

3.4. Measuring Corporate Social Responsibility

Corporate Social Responsibility (CSR) encompasses obligations associated with adhering to social norms and addressing environmental concerns that organizations must incorporate to safeguard society and the environment. Companies that actively embrace and adhere to CSR principles are seen as more effective in terms of societal standards and environmental concerns and exhibit a greater propensity for achieving robust financial performance, as indicated by Asmeri et al. in 2017.

In this context, organizations that have embraced and actively practised CSR have a value of '1,' while those that have not been designated a value of '0'. External observers tend to rely more heavily on objective evaluation criteria, primarily due to their limited familiarity with business operations and corporate practices, allowing for post-facto financial oversight to assess managerial conduct. In contrast, insiders employ more subjective criteria informed by their deep understanding of business operations and firm-specific knowledge from their prior experiences. Consequently, insiders can establish proactive strategic controls on managerial decisions, thus evaluating their behaviour. The pertinent variables used in the analysis are summarized in table 1.

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Table 1. Variable Measurements

Variable Name	Variable description
• Financial Performance - Dependent Variable	
Return on Assets	Net operating Income / Average Total Assets
Return on Equity	Net operating Income / Average Total Equity
• Independent Variable CSR - Independent Variable	
Corporate Social Responsibility	
• Control Variables	
Leverage metric incorporates both operational and financial leverage to assess the overall level of leverage	
Total Assets	Natural logarithm of Average Total Assets

Source: Authors' elaboration

3.5. Statistical model

We will utilize a multiple linear regression analysis, and the following equation has been developed:

Bank's Financial Performance $_{i\,t} = \beta_0 + \beta_1 (CSR_{i\,t}) + \beta_2 (Leverage_{i,t}) + \beta_3 (Total\ Asset_{i,t}) + \varepsilon_i$ **(1)**

The bank's financial performance is the dependent variable, represented by "ROA" and "ROE", as various factors influence it. These include the CSR dummy variable, which acts as the independent variable. Additionally, the model accounts for the bank's "Total Assets" and "Leverage" as control variables. However, it's important to note that the symbol ε represents the model's error, as no model is entirely error-free and perfectly accurate. "Total Assets" reflects the bank's size, while "leverage" signifies the bank's level of leverage and financial risk. Here are the two detailed equations made for regression analysis:

$ROE_{i,\,t} = \beta_0 + \beta_1 (CSR_{i,\,t}) + \beta_2 (Leverage_{i,\,t}) + \beta_3 (Total\ Asset_{i,\,t}) + \varepsilon_i$ (2)
$ROA_{i,\,t} = \beta_0 + \beta_1 (CSR_{i,\,t}) + \beta_2 (Leverage_{i,\,t}) + \beta_3 (Total\ Asset_{i,\,t}) + \varepsilon_i$ (3)

3.6. Data analysis

In this section, we delve into the heart of our study, conducting a detailed analysis of the data collected from Islamic and conventional banks. Using Stata software, we focus on key financial performance indicators and their interactions with Corporate Social Responsibility (CSR), Leverage, and Total Assets. This section serves as the foundation for uncovering valuable insights into the financial dynamics of these two banking sectors.

4. Results

4.1. Descriptive statistics

In this section, we comprehensively analyse the data collected from Islamic and conventional banks, aiming to understand better their financial performance and Corporate Social Responsibility (CSR) practices. To facilitate this understanding, we begin with a detailed exploration of descriptive statistics for both types of banks. These statistics shed light on key financial indicators and their variations within the selected banks, ultimately forming the basis for our subsequent analyses. We delve into Return on Equity (ROE), Return on Assets (ROA), CSR scores, Leverage, and Total Assets to offer a comprehensive overview of the financial dynamics of Islamic and conventional banks in our study.

4.2. Descriptive Statistics for Islamic banks

Descriptive statistics for Islamic banks are summarized in the next Table 2.

Return on Equity (ROE): The dataset presents insights into the financial performance of a sample of 15 Islamic banks. The average Return on Equity (ROE) for these Islamic banks is approximately 5.91%, with a standard deviation of about 5.33%. ROE is a critical financial metric that assesses a company's profitability of its shareholders' equity. In this context, the dataset's ROE values range from a minimum of -3.51% to a maximum of 12.64%. The positive mean ROE suggests that, on average, these Islamic banks are generating a return on equity, indicating a moderate level of profitability. However, the variation in

ROE values implies that profitability among these Islamic banks differs significantly. Further analysis is necessary to discern the underlying factors contributing to this diversity within Islamic banking institutions.

Return on Assets (ROA): For Islamic banks, the dataset reveals an average Return on Assets (ROA) of approximately 0.344, with a standard deviation of roughly 1.25. ROA is a key financial metric that measures how efficiently a bank utilizes its total assets to generate profit. In this dataset, the ROA values range from a minimum of -3.65 to a maximum of 1.37. The average ROA of 0.34 suggests that, on average, these Islamic banks are generating a profit of approximately 34.4 cents for every dollar of assets they hold. However, the wide dispersion in ROA values, similar to ROE, indicates significant variability in asset utilisation efficiency among Islamic banks. Some Islamic banks may excel in generating profits from their assets, while others might face challenges in optimizing their asset base for earnings. A more detailed analysis is required to understand the factors contributing to this diversity within Islamic banking institutions.

Corporate Social Responsibility (CSR): The average CSR score for Islamic banks is around 0.57, indicating that, on average, these banks have a positive orientation toward CSR. The standard deviation of 0.50 highlights some variations in CSR activities among these institutions, suggesting a dynamic landscape in implementing CSR initiatives.

Leverage: The average leverage is approximately 6861809, with a standard deviation of 5028195. The wide range of leverage, from 184931 to 19200000, reflects Islamic banks' varying degrees of financial risk. Some may employ higher leverage levels to magnify returns, while others may adopt a more conservative approach.

Total Assets: The average Total Assets for Islamic banks are around 15.47, with a standard deviation of 1. This indicates that the sample of Islamic banks generally maintains similar total asset sizes with limited variability, potentially reflecting a common scale of operations in this subset.

Table 2. Descriptive statistics Islamic banks

	Mean	Minimum	Maximum	Std deviation
	Statistic	Statistic	Statistic	Statistic
ROE	5.91162	-3.5109	12.64	5.330532
ROA	0.344	-3.65	1.37	1.24997
CSR	0.5333333	0	1	0.5163978
LEVERAGE	2.38e+08	2203387	1.09e+09	3.71e+082
TOTAL ASSET	16.858	14.68	20.94	0.714672

Source: Authors' elaboration

4.3. Descriptive Statistics for Conventional Banks

5. Descriptive statistics for Conventional banks are summarized in the next Table 3.

Return on Equity (ROE): measures a bank's profitability about its shareholders' equity. The data shows that the conventional banks in the sample have an average ROE of 8.84, with a standard deviation of 18.02, indicating a relatively wide range of profitability. The minimum ROE observed is -76.43, suggesting that some banks in the sample experienced negative returns on equity, while the maximum ROE is 75, signifying the potential for high returns. The positive mean ROE implies that, on average, these banks profit from their shareholders' equity. However, the significant standard deviation points to the variance in ROE performance across the banks, which may warrant further investigation into the factors influencing profitability within this group.

Return on Assets (ROA): is a metric that evaluates a bank's efficiency in generating profits from its total assets. The dataset reveals that the 70 conventional banks have an average ROA of 1.51, with a standard deviation 3.52. This metric helps assess how well a bank uses its assets to produce earnings. The minimum ROA of -2.48 suggests that some banks in the sample experienced losses relative to their assets, while the maximum ROA of 18 showcases the potential for high profitability. The positive mean ROA indicates that, on average, these banks can profit from their assets. However, the significant standard deviation highlights the diversity in ROA performance among the banks, underscoring the importance of further investigation to understand the underlying factors contributing to this variability.

Corporate Social Responsibility (CSR): Similar to Islamic banks, conventional banks also exhibit a positive orientation toward CSR, with an average CSR score of approximately 0.57 and a standard deviation of 0.50. This implies that CSR is an area of focus for these banks, with some variation in CSR practices among them.

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Leverage: The measure of leverage in conventional banks showcases substantial variability, with an average of 6861809 and a standard deviation of 5028195. This reflects the differing financial risk profiles and debt management strategies adopted by conventional banks, resulting in various leverage levels.

Total Assets: The average total assets for conventional banks is around 15.47, with a standard deviation 1. Similar to Islamic banks, this suggests that conventional banks in the sample maintain similar total asset sizes, indicating some level of homogeneity in the scale of their operations.

Table 3. Descriptive statistics of conventional banks

	Mean	Minimum	Maximum	Std deviation
	Statistic	Statistic	Statistic	Statistic
ROE	8.844854	-76.43	75	18.02623
ROA	1.514429	-2.48	18	3.523278
CSR	0.5714286	0	1	0.4984448
LEVERAGE	6861809	184931	1.92e+07	5028195
TOTAL ASSET	15.46835	13.63281	16.88945	1.000453

Source: Authors' elaboration

5.1. Regression analysis

5.1.1. The Impact of CSR on financial performance in Islamic banks

In our analysis of Islamic banks, we examined the relationship between Corporate Social Responsibility (CSR) and financial performance using two distinct models. Model 1.1 employed Return on Equity (ROE) as the performance metric, while Model 2 utilized Return on Assets (ROA) (Table 4). For Model 1, which was based on ROE, the coefficient of determination (R^2) was 0.91, indicating that the model could explain approximately 91.86% of the variation in financial performance, as measured by ROE. The adjusted coefficient of determination (adjusted R^2) was 0.84 for Model 1.1.

On the other hand, Model 1.2, which employed ROA as the performance metric, yielded an R^2 value of 0.95, with an adjusted R^2 of 0.61. These results suggest that, for Islamic banks, both models provided strong explanatory power, with Model 1.2 (ROA) having a slightly higher R^2 and adjusted R^2. This demonstrates the robust relationship between CSR and financial performance in Islamic banking, highlighting the importance of considering different performance metrics for a comprehensive analysis.

Table 4. Model 1 Summary

Model	R	R^2	Adjusted R^2
1.1	0.8812	0.9186	0.8488
1.2	0.6973	0.9577	0.6148

Source: Authors' elaboration

5.1.2. The impact of CSR on Islamic bank performance using ROE as a measure

Within our study on Islamic banks, we explored the determinants of Return on Equity (ROE) using Model 1. The results reveal a significant and positive relationship between Corporate Social Responsibility (CSR) and ROE within Islamic banks. Specifically, the coefficient for CSR stands at 5.66, with a standard error of 1.02. The t-statistic registers at 5.52, with a p-value of 0.000, indicating a robust and statistically significant relationship between CSR practices and ROE within Islamic banks. These findings suggest that Islamic banks that emphasize CSR tend to generate higher Returns on Equity, highlighting the impact of responsible business practices on shareholder returns.

Conversely, the relationship between Leverage and ROE within Islamic banks appears less pronounced. The coefficient for Leverage is -4.34e-09, with a standard error of 4.12e-09. The t-statistic stands at -1.06, and the p-value is 0.29. Although the relationship is statistically significant, the low t-statistic suggests that the strength of the relationship is limited. Nevertheless, the negative coefficient implies that higher leverage levels may be associated with lower ROE, underscoring the importance of prudent leverage management in optimizing shareholder returns within Islamic banks.

Furthermore, our analysis indicates that the size of Islamic banks, represented by Total Assets, negatively influences ROE. The coefficient for Total Assets amounts to -0.84, with a standard error of 0.56. The t-statistic is -1.49, and the p-value is 0.13. These findings suggest that larger Islamic banks, as measured by total assets, tend to display lower Returns on Equity. This highlights potential challenges associated with size within Islamic banking, with larger banks potentially struggling to achieve ROE levels similar to their smaller counterparts.

In summary, our analysis of the determinants of ROE within Islamic banks underscores the significance of Corporate Social Responsibility (CSR) in driving higher Returns on Equity (Table 5). While Leverage exhibits a less pronounced relationship, it nevertheless emphasizes the importance of responsible leverage management in optimizing ROE. The negative impact of total asset size on ROE highlights the complexity of achieving high returns for larger Islamic banks. These findings hold significant implications for stakeholders in the Islamic banking sector, emphasizing the benefits of CSR practices and the necessity for prudent management of size and leverage to enhance ROE.

Table 5. Regression Results for ROE-based Performance

ROE	Coef	Std. Err	T	P>|t|
CSR	5.661145	1.025133	5.52	0.000
Leverage	-4.34e-09	4.12e-09	-1.06	0.291
Total Assets	-0.8470756	0.5681743	-1.49	0.136

Source: Authors’ elaboration

5.1.3. The impact of CSR on Islamic bank performance using ROA as a measure

Our study, which focuses on Islamic banks, analysed the relationship between financial performance, as measured by return on assets (ROA), and various determinants, revealing a significant role played by corporate social responsibility (CSR). Specifically, the coefficient for CSR in the model is 0.76, with a standard error of 0.38. The t-statistic records 1.99, accompanied by a p-value of 0.046. These outcomes highlight a noteworthy and positive association between CSR and ROA, indicating that Islamic banks with higher CSR scores tend to experience higher Returns on Assets. These findings underscore responsible corporate practices' pivotal role in enhancing Islamic banking's financial performance.

Moreover, our analysis demonstrates a pronounced connection between Leverage and ROA within Islamic banks (Table 6). The coefficient for Leverage is 3.21e-09, with a standard error of 1.54e-09. The associated t-statistic is 2.09, and the p-value is 0.037. These results imply that Islamic banks' leverage level has a statistically significant influence on their ROA. It suggests that increasing leverage is linked to a higher ROA, emphasizing the importance of financial decisions related to leverage within Islamic banking institutions.

Conversely, Total Assets (Size) appear to substantially and negatively impact ROA within Islamic banks. The coefficient for Total Assets is -0.68, with a standard error of 0.21. The t-statistic is -3.23, and the p-value is 0.001. These findings indicate that larger Islamic banks, as measured by their total assets, tend to exhibit lower Returns on Assets. This implies that while size offers certain advantages, such as economies of scale, it also presents challenges regarding operational efficiency and ROA within the context of Islamic banking.

Our analysis unveils the intricate relationships between CSR, Leverage, and Size within Islamic banks and their impact on financial performance, as measured by ROA. Corporate Social Responsibility emerges as a significant driver of higher ROA, while Leverage and Size exhibit contrasting effects. These insights are particularly important to decision-makers in Islamic banking, emphasizing the potential benefits of prioritizing CSR practices and making prudent financial management decisions, particularly regarding leverage. It also highlights the need to consider the complexities of size when assessing financial performance within the unique context of Islamic banking.

In our study focusing on Islamic banks, we conducted an in-depth analysis of the relationship between Corporate Social Responsibility (CSR) and financial performance, measured through both Return on Assets (ROA) and Return on Equity (ROE). The findings underscore that CSR practices exhibit a significant and positive association with ROE, highlighting that Islamic banks emphasizing CSR tend to generate higher Returns on Equity. In contrast, the relationship appears somewhat weaker but still statistically significant when considering ROA as the measure of financial performance. This indicates that while CSR significantly enhances shareholder returns within Islamic banks, its impact on overall asset efficiency, as reflected by ROA, is slightly more nuanced. These insights provide valuable guidance for Islamic banks and their stakeholders, emphasizing the multifaceted relationship between CSR and financial performance.

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Table 6. Regression Results for ROA-based Performance

ROA	Coef	Std. Err	t	P>|t|
CSR	0.7641637	0.3837603	1.99	0.046
Leverage	3.21e-09	1.54e-09	2.09	0.037
Total Assets	-0.686154	0.212697	-3.23	0.001

Source: Authors' elaboration

5.1.4. The Impact of CSR on financial performance in Conventional banks

In our analysis of conventional banks, we explored the relationship between Corporate Social Responsibility (CSR) and financial performance using two distinct models. Model 1 employed Return on Equity (ROE) as the performance metric, while Model 2 utilized Return on Assets (ROA). For Model 1, the coefficient of determination (R^2) was 0.4627, indicating that the model could explain approximately 46.27% of the variation in financial performance, as measured by ROE. In contrast, Model 2 yielded an R^2 value of 0.3172, which means that the model explains 31.72% of the total variance. These results suggest that, for conventional banks, Model 1 incorporating ROE as the performance metric provides a more suitable framework for understanding the relationship between CSR and financial performance. The significance of this distinction underscores the importance of selecting an appropriate performance metric for a comprehensive analysis (Table 7).

Table 7. Model 2 Summary

Model	R	R^2	Adjusted R^2
2.1	0.2249	0.4627	0.1897
2.2	0.2144	0.3172	0.1787

Source: Authors' elaboration

5.1.5. The impact of CSR on Conventional bank performance using ROE as a measure

Under Model 1 (ROE), the regression results reveal several significant insights in the context of conventional banks (Table 8). Firstly, it is important to note that the Corporate Social Responsibility (CSR) variable displays a negative coefficient of -1.21. Still, this coefficient is not statistically significant, as indicated by the high p-value 0.79. These results suggest that, for conventional banks, there is no statistically significant relationship between corporate social responsibility practices and profitability as measured by ROE. This lack of statistical significance may raise questions about the impact of CSR initiatives in this sector.

On the other hand, the Leverage variable shows a negative coefficient of -1.79e-06 and has a p-value of 0.06. While the coefficient is negative, indicating an inverse relationship, the low statistical significance suggests a marginal impact of leverage on the ROE of conventional banks. This finding might warrant further investigation.

Finally, the Total Assets variable exhibits a significant positive coefficient of 16.36 with a p-value of 0.001. This means that an increase in total asset size is associated with a significant increase in ROE for conventional banks. Total asset size appears to play a crucial role in profitability for these banks. These results underscore the importance of asset size in determining ROE for conventional banks, while other factors, such as CSR practices and leverage, do not appear to significantly impact profitability.

Table 8. Regression Results for ROE-based Performance

ROE	Coef	Std. Err	z	P>|z|
CSR	-1.216442	4.595983	-0.26	0.791
Leverage	-1.79e-06	9.67e-07	-1.86	0.064
Total Assets	16.363994	69.42794	3.35	0.001

Source: Authors' elaboration

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5.1.6. The impact of CSR on Conventional bank performance using ROA as a measure

Within the context of conventional banks, Model 2 focuses on assessing financial performance through Return on Assets (ROA). This model investigates how various factors influence ROA within the conventional banking sector, shedding light on the specific dynamics affecting asset-related profitability.

The Corporate Social Responsibility (CSR) variable features a negative coefficient of -2.282, indicating an inverse relationship between CSR activities and ROA (Table 9). Furthermore, the negative coefficient is statistically significant, as denoted by the low p-value of 0.012. These results imply that conventional banks emphasizing CSR might experience diminished ROA. This raises important questions about the potential trade-off between social responsibility efforts and asset-related profitability in the sector.

Shifting to the Leverage variable demonstrates a negative coefficient of -5.07e-07, with a significant p-value of 0.008. This suggests that leverage has a notable, albeit somewhat marginal, impact on ROA. The negative coefficient signifies increased leverage, associated with lower ROA for conventional banks. Therefore, effective leverage management is pivotal in preserving asset-related profitability within the sector.

Lastly, the Total Assets variable shows a positive coefficient of 3.71 and a highly significant p-value of 0.000. This finding underscores a strong positive connection between the size of total assets and ROA in conventional banks. It suggests that larger total asset bases correlate with higher ROA, emphasizing the vital role of operational scale in enhancing asset-related profitability.

Model 2's results provide insights into the complex interplay of factors influencing ROA in conventional banks. While CSR practices may lead to lower ROA, managing leverage wisely is crucial for preserving asset-related profitability. The size of total assets significantly contributes to higher ROA, underlining the importance of operational scale in determining profitability within the conventional banking industry.

In summary, the comparison between Model 1, where performance is measured by Return on Equity (ROE), and Model 2, where performance is measured by Return on Assets (ROA), within the sample of conventional banks, reveals contrasting insights. In Model 1, Corporate Social Responsibility (CSR) practices lack statistical significance and do not significantly impact ROE, consistent with prior studies. Model 2, however, shows a statistically significant and negative relationship between CSR and ROA, aligning with previous research. Furthermore, while Model 1 does not find a significant relationship between Leverage and ROE, Model 2 emphasizes the importance of leverage management, like earlier studies. In both models, Total Assets exhibit a positive and statistically significant relationship with performance, highlighting the significance of operational scale. These results emphasize the multifaceted nature of financial performance in conventional banks and the role of the chosen performance measure in yielding distinct insights regarding key determinants.

Table 9. Regression Results for ROA-based Performance

ROA	Coef	Std. Err	z	P>|z|
CSR	-2.282348	0.9043818	-2.52	0.012
Leverage	-5.07e-07	1.90e-07	-2.66	0.008
Total Actif	3.711052	0.9621243	3.86	0.000

Source: Authors' elaboration

6. Discussion

The results highlight the distinctive nature of the relationship between CSR and financial performance in these two banking sectors. In the case of Islamic banks, the findings suggest a positive link between CSR practices and ROA. This implies that as Islamic banks prioritize and enhance CSR activities, they experience improved financial performance based on their assets. The results align with the underlying ethical principles of Islamic finance, emphasizing the importance of ethical conduct and social responsibility.

Conversely, the relationship between CSR and ROA between conventional banks takes a different course. The findings indicate a statistically significant negative association between CSR and ROA. This implies that intensifying CSR efforts may adversely affect asset-based financial performance in conventional banking. The negative coefficient emphasizes the potentially detrimental effect of CSR practices in the conventional banking context.

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These divergent outcomes underscore the sector-specific nuances of CSR and its influence on financial performance. Islamic banks appear to benefit from robust CSR practices regarding ROA, while conventional banks encounter an adverse relationship. These distinctions may be attributed to these banking sectors' unique ethical and strategic orientations.
The adverse impact of CSR on ROA in conventional banks emphasizes the necessity for a nuanced understanding of CSR strategies, especially within the conventional banking landscape. It reminds us that implementing CSR initiatives in conventional banks may involve trade-offs and complex dynamics. These findings emphasize the intricate interplay between CSR and financial performance, underscoring the need for tailored CSR strategies in different banking sectors.

7. Conclusion

In conclusion, our study has analyzed the relationship between Corporate Social Responsibility (CSR) and financial performance in Tunisia, focusing on Islamic and conventional banks. The results shed significant light on the nuances of this relationship in these two distinct banking contexts.
First and foremost, we have found a positive and significant association between CSR and Return on Assets (ROA) for Islamic banks. These findings align with the ethical principles of Islamic finance, underscoring the importance of ethics and social responsibility in these financial institutions. They indicate that Islamic banks prioritising CSR tend to exhibit better financial performance based on their assets.
However, the relationship between CSR and financial performance is more complex for conventional banks. In the model based on Return on Equity (ROE), CSR does not exhibit a statistically significant relationship with profitability. Conversely, we observe a statistically significant negative relationship in the model based on ROA. This suggests that, in the context of conventional banks, increasing CSR efforts may lead to a decrease in asset-based financial performance.
The results also emphasize the importance of managing leverage to maintain asset-related profitability in both banks. Furthermore, a larger total asset size is associated with higher financial performance, highlighting the crucial role of operational scale.
Finally, comparing Islamic and conventional banks highlights significant differences in the relationship between CSR and financial performance. While Islamic banks benefit from strong CSR practices regarding ROA, conventional banks experience an unfavorable relationship.
In summary, this study reveals the complexity of the relationship between CSR and financial performance, with sector-specific dynamics in each banking context. It underscores the importance of tailoring CSR strategies to the unique characteristics of each banking context. These findings provide valuable insights to Tunisian banks, helping them make informed CSR and financial management decisions.

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Chief Executive Officer's (CEO's) Characteristics and Bank Performance: A Comparative Study of Islamic and Conventional Banks in Tunisia

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Abstract

This study examines the impact of CEO characteristics on bank performance within the Tunisian banking sector, focusing on a dataset of 1,340 professionals spanning from 2018 to 2022. Specifically, we compare Islamic and conventional banks, analyzing CEO traits such as educational background and decision-making authority. Our findings reveal higher customer satisfaction levels in Islamic banks (75%) compared to conventional banks (45%). CEO educational background positively influences bank performance in both bank types, with variations in ideal backgrounds. Larger banks tend to perform better, and greater CEO decision-making delegation enhances performance, contradicting the New Institutional Theory. Additionally, the age and frequency of CEO-board meetings significantly affect conventional bank performance. At the same time, these variables are less significant in Islamic banks due to their smaller size and older CEO demographics. Overall, our research highlights the critical role of CEO characteristics in shaping bank performance. This study provides valuable guidance for organizational leadership and regulatory bodies seeking to optimize banking operations. Understanding the impact of a CEO's educational background and decision-making authority on performance underscores the importance of strategic leadership in navigating dynamic market conditions. These insights are crucial for fostering resilience and competitiveness within the Islamic and conventional banking sectors.

Keywords: Bank performance, CEO's-education, Islamic-banks, Conventional-banks, Delegation of decision-making authority

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1. Introduction

Islamic banks, guided by their core principles of human welfare, inclusive economic growth, and fair resource allocation (Mannan, 2015), are gaining rapid prominence as a compelling alternative to conventional banking (Ikra et al., 2021; Bashir et al., 2020). Notably, the increasing volume of literature on Islamic banking reflects a growing recognition of its potential and significance (Hassan et al., 2017a). This sector's emphasis on ethical and socially responsible banking practices distinguishes it within the financial landscape. This research seeks to contribute to understanding how to improve banking performance in general and Islamic bank performance, particularly in the Tunisian context, focusing on the influence of CEO characteristics and decision-making structures on bank performance.

Recent literature predominantly concentrates on lower and middle management in various firms, as well as CEOs and founders of companies. However, limited attention has been given to CEOs in the banking sector. This includes Islamic banks, although their potential impact on economic development is more significant, given their effective control over a substantial part of the economy. The CEO is regarded by (Bertrand and Schoar, 2003) as primarily responsible for the institution's overall operations. As the bank's overall structure architect, the CEO's characteristics significantly influence bank profitability (March and Simon, 1958). In this regard, the CEO's educational background can substantially influence the decision-making process of organizations, subsequently affecting their future performance (King, 2016). This study addresses this inquiry by comparing Conventional and Islamic banks in Tunisian.

In this study, we have applied a rigorous research approach to investigate the relationship between CEO characteristics, decision-making structures, and bank performance in the Tunisian context. Our research methodology comprises a comprehensive data collection approach involving the utilization of diverse sources, including research questionnaires, annual reports of banks, and CEO’s profiles on social networks that have been visited. Our analysis explores customer satisfaction, a critical aspect of our study. Notably, the data points to a significant trend: Islamic banks consistently achieve notably higher levels of customer satisfaction than their conventional counterparts. This finding is a significant highlight, revealing the superior performance of Islamic banks in this crucial area. Our findings also reflect that CEO educational backgrounds, in terms of field and level, significantly matter for bank performance in Islamic and conventional banks. We also explored the role of decision-making authority delegation and its impact on bank performance.

While this topic concerning bank performance has been explored in previous research, several distinctive aspects set this study apart. This paper contributes to the existing literature in three key ways. Firstly, this paper adds to the upper echelon theory by showing that the CEO's educational background, field, and level significantly influence bank performance in Islamic and conventional banks. Notably, it demonstrates that CEOs with a background in finance consistently outperform their counterparts. In addition, CEOs with higher levels of education perform better than others. Furthermore, the findings provide limited support for the idea that CEOs with engineering-related degrees positively impact bank performance, but only within the realm of conventional banks.

Furthermore, our study significantly expands the existing literature on the delegation of decision-making authority and its impact on enhancing bank performance. Notably, this research marks a pioneering effort in the field, as it stands among the first to provide empirical evidence supporting the assertion that a CEO's delegation of decision-making authority leads to improvements in bank performance across both Islamic and conventional banking sectors. Our findings challenge traditional top-down management paradigms, indicating that a more decentralized decision-making structure can yield better firm performance. This shift towards delegation not only aligns with contemporary trends in management but also has practical implications for enhancing the competitiveness and sustainability of Islamic and conventional banks. These findings diverge from the New Institutional Theory (NIT), which posits that a firm's strategy and decision-making processes are shaped by environmental factors beyond the CEO's control. This concern is shared by Bruton et al. (2010) and Meyer & Rowan (1977).

Ultimately, our findings highlight a compelling correlation between a CEO's financial education and propensity to delegate responsibilities, positively influencing bank performance. This noteworthy outcome is primarily observed within the context of conventional banks, aligning closely with the findings reported by Zaidi et al. in their 2021 study. However, it's important to note that we did not find similar evidence within the Islamic banking sector, suggesting potential nuances in the decision-making dynamics specific to these institutions. Furthermore, our research distinguishes itself by encompassing a comprehensive sample of both public and private banks, a departure from the prevailing focus on public banks typically found in economic studies due to the ready availability of data.

Despite the growing body of literature exploring the influence of CEO characteristics and decision-making structures on organizational performance, there remains a notable gap in our understanding of how these factors specifically affect the performance of banks in the Tunisian context, particularly in the context of both conventional and Islamic banks. While existing research has offered valuable insights, there is a need for a comprehensive examination of the relationships between CEO

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educational backgrounds, delegation of decision-making authority, and bank performance in this unique setting. Understanding the nuanced dynamics that impact the financial outcomes of banks in Tunisia is crucial for practitioners and policymakers seeking to enhance the stability and competitiveness of the banking sector. This study seeks to bridge this gap by conducting a rigorous empirical analysis, shedding light on these relationships, and providing valuable insights for the financial industry.

The rest of the paper is organized as follows: the first section presents the study's conceptual framework and theoretical foundation. The second section reviews the related literature and states the various hypotheses of the study. In the third section, I focus on the data collection process, the presentation of results, the discussion of results, the practical implications and limitations of the study, and provide suggestions for future research.

2. Literature review and hypothesis development

2.1. *Foundations of Organizational Decision-Making Theories and Islamic Finance in Tunisia*

This section provides a foundation for our study by explaining key theories that shape executive decisions and offers insights into Islamic finance globally and in Tunisia.

As shown in Figure 1, the Upper Echelon Theory posits that the CEO's bounded rationality, which means that they make decisions within the limits of their cognitive abilities and the available information, combined with their educational and professional backgrounds, influences their managerial decision-making. This, in turn, affects the overall performance of the organization.

Figure 1. The Upper Echelon Theory

Source: Authors' elaboration

According to Hambrick and Mason, the originators of the Upper Echelon Theory (UET), managers' decisions are inherently shaped by their educational and professional backgrounds. Despite CEOs evolving into generalists due to their responsibilities to the entire company, more attention remains paid to decisions within their specific domain than in other areas (Hambrick, 2007; Hambrick & Mason, 1984). Consequently, the theory is grounded in bounded rationality (Cyert & March, 1963; March & Simon, 1958). To comprehend why organisations make specific choices or exhibit certain performance patterns, it becomes imperative to consider the biases and predispositions of their most influential actors (Hambrick, 2007).

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This line of reasoning supports various studies, including Dearborn and Simon (1958), who, in their empirical investigation, illustrate that when faced with a problem, top managers tend to resolve it based on their background and experiences. The influence of the career path on the decision-making process is further affirmed by Stone (1998). Calori et al. (1994) provide evidence that CEOs draw upon their experiences and knowledge to address problems in situations of uncertainty. Alice (2000) lends support to this theory, asserting that "CEOs may rely on known patterns of strategy and action in making decisions during chaotic times" (Alice et al., 2000, p.103) Zaidi et al., (2021).

2.2. New Institutional Theory

The emergence of the new institutional theory can be traced back to the 1980s when Meyer and Rowan (1977) pioneered it, and DiMaggio and Powell (1983) further developed it.

This theory states that the organizational structure cannot be comprehensively understood without considering broader environmental forces Abaya (2012); Zaidi et al., (2021). The institutional theory aims to elucidate how the regulatory framework influences the pursuit of long-term sustainability goals by organizations. Ayaba (2012) argues that firm strategy and decision-making processes are subject to environmental factors beyond the CEO's control; this concern is shared by Bruton et al. (2010). Meyer & Rowan (1977), the founders of the Institutional theory, contend that the CEO's decision-making process and firm strategy are guided by this regulatory framework, a viewpoint shared by Bruton et al. (2010).

2.3. The theory of organizational architecture (TOA)

The theory of organizational architecture (TOA) as a theory of decision allocation explains the distribution of decision-making authority within a company (Brickley et al., 2001). The decentralized organizational design, as opposed to the centralized design, allows actors from the low level in the organization to give their point of view and make their own decisions. This enables the company to deal with the talent pool within it. In this work, we examine the organizational structure of Tunisian banks by visiting 1380 bank agencies to investigate whether decentralized banks outperform others and to compare conventional and Islamic banks.

The delegation of decision-making authority is when someone relies on other people to take action on his behalf. In decentralized organizational structure, there is more delegation of decision-making authority than in centralized one and less workload on the CEO. The delegation of decision-making authority allows the subordinates to decide and participate in the company's decision-making process, which develops skills and capacities. Generally, the larger an organization is, the more the CEO delegate's decision-making power. In this work, the delegation is from the bank CEO to the agency directors between the bank and their branches. The decentralized decision-making structure is based on the horizontal relationship between the different management levels. In this case, the decision-making agents and the agents who implement those decisions have been separated. Moreover, the results show that the more the CEO delegates decision-making authority, the better the bank performs.

2.4. The Quranic Prohibition of Ribaa: A Clear and Sincere Guidance for Muslims

Islam's unequivocal prohibition of Ribaa, a concept meticulously documented in the Quran, is a testament to the sincerity and clarity of the religion's guidance. The Quran, notably in its longer chapters like Al-Baqara, Al-Imran, and An-Nisa, encompasses a comprehensive set of laws and principles that govern the lives of Muslims, with one of the most crucial rules addressing Ribaa. The Quran explicitly forbids Ribaa in these three chapters, underscoring its significance within Islamic doctrine. The Quran consistently reiterates this message many times. I have selected a specific Quranic verse that unequivocally underscores the prohibition of Ribaa, making it abundantly clear that Muslims should abstain from consuming it. This serves as a fundamental rationale for supporting Islamic banks and avoiding conventional ones in Islamic countries for a religious reason and in other countries for economic reasons. Conventional banks primarily profit from Ribaa, and when you deposit your money in a conventional bank, you indirectly contribute to their earnings. Moreover, if you receive interest on your savings, it constitutes Ribaa, which is strictly prohibited in Islam.

سورة البقرة (2:275):

" الَّذِينَ يَأْكُلُونَ الرِّبَا لَا يَقُومُونَ إِلَّا كَمَا يَقُومُ الَّذِي يَتَخَبَّطُهُ الشَّيْطَانُ مِنَ الْمَسِّ ۚ ذَٰلِكَ بِأَنَّهُمْ قَالُوا إِنَّمَا الْبَيْعُ مِثْلُ الرِّبَا ۗ وَأَحَلَّ اللَّهُ الْبَيْعَ وَحَرَّمَ الرِّبَا ۚ فَمَن جَاءَهُ مَوْعِظَةٌ مِّن رَّبِّهِ فَانتَهَىٰ فَلَهُ مَا سَلَفَ وَأَمْرُهُ إِلَى اللَّهِ ۖ وَمَنْ عَادَ فَأُولَٰئِكَ أَصْحَابُ النَّارِ ۖ هُمْ فِيهَا خَالِدُونَ "

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This verse from Surah Al-Baqara strongly condemns usury (Ribaa) and underscores the moral and spiritual consequences of engaging in exploitative financial practices. The verse distinguishes between permissible trade and usury, emphasizing the importance of ethical economic activities and the need to seek guidance from Allah to avoid sinful practices. Muslims are called to adhere to these principles, even if it means opting for Islamic finance solutions that may incur slightly higher costs. Choosing Islamic finance over conventional institutions, which often rely on Ribaa, aligns with Muslims' commitment to living by the principles of their faith and upholding the sincerity and clarity of Islamic teachings. It reflects their religious conviction and dedication to ethical and responsible financial practices that benefit individuals and society.

From my perspective, it is crucial to critique those Muslim-majority countries whose economies heavily rely on conventional banks, as a substantial portion of their profits comes from interest and Ribaa. This practice contradicts the fundamental principles of Islam, which prohibits Ribaa. These countries must promote alternatives, such as Islamic banks, which adhere to religious principles and contribute to a more ethical economy in alignment with Islamic values. It is worth noting that in today's world, being a Muslim does not necessarily mean adhering to Islamic principles. Unfortunately, this generalization extends to Islamic financial institutions as well. Sometimes, they merely adopt a façade of Sharia and Islam, engaging in practices that do not align with Islamic rules.

2.5. Islamic banks

Islamic banks hold a unique position within society, functioning both as financial institutions and as fulfillers of collective religious obligations (Farook, 2007). This duality necessitates merging legal and ethical responsibilities, as emphasized from an Islamic perspective. Compliance with the necessary legal norms is paramount, but equally crucial is the adherence to Shari'ah requirements, which are considered laws in themselves. While applying AAOIFI (Accounting and Auditing Organization for Islamic Financial Institutions) standards is not obligatory, it is strongly recommended, as it provides valuable guidance and resolves potential Shari'ah concerns (Calandra et al., 2024). The principles of equality are central in Islam, and Islamic banks are expected to uphold this ethos across all facets of their operations. This encompasses dealings with debtors, banking services to individuals with special needs, and employment policies, where neither gender should be prioritized unless the distinction is solely based on business experience or knowledge.

Additionally, Islamic banks must provide suitable working conditions for their employees, including prayer facilities. Integrating religion as the foundation of the entire financial system is paramount. As proposed by Brammer et al. (2007), organized religion plays a significant role in establishing and disseminating ethical guidelines that align with religious doctrines. These guidelines provide practical direction for ethical business conduct, and this orientation permeates throughout the business organization. In conclusion, integrating religion as the foundation of the entire financial system is paramount. Religion offers a robust ethical framework that guides economic activities, promoting moral and ethical principles. This foundation instils trust and confidence in financial systems and respects the cultural identity of the people it serves, fostering social cohesion and inclusivity. Moreover, by adhering to responsible and risk-averse financial behavior in line with religious teachings, the financial system can mitigate the likelihood of speculative bubbles, financial crises, and economic instability.

Religious principles that emphasise environmental stewardship and social responsibility can promote sustainable and socially responsible investments, addressing the growing demand for ethical finance. Integrating religion into the financial system allows individuals to align their decisions with deeply held beliefs, fostering conscientious and responsible financial practices. This approach also has a global appeal, attracting clients and investors from diverse religious backgrounds, making it a more inclusive and adaptable model. In summary, integrating religion into the financial system honours personal faith and ensures the overall health and stability of financial markets and institutions.

2.6. Islamic Banks in Tunisia

In 2022, Tunisian Islamic banks, led by Zitouna Bank, the first Islamic bank developed in Tunisia in 2009, achieved notable growth and recognition. Despite economic challenges from the ongoing economic crisis, these banks displayed resilience and profitability, cementing their reputation. The share of assets held by Islamic banks increased by 30% between 2018 and 2022, with positive trends in deposits and credits.

The profit margins, a critical part of Gross Operating Income (GOI), continued to dominate. One of the banks even achieved an exceptional margin exceeding 90%. Meanwhile, the ratio between operating costs and income improved, indicating cost efficiency. Islamic banks experienced substantial growth in their net profit, and Zitouna Bank recovered from previous losses.

The achievements of Islamic banks in Tunisia display their growth and resilience, highlighting the promising path of Islamic finance in the country. Additionally, Banque Zitouna made significant advancements in digital transformation, enhancing customer satisfaction and fostering innovation. These efforts have positioned it as a leader in Tunisia's banking landscape.

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Intriguingly, while Islamic banks constitute only 13% of the total number of banks in Tunisia, they have successfully attracted over 25% of customers, boasting an impressive average customer satisfaction rate of 75% compared to the 45% reported by conventional banks. This remarkable achievement underscores Islamic banking services' growing preference and commitment to customer contentment.

Thanks to its efforts, Zitouna Bank has successfully opened 12 new branches. This achievement highlights the rapid progress of Islamic banks, positioning them for even greater success. The expansion of Zitouna Bank's branches underscores the promising trajectory of Islamic banking institutions. Their growth strengthens their presence in the financial sector and reflects the increasing demand for ethical and Sharia-compliant banking services. This positive trend suggests that the future holds immense potential for Islamic banks to flourish and expand further.

2.7. CEO education and bank performance, delegation of decision-making authority

This paragraph review examines the intricate relationship between CEO characteristics, delegation of decision-making authority, and bank performance. It delves into a wealth of research findings that have explored these key determinants of organizational success.

2.7.1. CEO education and bank performance

The existing literature has extensively examined the relationship between a CEO's educational background and firm performance. This has led to varying opinions that offer contrasting perspectives on the subject. The two main schools of thought concerning this relationship can be summarized as follows.

The first school of thought contends that CEO educational backgrounds play a significant role in influencing firm performance. Ayaba's study, which focused on 100 listed firms in the Stockholm Stock Exchange between 2008 and 2010, revealed that CEOs' financial backgrounds have a significant and positive impact on corporate performance. However, CEOs' educational levels did not correlate strongly with firm performance.

Similarly, Jalbert et al. conducted an extensive decade-long study involving a substantial sample of CEOs from major U.S. corporations. Their findings suggested that educational qualifications and the quality of education significantly contribute to CEOs reaching their positions. However, the impact of these factors on the remuneration CEOs receive in that role is rather limited. Notably, they observed that the reputation of a CEO's graduate school had a slight negative association with return on assets but a positive correlation with Tobin's Q. This suggests that the connection between CEO education and firm performance is only mildly correlated, with the specific type of degree potentially influencing this relationship. Furthermore, Jalbert et al.'s subsequent research in 2010 reaffirmed the connection between a CEO's educational background and firm performance.

An alternative standpoint, represented by the second school of thought, challenges the notion that a CEO's educational background substantially impacts firm performance. Several studies have failed to establish a clear correlation between CEO education and organizational outcomes. For instance, Ting et al. (2015) investigated the effect of CEO personal characteristics on financial leverage in Malaysia from 2002 to 2011. Their research showed that CEO profile photos, age, prior experiences, and tenure were significantly related to leverage, but CEO educational background did not significantly influence firm performance. This view contradicts the belief that educational qualifications determine a CEO's ability to enhance a company's performance.

In the case of family-controlled firms, Lin et al. (2007) studied the relationship between CEO backgrounds and firm performance in Taiwan. Their findings revealed a significant association between a firm's operating characteristics and the CEO's background. Interestingly, they demonstrated that a CEO from within the family often proved to be a better choice for enhancing firm performance than a professional CEO. These findings imply that the influence of CEO education on firm performance may vary across different contexts and organizational structures.

While existing literature offers conflicting viewpoints on the relationship between CEO educational background and firm performance, this study aims to contribute to this discourse by examining its implications within the context of Tunisian banks, encompassing both conventional and Islamic institutions. Some studies suggest a positive correlation between CEO educational qualifications and firm performance, highlighting the potential influence of factors such as financial background and the reputation of graduate schools. Conversely, alternative perspectives challenge the notion that CEO education significantly impacts organizational outcomes. For instance, research in Malaysia found that a CEO's educational background is insignificant in determining firm performance. In contrast, studies on family-controlled firms in Taiwan revealed nuanced associations between CEO backgrounds and organizational success. For all of the previous elements, our first hypothesis is:

H1: The CEO's educational background has a positive impact on bank performance

2.7.2.Delegation of decision-making authority and bank performance

Delegation of decision-making authority is an important instrument for shaping managerial incentives. Scholars have studied the factors that determine the degree of decentralization in such organization. Much literature has confirmed that delegation of decision-making authority affects an organization's performance. Senyuta (2013) investigates how the delegation of decision-making authority is related to the performance of the bank's local branches during the period between 2004 and 2008. Results show that delegation of decision-making authority ameliorates quantitative performance; banks generate more profits, but it may deteriorate performance quality; decisions made in the decentralized structure are worse than those made in a centralized one. According to Senyuta (2013), delegating decision-making authority may generate a trade between the quantitative and qualitative performance characteristics.

Tran et al. (2019) explores how the distribution of decision-making authority within the board of directors affects the variability of performance as measured by variation in monthly stock returns, ROA and Tobin's Q. They confirm that not only board concentration of power causes performance volatility; it is also possible that performance volatility modifies how the board decides to delegate authority. They found that the more the decision power is concentrated in the hands of the CEO, the firmer performance variability is. These findings are consistent with those of (Adams et al., 2005; Altunbaş et al., 2019).

Adams et al. (2005) argue that when decision-making authority is concentrated in the hands of the CEO, the probability of either very good or very bad decisions is higher than in organizations in which many people share the responsibility of the decision-making process. However, they found no evidence that firms with decentralized decision-making authority perform better than others with centralized decision-making did. Han et al. (2016), confirm that CEO's power is positively associated with firm performance. According to him, power concentration in the hands of the CEO is a good way to manage such organization. This is contrary to a study by Alexandre et al. (2013), who also investigates whether or not the concentration of power in the hands of the CEO influences corporate performance variability based on the sample of 204 firms in France. They demonstrate that firms headed by a powerful CEO exhibit lower performance volatility.

Gur et al. (2016) examine the effect of trust on decision delegation. They mention that a Decentralized decision-making structure in higher-trust environments is a good way to enhance corporate management, which in turn increases firm performance through three channels: it reduces the cost of information transfers, organizations respond more rapidly to market changes, and ameliorates work conditions, which increase the level of job satisfaction. Bloom et al. (2012) highlighted that trust is the basic determinant of power delegation, affecting firm performance. According to them, the CEO have to choose which decisions to make by himself and which ones to delegate. The more the CEO trusts his managers the more he delegates decisions (Bloom et al.2012).

Dlugosz et al. (2017), in their paper titled "Decision-making delegation in banks", examine the bank organizational structure, specifically the location of deposit rate-setting authority (whether branches set locally the deposit rate to respond to local shocks or not). Results show that the more branches make decisions independently, the better they perform. According to Dlugosz et al. (2017), decentralization of decision-making authority guarantees a quicker response to local shocks, which in turn enhances bank profitability given that the bank sector is characterized by the importance of soft information for their decision-making (Dlugosz et al. 2017).

Canales &Nanda (2012) confirm that decentralized banks, which give more discretionary power to their branch managers over lending decisions, participate more in financing small businesses in competitive banking markets. However, they choose firms when they have market power. According to Canales & Nanda decentralized organizational structure's effectiveness depends on the context of the institutional environment. They conclude that decentralized banks are more responsive to their competitive lending environment. Skrastins et al. (2014), based on a sample of 2,000 bank branches in India during 1999- 2006, document that bank hierarchical structure leads to reduced loan performance; it affects both the quantity and the quality of loans. Results also show that more decentralized branches perform better than others as they said, "Delinquencies on loans in more decentralized branches are lower by 30 per cent, and a similar loan portfolio in the decentralized branch generates a 15 per cent higher return for the bank" (Skrastins et al., 2014, p 3).

Pathan (2009) further explores how board structure affects firm performance and examines the effect of CEO power on bank performance, as measured by the CEO's ability to influence board decisions. Based on the sample of 212 large US bank holding companies from 1997 to 2004, results show that the more the bank board participates in the decision-making process and effectively monitors the manager to limit his misbehaviours, the higher the bank's performance is. In conclusion, Pathan (2009) confirms that CEO power deteriorates banks' performance and may damage sustainability.

Existing studies have offered mixed findings on the relationship between decision-making delegation and bank performance, highlighting both the potential benefits and drawbacks of decentralized decision-making structures. However, within the Tunisian banking landscape, where Islamic and conventional banks coexist, there is a unique opportunity to explore how decision-making authority is structured and its implications for bank performance. By examining the dynamics of decision-making delegation within Tunisian banks, this study sheds light on how empowering CEOs and managers to make strategic

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decisions can lead to enhanced performance metrics. Specifically, delegating decision-making authority will foster a more agile and responsive banking sector, enabling banks to adapt quickly to market changes, capitalize on opportunities, and effectively manage risks. Moreover, by empowering branch managers and board members with decision-making authority, banks may cultivate a culture of innovation and accountability, ultimately driving improved financial performance. Therefore, this research contributes to a more comprehensive understanding of the complexities of decision-making processes in the Tunisian banking sector, focusing on elucidating the mechanisms through which decision-making delegation positively influences bank performance. Our second hypothesis is:

H2: Delegation of decision-making authority positively affects bank performance

3. Methodology

This section addresses the research method adopted. In the first section, we primarily present the research philosophies that have guided this research. While discussing the research methods, this section generally discusses the definition of variables and the coding process. The later part presents and analyzes the main results.

3.1. Research design and data collection

This study draws upon a variety of data sources. The primary source is a research questionnaire, supplemented by manually collected information from banks' annual reports spanning 2018 to 2022. The accuracy of the data was verified through cross-referencing with information available on the banks' websites, the Central Bank of Tunisia (BCT), and the Tunisian Stock Exchange's website (BVMT). Moreover, information regarding the personal characteristics of CEOs was gathered by examining their profiles on social networks, reviewing online articles, and, in some cases, through direct inquiries during visits to their respective banks.

3.2. Population and sampling plan

The analysis is based on a sample of Tunisian bank CEOs from 2018 to 2022. To build this dataset, we embarked on a comprehensive data collection process. This rigorous approach led us to compile a dataset comprising 1,380 banking professionals. From this initial pool, we applied a selective criterion. Specifically, we retained banks to obtain detailed information regarding CEO educational backgrounds, including the types of degrees they held, such as undergraduate or postgraduate (Figure 1 and Figure 2). To gather this specific information directly with the CEOs through personal interviews, sometimes making an appointment and sending an electronic copy before the meeting or extracting relevant data from their profiles on various social networks.

The questionnaire was distributed to 1,380 individuals, encompassing CEOs, branch managers, and other banking professionals from both public and private banks across conventional and Islamic banks in Tunisia. Our analysis was performed on a sample representing 80% of all banks in Tunisia. Notably, five banks, namely BTK, QNB, BFT, BFPME and Citi Bank, were excluded from the study due to their unavailability on the stock exchange and a lack of online-published annual reports. These banks also had a limited number of branches. Out of the initial sample, 41 responses were excluded because they did not provide all the necessary information we required.

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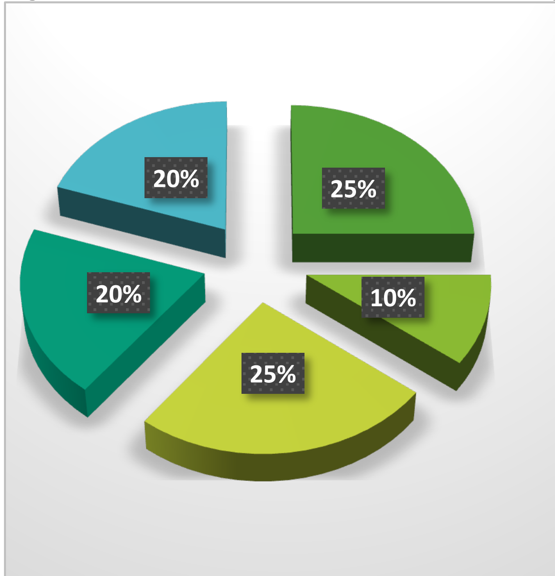
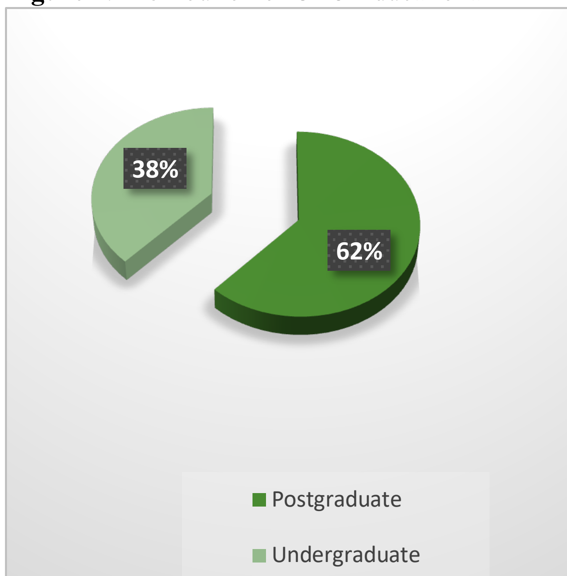
Figure 1. Distribution of CEO Educational Background



Source: Authors' elaboration

Figure 1 illustrates the educational backgrounds of CEOs, which can be categorized into five distinct groups. Among these, 25% of CEOs had a financial background, and an equivalent percentage had a management background, making it the most common educational profile in the sample. Engineering backgrounds accounted for 10%, while economics and other backgrounds comprised 20% of the total.

Figure 2. Distribution of CEO Educational



Source: Authors' elaboration

Figure 2 reveals that 62% of the CEOs held postgraduate degrees (Masters or Doctorates), while 38% possessed undergraduate degrees.

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3.3. Definition and coding of independent variables

In this research, both dependent and independent variables have been employed, primarily focusing on CEO and bank characteristics as the independent variables. The analysis also incorporated controls for traditional factors known to impact bank performance. The study utilized a range of discrete and continuous variables. For discrete variables, dummy variables were introduced. These dummy variables are binary, taking the value of 0 or 1. A value of 0 indicates the absence of the variable, while 1 signifies its presence. Using dummy variables was necessitated by including qualitative independent variables, specifically representing various CEO educational backgrounds such as finance, engineering, economics, management, and others. The independent variables were employed to elucidate the variations in the dependent variable.

3.3.1. CEO educational background

The educational backgrounds of CEOs are categorized based on their highest qualification in a particular field of study. To gauge CEO educational training, dummy variables have been generated to signify each educational background. For instance, the dummy variable "Finance" takes 1 if the CEO holds a finance-related degree and 0 otherwise. This same coding procedure is applied to economics, management, engineering, and other backgrounds. Due to the considerable diversity in CEO training, the educational backgrounds have been limited to engineering, finance, management, and economics since these are the most prevalent in the dataset. All other backgrounds are collectively represented by the dummy variable "Other".

3.3.2. CEO Educational Level

The educational level variable has been categorized into two primary groups. A dummy variable has been established, taking the value of one if the CEO has a postgraduate qualification and zero otherwise. CEOs holding only a bachelor's degree (baccalaureate + three years/baccalaureate + four years) have been grouped within the undergraduate category. In the postgraduate category, CEOs possessing master's and doctorate degrees have been combined. Only CEOs with at least a bachelor's degree were considered and included in the educational background variable to ensure consistency.

3.3.3. CEO gender

CEO gender serves as a noteworthy variable, representing an element of CEO characteristics aimed at exploring the influence of women's participation in top management teams. Nevertheless, the observed sample comprises men (98%). While we anticipate that this variable may not yield significance in the study due to the predominantly male sample, we still include it as a control variable.

3.3.4. CEO tenure

CEO tenure is incorporated into this study as a control variable. The CEO's tenure denotes the duration the CEO has spent working within the same bank. Numerous scholars have affirmed that CEOs with prolonged tenure enhance bank performance because their extensive experience within the same organizational context equips them to navigate diverse challenges. As emphasized by Ayaba (2012), a CEO with a lengthier tenure in a company constitutes an asset for overall firm performance. Therefore, it is hypothesized that banks led by CEOs with longer tenures outperform others.

3.3.5. CEO age

CEO age is a discrete variable utilized in this study. Hermann and Datta (2006) demonstrated that younger CEOs are more risk-takers and more adaptable to change. According to their findings, younger CEOs possess enhanced physical and mental capacities for processing and analyzing information. Conversely, some argue that older CEOs, with their accumulated experience, are more prone to making sound decisions. In this study, the sample comprises CEOs aged 40 and above. Drawing from this analysis, it is hypothesized that banks led by younger CEOs outperform those guided by their older counterparts. Consequently, age is expected to hurt bank performance.

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3.3.6. Delegation of decision-making authority

To know whether the bank uses decentralized or centralized decision-making authority, the question “What is the proportion of the delegation of decision-making authority (credit files)? We have been asked to test the decentralization o organizational structure. The answers are in percentage form. The more the CEO trusts the branch manager, the more he delegates decision-making authority. The percentage of the delegated files measures the CEO-manager confidence. I guess the more the CEO delegates decision-making authority, the better the bank performs.

3.3.7. Bank size

The size of a bank is presented by the number of bank agencies collected from the annual reports of banks and their websites. A large number of bank agencies is a sign of a large bank. I guess that larger banks outperform others.

3.4. Dependent variable: Bank performance

Return on equity (ROE) was used and calculated as the ratio of net income to shareholders' equity to assess bank performance. However, it is worth noting that several authors have pointed out limitations associated with using ROE as an indicator of bank performance. This metric overlooks the impact of inflation, risk, and potential shortcomings (Ayaba, 2012). The average bank performance over five years was utilised to enhance the precision of measuring bank performance and ensure that it genuinely corresponds to the study period. This approach guards against the potential that a one-year value might be significantly influenced by events unrelated to the current CEOs managing the bank. Adopting a five-year interval aligns with the practices of previous studies (Carpenter et al., 2001; Koyuncu et al., 2010; Ayaba, 2012).

4. Results

The methodology will proceed in two stages. First, we will test the validity of our questionnaire. Then, regressions will be carried out to judge the explanatory nature of the various variables when introduced simultaneously. Finally, we will describe in detail the various tests that are being carried out.

4.1. Validation of the questionnaire

Validity refers to the credibility of the conclusions drawn in a study. It pertains to whether an indicator or measurement effectively captures the concept it claims to represent (Bryman & Bell, 2007). In this research, the selection and coding of variables have been guided by theories within the subject area. Extensive literature within this field has also played a crucial role in coding. Additionally, a significant portion of the data used in this study is sourced from the annual reports of the Tunisian banks. These banks adhere to regulations set by Tunisian regulatory authorities to ensure that the information provided to investors meets established standards.

To further enhance the accuracy of the information used in this paper, I have cross-referenced data from multiple sources to validate details about CEOs, such as their age, educational background, and banking experience. In cases where conflicting information emerged, the bank was excluded from the sample (BTK, QNB, BFT, TSB, BFPME, Citi Bank). Regarding measuring bank performance, bank size, and CEO characteristics, a thorough review of existing literature was conducted to ensure alignment with measures employed by previous researchers. Based on these efforts, this study upholds the validity criteria. This part of the research aims to test the validity of the above-mentioned questionnaire and to see how respondents respond to these items. We tested the validity of the internal consistency of our questionnaire by performing a Cronbach’s Alpha (α = 0,795), which is largely significant. This measure indicates internal consistency in your questionnaire or test, meaning that the items within are highly reliable and consistently measure the same underlying concept.

4.2. Unlocking Islamic Finance: A Path to Customer Satisfaction and "Baraka"

Our research has given special attention to a specific set of information we consider extremely important. We are particularly interested in how satisfied people are with the banking services they receive. We started our presentation with this data because it shows how well Islamic banks are doing (Figure 3). We found that, on average, customers of Islamic banks are happy, with a 75% satisfaction rate. This is quite different from customers of regular banks, who have a 45% satisfaction rate. To clarify

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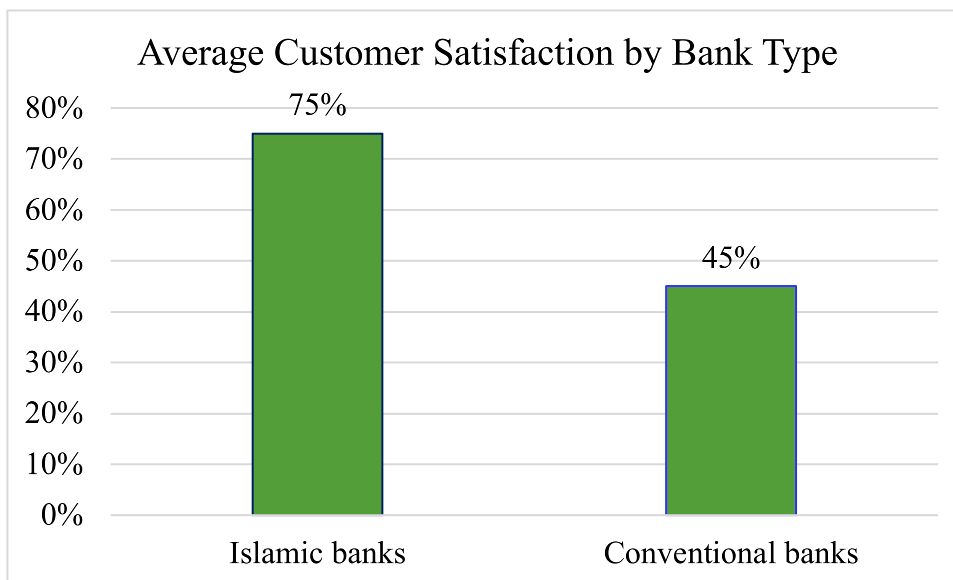
this difference, we have created a comparison chart below that shows the big gap in satisfaction levels between Islamic and conventional banks.

Figure 3. Customer satisfaction



Source: Authors' elaboration

This visual representation supports what we have discovered and backs up the reasons behind our upcoming suggestion about supporting Islamic finance. It highlights how important Islamic banks are in creating happy customers, going beyond conventional banking services and embracing the meaningful concept of "Baraka" in Islamic finance. Therefore, we strongly recommend that people in Tunisia and elsewhere seriously consider using Islamic finance. This is not just about numbers; it represents the satisfaction of making financial choices with deeper meaning.

4.3. Regression analysis

In this study, we used multi-regression analysis because there are two or more explanatory variables. In the regression analysis, I created dummy variables for each of the various types of educational background. These dummy variables were necessary because I had to convert each of the qualitative independent variables into quantitative variables so that I could run a multi-regression analysis to assess the impact on each variable.

4.3.1. Model 1: CEO educational background and bank performance

Model 1 explores the relationship between CEO educational backgrounds and financial bank performance. This analysis is divided into two sub-models: Model 1-1 focuses on conventional banks, while Model 1-2 examines Islamic banks. The central question this model aims to answer is how the educational background of a bank CEO influences the bank's financial performance, specifically as measured by the return on equity ratio (ROE).

Both sub-models aim to illuminate the relationship between CEO educational backgrounds and bank performance, with the ultimate goal of providing valuable insights into the banking sector in Tunisia. By comparing the results of these two models, we can also conclude any variations in the influence of CEO education based on the type of bank, whether conventional or Islamic.

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4.3.2.Model 1-1: CEO educational background and conventional bank performance

In this model, we investigate the relationship between the educational backgrounds of CEOs and conventional bank performance in Tunisia (Table 1). We use the return on equity ratio (ROE) as a key performance measure to determine how the CEO's educational qualifications affect conventional banks' financial performance.

Table1. Summary of model 1-1 educational background and bank performance using return on equity ratio (ROE) to measure Conventional bank performance.

Variables	Beta	P-Value	Expected Relationship	found relationship
Finance	,305	,000***	+	+
Management	,053	,000***	+	+
Engineering	,181	,000***	+	+
Economics	-,245	,000***	+	-
EDLEVEL	,350	,009***	+	+
Dependent Variable: average return on equity ratio (AROE) *, **, ***, respectively signification at 10%, 5%, 1%				

Source: Authors' elaboration

Hypothesis 1 states that the CEO's educational background, both level and field, is positively associated with bank performance. To examine this hypothesis within the framework of Tunisian conventional banks, I incorporated variables related to the educational background of CEOs. Given the presence of five distinct educational backgrounds (finance, management, economics, engineering, and other backgrounds), dummy variables were introduced. The software automatically excluded the "other backgrounds" variable). The variable "educational level" was also introduced, taking the value 1 to indicate that the CEO has a postgraduate qualification and 0 otherwise.

The results obtained from the linear regression of Model 1-1 in Table 1 reveal that 72.2% of the variation in the dependent variable (AROE) is accounted for by the independent variables. The resulting R^2 holds a significant value of 0.000, less than the p-value of 0.05 at a 95% confidence level. This signifies the statistical significance of the regression model at this confidence level. The F-statistic, measuring overall model significance, yields a value of 693.170 with a highly significant p-value ($p < 0.0001$).

Analysis indicates a positive influence of CEO financial education and engineering education on conventional bank performance, with respective coefficients of (β= 0.305) and (β=181), both statistically significant at the 1% level. This aligns with the concept that banks led by CEOs with a finance-related or engineering-related degree attain significantly higher levels of bank profitability than those led by CEOs with diverse backgrounds such as management and economics.

Conversely, institutions guided by CEOs with an economics background exhibit a performance disadvantage compared to finance, engineering, and management. The coefficient for this interaction is negative (β=-0.245) and statistically significant at the 1% level. Furthermore, the results reveal that CEOs with postgraduate qualifications enjoy a higher performance advantage (β=0.350) compared to their counterparts, and this effect is significant at the 1% level. These findings not only align with prior research (Custódio and Metzger 2014; Anderson et al., 2018; Gounopoulos et al., 2018; Zaidi et al., 2021; Zaidi et al., 2023) but also substantiate the principles of the upper echelon theory, thus confirming the first hypothesis of our research.

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4.3.3.Model 1.2: CEO educational background and Islamic bank performance

In this model, we delve into the connection between CEOs' educational backgrounds and Islamic banks' performance in Tunisia. We assess their performance using the return on equity ratio (ROE) as the key performance measure. The primary objective is to understand the influence of the CEO's educational qualifications on the financial performance of Islamic banks.

Table 2. Summary of model 1-2 educational background and bank performance using return on equity ratio (ROE) as a measure of Islamic bank performance

Variables	Beta	P-value	Expected Relationship	found relationship
Finance	,720	,000***	+	+
Management	,119	,041**	+	+
Engineering	-,030	,510	+	-
Economics	-,027	,597	+	+
EDLEVEL	,323	,000***	+	+
Dependent Variable: average return on equity ratio (AROE) *, **, ***, respectively signification at 10%, 5%, 1%				

Source: Authors' elaboration

The linear regression analysis of Model 1-2 in Table 2, conducted to test Hypothesis 1, indicates that 66.8% of the variation in the dependent variable (AROE) is accounted for by the independent variables. This resulting R^2 attains a significant value of 0.000, which is less than the p-value of 0.05 at a 95% confidence level. Consequently, the regression model demonstrates significance at this level of confidence. The F-statistic of 67.331, with a highly significant p-value ($p < 0.0001$), reinforces the overall significance of the model.

The findings reveal a positive and statistically significant impact of CEO financial education on bank performance ($\beta=0.720$) at the 1% significance level. This result aligns with the notion that banks led by CEOs with a finance-related degree achieve significantly higher profitability levels than those led by CEOs with diverse backgrounds such as management, engineering, and economics. Additionally, some evidence indicates that CEOs with a management-related degree markedly improve bank performance.

Furthermore, the findings indicate a notable performance advantage among CEOs with postgraduate education ($\beta=0.323$), demonstrating statistical significance at the 1% level. However, the data do not conclusively support that CEOs with an engineering background outperform their counterparts. These results not only align with previous research (Custódio and Metzger 2014; Anderson et al., 2018; Gounopoulos et al., 2018; Zaidi et al., 2021; Zaidi et al., 2023) but also substantiate the principles of the upper echelon theory, thereby confirming Hypothesis 1 of our study.

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4.3.4. Model 2 Decentralization of decision-making authority and bank performance

Model 2 delves into the relationship between the delegation of decision-making authority within banks and their financial performance. It encompasses two sub-models: Model 2.1 concentrates on conventional banks, while Model 2.2 focuses on Islamic banks. The primary objective of Model 2 is to examine how the delegation of decision-making authority within a bank affects its financial performance, with a particular emphasis on the average return on equity ratio (AROE).

4.3.5. Model 2.1: Decentralization of Decision-Making Authority and Conventional Bank Performance

In Model 2.1, we scrutinize the extent to which decentralization of decision-making authority influences the financial performance of conventional banks in Tunisia. This sub-model aims to reveal whether banks that delegate decision-making authority more effectively exhibit improved financial performance, as measured by AROE. By analyzing the results, we aim to gain insights into the impact of decentralized decision-making structures in conventional banking.

Table 3. Summary of model 2-1 Decentralization of decision-making authority and bank performance using average return on equity ratio (AROE) as a measure of bank performance; Tunisian conventional banks

Variables	Beta	P-Value	Expected Relationship	found relationship
Delegation	,479	,000***	+	+
BRANCHES	,366	,000***	+	+
Meetings	,031	,018**	+	+
GENDER	-,031	,011**	+	-
AGE	-,008	,506	+	+
DUALITY	,161	,000***	-	+
Dependent Variable: average return on equity ratio (AROE)				
*, **, ***, respectively signification at 10%, 5%, 1%				

Source: Authors' elaboration

Hypothesis 2 states that the Delegation of decision-making authority positively affects bank performance. To test for this hypothesis in the context of conventional banks, variables related to bank organisational structure have been used into model 2-1. Table 3 above presents the regression results. The variable of interest is the proportion of delegated files decided in the agency delegation. The set of controls includes firm size, measured by the number of branches, CEO meetings frequency, CEO duality, Age and Gender. The average ROE ratio measures bank financial performance.

The R2 for this model is equal to 0,807. This means that 80.7% of the variation in the dependent variable (AROE) is explained by the independent variables. This R^2 gives a significant value of 0,000, which is less than the p-value of 0.05 at the

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95% level of confidence. Thus, this indicates that the regression model is significant at this level of confidence. With an F-statistic of 926.742 and a p-value of 0.000 (highly significant), this indicates the model's overall significance.

In addition, the number of branches positively impacts bank performance (β=0,366), and it is significant at the level of 1%, which means that larger banks outperform their peers. In addition, there is little evidence that banks managed by dual-role CEOs outperform others (β=0,161), and this impact is significant at the level of 1%. In the context of conventional banks, the best performers are banks with decentralized decision-making authority, which delegate more decision-making authority. In addition, larger banks with more branches are more likely to perform better than others. Moreover, banks managed by CEOs who hold the positions of Chief Executive Officer (CEO) and Chairman of the Board of Directors outperform their peers.

4.3.6.Model 2.2: Decentralization of decision-making authority and Islamic bank performance

On the other hand, Model 2.2 focuses specifically on Islamic banks. Exploring whether the decentralization of decision-making authority affects their financial performance compared to conventional banks. Through this sub-model, we seek to ascertain how Islamic banks' unique operational principles intersect with decentralization and subsequently influence their financial outcomes.

Table 4. Summary of model 2-2 Decentralization of decision-making authority and bank performance using average return on equity ratio (AROE) as a measure of bank performance; Tunisian Islamic banks

Variables	Beta	P-Value	Expected Relationship	found relationship
Delegation	,285	,004**	+	+
BRANCHES	,595	,000***	+	+
Meetings	-,041	,382	+	-
GENDER	-,050	,234	+	-
AGE	,013	,761	+	+
DUALITY	,010	,820	-	+
Dependent Variable: average return on equity ratio (AROE)				
*, **, ***, respectively signification at 10%, 5%, 1%				

Source: Authors' elaboration

Hypothesis 2 states that the Delegation of decision-making authority positively affects bank performance. To test this hypothesis in the context of Tunisian Islamic banks, variables related to bank organizational structure have been used in model 2-2. The R 2 is equal to 0,713. This means that the independent variables explain 71.13% of the variation in the dependent variable (AROE). This R^2 gives a significance value of 0,000. This thus indicates that the regression model is significant at the 1% confidence level. The F-statistic: 68.901 with a significant p-value ($p < 0.000$), indicating the model's overall significance.

Table 4 above presents the regression results for hypothesis 2 in the context of Tunisian Islamic banks. The agency delegation positively and significantly impacts bank performance (β= 0,285). Also, the number of branches positively and significantly

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impacts bank performance (β=0,595). However, there is no evidence that banks led by dual-role CEOs outperform others. In conclusion, the best performers are banks with decentralized decision-making authority who delegate more. In addition, larger banks with more branches are more likely to perform better than others. However, there is no evidence that banks managed by CEOs who hold the positions of Chief Executive Officer (CEO) and Chairman of the Board of Directors outperform their peers. These results confirm the hypothesis number 2 of our research.

5. Discussion

In summary, both models show that various predictor variables significantly impact the return on equity for both conventional and Islamic banks. However, the specific variables and their effects differ between the two banking sectors, reflecting each type of institution's unique characteristics and operations. The conventional bank model explains a slightly higher proportion of the AROE variance than the Islamic one.

The regression results for conventional banks reveal a noteworthy relationship between CEOs' educational backgrounds and bank performance. Notably, CEOs with educational backgrounds in finance and engineering positively influence bank performance, leading to enhanced bank profitability. In contrast, CEOs with economic backgrounds appear to have a comparatively lower performance advantage. Furthermore, it is worth highlighting that CEOs holding postgraduate degrees tend to exhibit a superior performance advantage.

Similarly, in the context of Islamic banks, a parallel pattern emerges, where the educational background of CEOs continues to impact bank performance. More specifically, CEOs with a financial education background still exhibit a higher positive influence on bank performance. There is little evidence that CEOs led by Management degrees outperform others. Interestingly, postgraduate CEOs in Islamic banks maintain a notable performance advantage.

From Model 2, we conclude that the delegation of decision-making authority has a positive and significant effect on bank performance in Islamic and conventional banks. For conventional banks, the CEO's duality positively and significantly affects bank performance. However, no evidence exists that Islamic banks managed by dual-role CEOs outperform others.

In conclusion, the findings suggest that the CEO's educational background significantly influences both types of banks, although the specific fields of education leading to enhanced performance differ. These results deviate from the principles of the institutional theory proposed by Meyer and Rowan (1977) and DiMaggio and Powell (1983). The institutional theory posits that the firm's strategy and decision-making processes are shaped by environmental factors beyond the CEO's control, a notion supported by Abaya (2012) and Bruton et al. (2010). Abaya (2012) contends that a CEO's educational background lacks a significant impact on firm performance, asserting that firm profitability results from the environmental and social regulatory framework influencing organisational management and decision-making. Our study contributes to the literature by unravelling this intricate relationship and demonstrating that bank performance is intricately linked to the CEO's educational background, encompassing the level and field of education. The findings challenge the tenets of the new institutional theory, an extension of the original institutional theory by DiMaggio et al. in 1983, which posits that firm performance is better explained by external events, regulatory frameworks, and other forces beyond the CEO's direct influence.

6. Conclusion

Based on the comprehensive analysis conducted in this study, several key findings have emerged regarding the relationship between CEO characteristics, decision-making authority, and bank performance within the Tunisian banking sector. Our research employed a robust two-stage methodology, beginning with validating our questionnaire to ensure its reliability, followed by regression analyses to explore the intricate dynamics between various variables and bank performance.

Firstly, our investigation revealed significant disparities between conventional and Islamic banks, particularly in customer satisfaction levels. Islamic banks exhibited notably higher customer satisfaction rates than conventional banks, underscoring the distinctiveness of their services and the meaningful concept of "Baraka" inherent in Islamic finance. These findings strongly advocate for considering Islamic finance as a viable and customer-centric alternative within the Tunisian banking landscape.

In delving deeper into the influence of CEO educational backgrounds on bank performance, our analyses illuminated intriguing variations between conventional and Islamic banks. While CEOs with backgrounds in finance and engineering demonstrated a positive impact on bank performance in conventional banks, the effect was primarily observed in finance-related degrees for Islamic banks. These nuanced differences emphasize the importance of tailored recruitment strategies and continuous CEO development to optimize performance across both banking sectors.

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Furthermore, our exploration into the decentralization of decision-making authority unveiled noteworthy distinctions between the two types of banks. While both conventional and Islamic banks benefitted from decentralized decision-making structures, the mechanisms at play differed, with conventional banks showcasing the significance of dual-role CEOs in driving performance. These findings underscore the need for adaptive corporate governance strategies to optimize performance in alignment with the unique operational principles of each banking sector.

However, it's essential to acknowledge our study's limitations. The findings are context-specific to the Tunisian banking sector, and caution must be exercised in generalizing the results to broader contexts. Additionally, establishing causation over correlation within the observed relationships presents a limitation inherent to the study design.

Moreover, our research challenges conventional economic theories, particularly the Institutional Theory, by highlighting the substantial influence of internal factors, such as CEO attributes and decision-making structures, on bank performance. This prompts a reevaluation of existing theoretical frameworks and calls for future investigations that delve deeper into the causal relationships between CEO characteristics, decision-making authority, and bank performance across diverse global banking sectors.

In conclusion, our study underscores the significance of CEO characteristics and decision-making authority in shaping bank performance within the Tunisian banking sector. The practical implications of our findings advocate for tailored recruitment strategies, continuous CEO development, and adaptive corporate governance mechanisms to optimize performance across both conventional and Islamic banks. By providing a nuanced understanding of the intricate relationship between CEO attributes, decision-making structures, and bank performance, our research contributes to the ongoing discourse surrounding sustainable banking practices and strategic management in the banking industry.

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The digital butterfly effect: unleashing the Islamic Banking industry in a post-pandemic era

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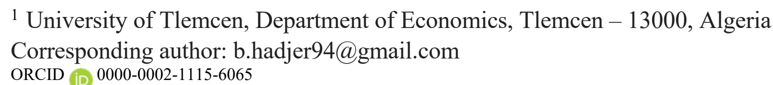
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Abstract

This study draws on the parallelism between digitalization and the complexity of the Islamic banking industry (IBs) in a post-pandemic era. It examines the digital Butterfly Effect on the Islamic banking industry to promote tech-driven IBs through an empirical lens. The study constructs a Fintech adoption index (FADi) and uses a Bayesian vector Auto-Regressive model, causality tests and impulse response functions for yearly data from 2008 to 2022 to examine the possible magnified effect of adopting Fintech by the Islamic banking industry in Malaysia. Key findings suggest that embracing Fintech by the IBs enhances the profitability of the banks, which is measured by the return on asset and return on equity. In addition, the study reports a ripple effect of FADi on the broader spectrum of the Malaysian economy. This indicates that Fintech fosters economic growth, household consumption, financial and insurance services, and corporate taxes. On the other hand, Fintech adoption helps reduce the unemployment rate. The findings contribute to the literature by investigating the IB as a system within financial chaos theory and the possible Butterfly Effect triggered by Fintech adoption.

Keywords: Fintech, digital butterfly effect, chaos theory, Islamic banking, Bayesian VAR

1. Introduction

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It is fascinating how a delicate thing such as a butterfly's wing flap may have the strength to start a tornado somewhere in the world; this concept is known as the butterfly effect; it was first introduced in the 1960s when a meteorologist at MIT modeling weather patterns revealed that a tiny rounding modification in his input parameters caused in enormously diverse weather proceedings (Lorenz, 2000). Further, the butterfly effect is used in various areas, including science, finance, mathematics, and biology. To illustrate, seemingly very small events may lead to enormous changes to a process or situation. Applying this concept to the Islamic banking (IB) system through a digital lens suggests that implementing financial technology tools into the operational processes of the IBs could have a ripple effect on the various areas of the market, economy, and environment(Abakah et al., 2023; Khan et al., 2021; Rafiki & Nasution, 2021; Rahim et al., 2023). Due to the unique framework of the IB institutions and the integration of ethical elements into their business model, IBs are sensitive to external and internal changes that may occur over time(Nawaz, 2017).

Pinning down the trajectory of the Islamic banking industry in a post-COVID era is very sophisticated work. Practitioners and economists scrutinize the Islamic banking industry from various aspects, taking apart different external and internal variables and aiming to map the determinants of the future of this growing industry. However, taking it all holistically and looking into the complexity of the Islamic banking industry might be the solution that would fit the intricacy of the phenomena. The complexity of the economic system, the increasing interactions of heterogeneous variables in a globalized world, the domino effect of the preceding financial crisis, and consequently, the gigantic financial losses of banking and financial institutions during the last years have led to the emergence of a fuller approach to analyzing the economy (Arthur, 1999; Nowotny, 2003; Awrey, 2012; Arthur, 2014). Looking back to the dramatic consequences of the financial crashes, the global financial crisis of 2008 is on the list; the later crisis exposed the blind spots left underexamined by the traditional finance theory, exhibiting, unfortunately, the negligence of the *'uncertainty'* of markets and exposing the lack of transparency. This triggered a investors' mind-shift in the financial sphere; the public started to look for an alternative to the traditional financial system, where transparency became the top priority (Rabbani, 2020); the journey into looking for a "*trustworthy*" business model paved the way for innovations and the emergence of a thirsty tech-savvy community. The race to reach the untapped Fintech market led to the birth of several upgraded digital services in the financial industry (Gomber et al., 2018), that spurs the market with novel fancy terminologies, to name a few of the services relatively newly born, such as artificial intelligence, Reg-tech, blockchain, cryptocurrency, smart banking, smart contract, peer to peer lending and many other *"nerdy"* terms, very appealing to the relevant public.

The Islamic banking industry is not an exception to the trend; indeed, technological developments are lowering the barriers to entry for entrepreneurs who want to operate in the Islamic Fintech sector (Ali et al., 2019; Khan, 2015; Lutfi and Ismail, 2016; Marzban et al., 2014; Taha and Macias, 2014; Torabi, 2017; Wahjono and Marina, 2017), especially after the onset of the COVID-19 pandemic, which pushed the financial sector to innovate more to facilitate digital transactions and to reduce in-person financial contacts and formalities. The ability to transform bulky data into usable information, the availability of tick-by-tick data, and the transparency characteristic of a multitude of Fintech tools and services helped economists and practitioners to test the presence of fractal patterns or nonlinearity in markets. The digitalization of the financial systems and the uniqueness of the Shariah-compliant banking industry bring under one umbrella a complex framework that might have dramatic consequences on the full economic situation of the country or region. Indeed, the Fintech ecosystem exhibits nonlinear features, dynamic behaviour, and very complex inner methodologies, with the exponential growth of this market grows the magnitude of its effect on other areas of the economy (Jinasena et al., 2020; Muthukannan et al., 2020).

Considering that Malaysia has a well-developed financial system and is one of the hot hubs for Fintech and Islamic finance (Tun-pin et al., 2019; Ab Razak et al., 2020; Sallah and Tasnim, 2022; Zakariyah et al., 2022), the influence of Fintech adoption on the broader spectrum of the economy is certainly significant. Undeniably, finance being embedded in the quasi totality of daily life interactions, certainly, in countries with the majority of the Muslim population, the adoption of Islamic Fintech can be quantified. It therefore may permit measuring the effect of tech on the IBs industry. The degree of sensitivity of IBs could be seen through the lens of the Butterfly effect; incorporating the Fintech element into this framework permits the articulation of a digital butterfly effect for the IBs and measuring the extent of the Fintech adoption by IBs on economic development in Malaysia.

This study builds on chaos theory in finance and examines the digital butterfly effect of financial technology adoption in the Islamic banking industry. Drawing on the parallelism between the digitalization of the finance industry and the complexity of the Islamic financial sector in a post-pandemic world. To ensure a comprehensive understanding of this phenomenon, this study is guided by the following primary research question:

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"*How does adopting Fintech in the Islamic banking sector create a digital butterfly effect that influences financial performance metrics and broader economic indicators?*".

Accordingly, this paper aims to provide a holistic understanding of how Fintech adoption transforms the Islamic banking landscape, not only by enhancing financial performance metrics such as Return on Assets (ROA) and Return on Equity (ROE) but also by generating significant ripple effects across the broader economy. This includes assessing impacts on GDP growth, unemployment rates, household consumption, and corporate tax revenue. Ultimately, the study seeks to establish and quantify the digital butterfly effect of Fintech integration within the Shariah-compliant financial ecosystem.

To the best of our knowledge, this study is the first attempt to investigate the possible digital butterfly effect from an Islamic Fintech perspective, where the literature has predominantly focused on the general effects of Fintech on conventional banking systems, overlooking the unique characteristics and requirements of Islamic banking. By addressing this gap, our study provides novel insights into how digital innovations interact with Shariah-compliant financial practices, potentially leading to significant and previously unexplored economic outcomes. Additionally, the originality of this research lies in its dual focus on technological innovation and Islamic finance principles. It extends the application of the butterfly effect to a new domain and enhances the understanding of Fintech's role in shaping the future of Islamic banking.

The rest of the paper comprises a literature review, methods and data, empirical results, discussion, and conclusion with final remarks and recommendations for policymakers.

2. Literature review

2.1. Fintech Industry and the Islamic Economics Perspective

The development of the Fintech industry is expanding globally, presenting substantial opportunities for new financial technology companies. This potential can be realized by offering diverse financial services and earning the respect and trust of their clients. A significant part of this industry focuses on serving Muslim populations, which supports the spread of Islamic Fintech. Islamic Fintech complies with Shari'ah principles and models, applying foundational Islamic financial and economic principles in its solutions (Rabbani et al., 2020). Technological advancements in the financial sector have raised the need to develop innovative Islamic financial solutions that endorse rapid evolution. The Islamic Fintech has to be deployed to achieve the major umbrella of Islamic economics beyond finance and banking (Oseni and Ali, 2019).

The emergence of Fintech has huge chances to promote and introduce Islamic financial products, solutions, and institutions in alignment with the advantages of technology. Generally, in Islamic principles, every transaction is permissible unless prohibited solutions, products, or structures are engaged (Atiyah *et al.*, 2024). Therefore, as a pure concept, Fintech is Shari'ah compliant until an impermissible action or product is involved financially or operationally. According to Hasan et al. (2020), Shari'ah compliance is paramount in the potential integration of Fintech with Islamic finance. Islamic Fintech firms have made significant efforts to ensure their business models adhere to Shari'ah requirements by following universally applicable Shari'ah standards and undergoing regulatory audits. Fintech has opened the opportunities for Islamic finance and banking to go digital, which is privileging access to its services and facilities by employing advancing technologies, for instance, blockchain, machine learning (ML), and Artificial intelligence (AI) (Rabbani et al., 2020).

First, blockchain technology has enormous potential to improve Islamic Fintech by increasing openness, security, and efficiency in financial operations. Blockchain can assure compliance in Islamic finance, which runs on Shari'ah rules emphasising ethical behaviour and the prohibition of interest, by creating immutable and transparent transaction records. Smart contracts, a major blockchain element, may automate and execute agreements based on specified criteria without middlemen, lowering costs and enhancing efficiency. Furthermore, blockchain can improve cross-border transaction efficiency and inclusion by making financial services accessible to underbanked people. The technology's capacity to offer a secure and transparent ledger of transactions is consistent with the ethical criteria of Islamic finance, promoting increased trust and confidence among stakeholders.

Generally, blockchain technology is not against the Shari'ah principles (Abu-Bakar, 2018); it shapes an art of cryptography that enhances the operational process of the transaction, provides tracking options that empower transparency, and works efficiently. It can be used in the Islamic Fintech platforms to ease access to funding, facilitate financial transactions (Hasan *et al.,* 2020), Zakah collection and philanthropic financial activities (Abojeib and Habib, 2021), waqf, and Halal economy (Tieman

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and Darun, 2017). Moreover, Smart contracts within blockchain require data on funding and transaction orders, including digital operational structures. These contracts are automatically issued based on client requests and are fully automated (Rabbani et al., 2020). However, smart contracts lack legal recognition or regulatory approval in many Islamic banking jurisdictions, posing a significant barrier to widespread adoption. To realize their potential in Islamic Fintech, appropriate legal frameworks and regulatory guidelines must be developed to align technological advancements with Shari'ah principles (Mat Rahim et al., 2018).

In addition, the recent promotion of smart contracts has been linked to cryptocurrencies like Ethereum and Bitcoin (Vujičić, 2018). The primary issue with these cryptocurrencies is the lack of official recognition in Islamic countries where Islamic law is the main source of legislation. Scholars have varied opinions on the permissibility of using cryptocurrencies. Abu-Bakar (2018) categorizes cryptocurrencies into permitted, prohibited, and those based on religious belief, with the last group focusing on developing Islamic cryptocurrencies supported by traditional currencies like the Dinar and Dirham. However*, o*ne of the significant challenges facing Islamic Fintech is the development of regulatory frameworks that support steady and lawful industry growth (Firmansyah and Anwar, 2019). Additionally, there is a shortage of skilled professionals with finance and Shari'ah law expertise, which poses another major challenge. Despite the rapid rise of Fintech, the levels of awareness, trust, and expertise among the general population remain relatively low, potentially hindering the industry's expansion

Also, Digital gold trading tools and apps have gained popularity as they offer a convenient and secure way for individuals to buy, sell, and trade gold online. For these tools to be Shari'ah compliant, several conditions must be met, such as Ownership and Possession, where the buyer must take immediate possession of the gold, physically or constructively, after the transaction. This ensures that the trade does not involve deferred delivery, which is not permissible., Certainty and transparency are where the transaction terms must be clear and transparent, including the gold's weight, purity, and price. Any ambiguity (gharar) in the transaction terms must be avoided. Finally, avoiding interest (riba) is important as the transaction must not involve interest-based financing. If the platform provides financing options, they must comply with Islamic financing principles, such as profit-sharing (mudarabah) or cost-plus financing (murabahah). By adhering to these principles, digital gold trading tools can be structured to comply with Shari'ah, providing Muslims with a permissible means to invest in gold digitally (Yahaya, 2023).

Furthermore, the Fintech sector institutions' development and operating technologies, along with the Shari'ah-related discussions, still hold much attention. Given their extensive effect on many aspects of our lives, it is critical to create machine learning (ML) algorithms that are accurate but also just and equitable. As machine learning (ML) technology becomes more integrated into banking, healthcare, and employment decision-making processes, the demand for fairness and impartiality grows (Mehrabi *et al.*, 2021). Ensuring these algorithms do not reinforce current prejudices or create new discrimination is critical for building confidence and encouraging equal results. This includes establishing strong data governance policies, constantly monitoring and auditing algorithmic judgements, and including ethical concerns in designing and deploying ML systems (Pessach and Shmueli, 2022).

The ML algorithms are designed to learn automatically from the inputs to the system (Chouldechova and Roth, 2020). Therefore, biases, discrimination, and unfairness may be caused by biases in the feeding or missing data. Some measures in the data can unbalance the data set and turn it into bias. Those measures can be related to disparate impact, demography, equality, awareness, and equalisation (Pessach and Shmueli, 2022). Hence, it is essential to run the data before entering it into the machine to prevent such biases from being created by altering the dataset's characteristics so that the distributions for both advantages and disadvantaged groups become identical, making it more difficult for the algorithm to distinguish between them.

On the other side, Grover and Roy believe that Intelligence-driven Fintech solutions have the potential to address financial exclusion and enhance access to financial services, particularly for the poor. AI-driven algorithms and machine learning technologies enhance financial services' efficiency, accuracy, and usability, allowing financial institutions to meet marginalised communities' needs better. It creates self-sustaining and reproducible solutions by leveraging the interdependent link between sustainable development, human advancement, and economic empowerment (Salampasis and Mention, 2018). However, applying Fintech, particularly AI and ML, in finance brings potential risks and considerations for protecting financial consumers and investors. These technologies can amplify vulnerabilities due to their complexity, dynamic adaptability, and level of autonomy. The lack of explainability in Fintech models' operations could lead to systemic and pro-cyclical market risks and potential misalignment with existing financial oversight and internal regulatory and governance frameworks, challenging the technology-neutral approach adopted in policymaking (Benlala, 2023).

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Within the range of the promises of technological emergence, there are still a lot of gaps that need to be bridged legally and in accounting. Many accountability measures have been proposed to promote responsible AI development, design, and deployment (Henriksen *et al.,* 2021). Accountability is a concept that gathers the desire for good governance and need to act with transparency, fairness, and justice (Bovens, 2010). The lack of accountability in such advanced technology involved in financial decision-making may create a "black box problem" that will result in more complicated, complex, and aggregated situations that will directly link to substantial effects on the markets (Fletcher and Le, 2021). Due to these concerns, the advantages of AI need to be carefully balanced against the specific risks that come with its proliferation in the markets (Fletcher and Le, 2021).

Several accountability methods have been suggested and implemented in the past few decades to guarantee that AI is designed, developed, and used responsibly. These procedures seek to address AI technology's ethical, legal, and societal concerns while encouraging openness, justice, and responsibility (Bovens, 2010). One of the key issues in AI accountability is determining who is responsible for AI system choices. Depending on the nature of the choice and the level of human engagement in the AI's operation, accountability may lie on AI system creators, operators, or users. Regulators and politicians are attempting to find a fair and transparent way to allocate this obligation (Bovens, 2010).

Uzougbo *et al.* (2024) highlighted that tackling the ethical concerns, which are related to no transparency in the decision-making process, advantage-giving selections to the users, discrimination, and non-fairness, necessitates a comprehensive strategy involving cooperation among technologists, policymakers, ethicists, and other stakeholders. Integrating ethical considerations into developing and deploying AI systems can help guarantee their use is fair, transparent, and accountable. The accountability process can occur accordingly after building a standard and certification system that runs the necessary test on the system before certifying it as a safe system for wide use in the financial sectors (Henriksen *et al.,* 2021). Following of the creation of such grounds, a manual of explanation should be designed for the users, developers, policymakers, and operators; this manual should aim to elaborate the system fairly and transparently by giving clear and enough explanation on every step of the system (Henriksen *et al.,* 2021, and Uzougbo *et al.,* 2024). Applying a system of accountability that includes all the parties involved will result in a risk-mitigating mechanism.

2.2. Ripple effects and Chaos theory: the dynamics of the Islamic banking industry

"When delicateness meets strength", the latter statement represents the quintessence of the Butterfly effect from a financial perspective. Even miniature decisions might have profound consequences in the increasingly interconnected markets. Indeed, a tiny increase in interest rate by the central bank can have a ripple effect on many fragments of the economy, starting from the financial and banking sectors to the labour market, influencing the competitiveness with alternative and Islamic banks, investment proportions, business creation, job offers, employment and economic growth (Murinde, 1996; Murinde & Ryan, 2003; Pagano, 1993). This magnified effect, famous by the term of the Butterfly effect, is part of the chaos theory (Klioutchnikov et al., 2017). Chaos theory is a branch of mathematics that deals with complicated and nonlinear systems that exhibit unexpected or potentially unexpected future behaviour. According to Biswas et al. (2018), chaos theory is a statistical field of research that posits that seemingly arbitrary nonlinear animated systems are predicted from a small number of simple equations. According to Devaney and Alligood (1989), a minor modification can have a large impact. Chaos theory argues that even deterministic systems governed by known rules and equations can lead to extremely unexpected results over time. This notion has applications in various domains, including physics, biology, weather forecasting, and economics (Klioutchnikov *et al*., 2017).

Chaos theory has been applied in the financial sector to understand market behaviour and price movements, most notably in the stock market and banking setting. The complexity of the system and the multitude of parties in the banking sector raise the unpredictability of the system and its consequences (Klioutchnikov et al., 2017; Murinde, 1996). Furthermore, the shift in the operational and regulatory environment (Khambata, 2000), based on market expectations and projections, is producing additional upheaval. As a result, every micro-event in the market, capital market, regulation, systemic operations, systems, or any other relevant subject might result in cascading effects and rapid market shifts.

Due to the complexity of the economic systems and globalization, the chaos theory, from the point of view of manageability and determinateness, proved to be an efficient theory that permits taking all the correlated fragments of the economy into consideration. Debnath (2022) demonstrated that pure deterministic models are unlikely to produce realistic data forecasts because monetary and financial systems are unpredictable due to human interactions. At the same time, chaos theory may play

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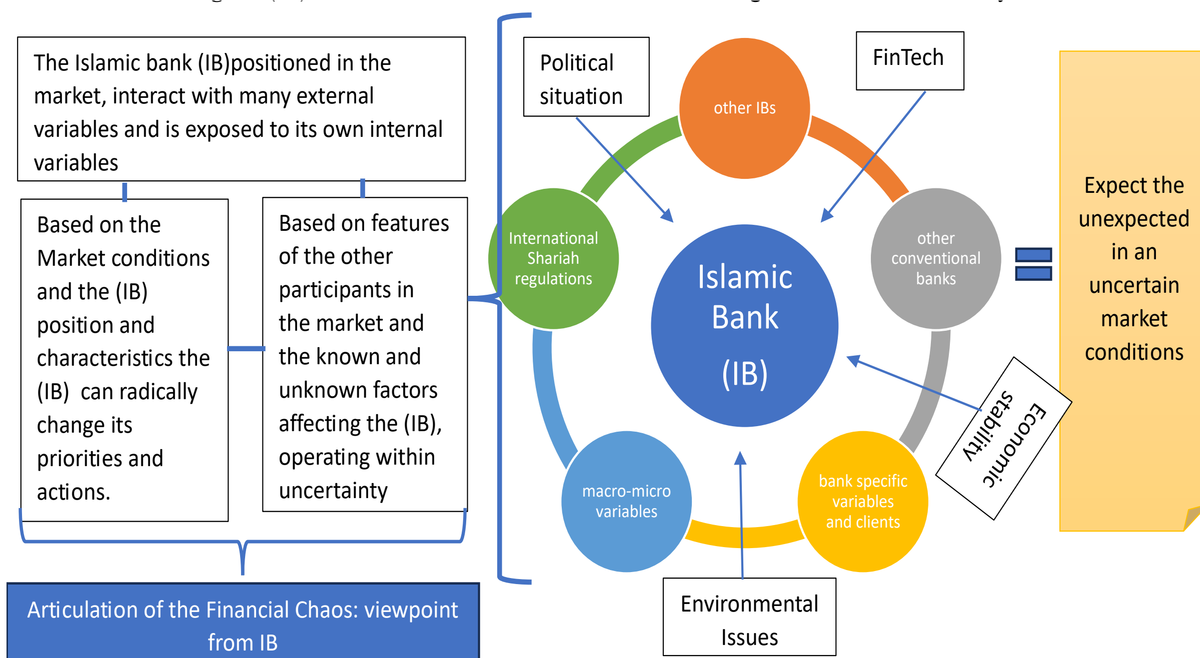
an important role in developing models of how economies run and adding unpredictable events caused by external occurrences such as COVID-19 (Spulbar and Minea, 2020). Using this theory in finance aids in spotting irregular nonlinear behaviour caused by new emergencies (such as technology) or a shift in goals, such as from efficient to moral (Debnath, 2022).

Thinking of an Islamic bank as a centre of Chaos theory, conceptualising a possible articulation of the Chaos theory and involving a butterfly effect in the market, the following figure can be proposed:

Expecting the unexpected is at the heart of the chaos theory, taking the Islamic bank system, which operates within an uncertain environment known as the market. The market has many other players that may influence the IB of interest. The IB may have different approaches to its operational methodologies based on different elements, such as its own characteristics and internal variables, the interactions with other banks and financial institutions, the market metrics, etc.. (Klioutchnikov et al., 2017; Mandelbrot & Richard, 2004). Considering its position in the market, the Islamic Bank's initial condition is sensitive to the variables that might influence the Bank's decisions and operations and, therefore, its new or unexpected position in the market. Considering the random characteristics of some elements of the markets and the essence of chaos and order, the IB system can go through chaos and order in many cycles. The theoretical foundation is summarized in the following Figure 1.

Figure 1. Foundation of the financial Chaos: looking into an Islamic banking system



Source: by the author based on klioutchnikov et al. (2017)

2.2. Unlocking the Islamic banking industry in a post-pandemic era: evidence from Fintech adoption:

The use of technology in the finance and banking sectors has developed a sense of competition between different institutions. The institution that offers its clients a great experience and relies on cost-efficiency, speed, and competitive advantages most likes to be the most popular and have more clients. The emergence of technology will most probably force the banking sector to offer reduced-cost services.

Fintech firms and institutions are focusing on offering new alternative ways to transfer money domestically and internationally, save money, and finance the needs of life (Kou *et al.,* 2021). According to (Leong & Sung, 2018) Fintech, services are more about payments, advisory services, and compliance. Haddad and Hornuf (2019) and World Bank (2020) listed more than nine categories to which Fintech is contributing, among which are financial and non-financial. All those categories with different uses by one way or another are positively impacting the economic growth and developing the infrastructures (Song & Appiah-Otoo, 2022).

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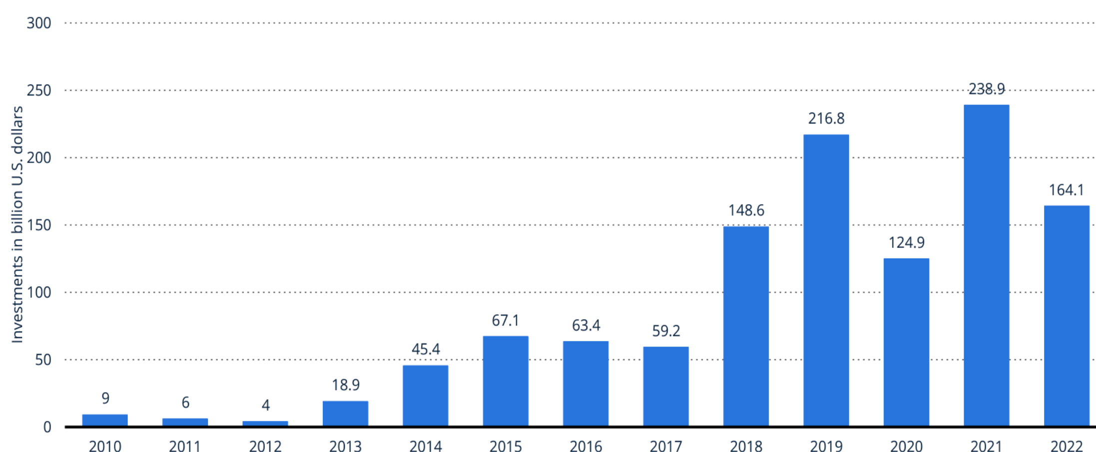
The technological revolution is one element that cannot be ignored when shaping the new face of the Islamic banking (IB) sectors. The IB industry's exposure to Fintech tools and digitalization of the sericitisation processes put the IB operational and regulatory framework in a more sensitive position (Hassan et al., 2020). On the one hand, the tech revolution will probably enhance IB's efficiency and profitability; delivering shariah-cost effective products more quickly is certainly one of the many positive aspects of Fintech adoptions (Abdeljawad et al., 2022). On the other hand, Simplicity and efficiency may be obtained, but uncertainty will occur, as in the case of Bitcoin and cryptocurrencies (Lahmiri et al., 2018). Moreover, technology gives Islamic banking a great chance to expand if the IBs fulfil their huge responsibility to educate the public about Islamic banking and its services.

However, the Fintech industry and technology-based finance still lack regulatory frameworks to facilitate and legalise their existence. As some countries are trying to form new regulations for tech adoption, there are regulatory limitations on the Fintech firms that increase different risks (Lee and Shin, 2018). Aysan and Unal (2023) highlighted that the lack of regulations may cause regulatory non-compliance and instability. Furthermore, it may reflect the level of liquidity and fund access. Al-Natoor (2023) referred to the inadequate awareness of Fintech and Islamic Fintech (IsFin) as one of the development constraints of the industry.

The era of digitalisation and the acceleration of technology solutions and tools have resulted in the deployment of technology into financial services. Other studies highlighted the rise in the frequency of downloading and using financial applications during the lockdown because COVID-19 spread by up to 32% daily. This percentage differs from one country to another according to the readiness and the level of development in a country's infrastructure.

After COVID-19, the number of Fintech start-ups has jumped to record more than 20.000 start-ups worldwide (Statista, 2022). Those firms worldwide are making massive investments to reach $238.9 US Billion dollars (Figure 2). Islamic Fintech (IsFin) firms are taking a huge segment of the Fintech industry, with a market size of USD 49 Billion in the Organisation of Islamic Cooperation (OIC) countries (Global Islamic Fintech Report, 2021).

Figure 2. Total Value of Investments into Fintech Companies Worldwide



Source: Statista Fintech Report (2022)

As Islamic finance (IF) and Islamic banking (IB) are significant components of the financial systems, the rise of financial solutions that comply with shari'ah is rising with the developments witnessed in the financial markets. The calls for IsFins applications started to take a serious turn with the dire necessity to be founded. In times of financial hardships, IF and Islamic financial institutions are establishing a steady ground that helps them to face the challenges of the time because of the genuineness of the IF solutions.

Regarding financial inclusion, Baber (2020) noted that those countries where Islamic finance and banking are more popular are more financially included than other countries. Furthermore, the establishment of IBs and IF solutions is providing an

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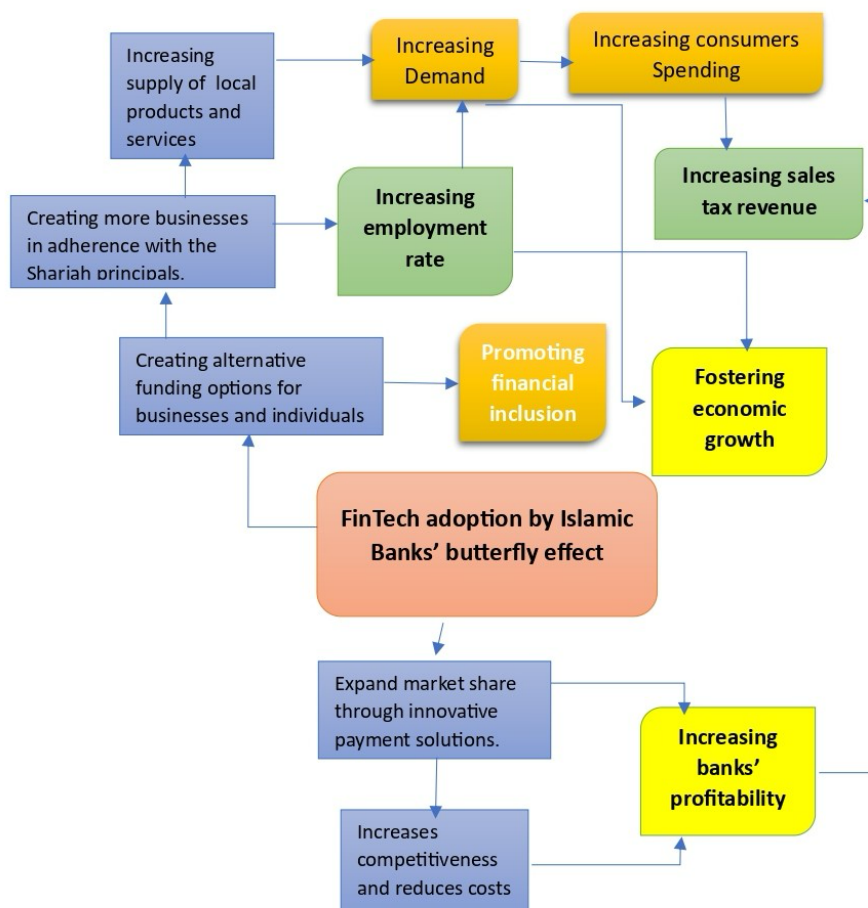
environment for developing businesswomen and female empowerment (Guo et al., 2021). However, conventional financial institutions are still more technologically advanced.

3. Methodology

This study lies at the heart of deciphering the multifaceted impact, namely the "digital butterfly effect" in the Islamic banking sector—a nuanced exploration of the profound shifts precipitated by digital interventions on IBs and economic development in Malaysia, particularly in a post-pandemic scenario (Figure 3).

Figure 3. Conceptual Framework for the Digital Butterfly Effect on Islamic Banking and the Broader Economy



Source: Authors' elaboration

The digital butterfly effect, when contextualized within Islamic banking, can catalyze noticeable transformations. These are not limited solely to the operations of Islamic banks but also affect the broader economic landscape, as depicted in Figure (03). Drawing a parallel to the deterministic yet chaotic system advanced in Lorenz's Butterfly Effect, one might conceptualize how a subtle flutter of a butterfly's wing in Islamic banking becomes instrumental, creating a ripple effect via advanced Fintech integrations. This effect ripples outward, infiltrating the larger economic framework and potentially influencing key macroeconomic determinants. This influence encompasses GDP growth trajectories and employment equilibria and significantly contributes to fostering enhanced financial inclusion across the broader economic spectrum. On the household front, the butterfly effect signals a paradigm shift in personal financial management. Families and individuals might experience

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more personalized banking services, better investment advice tailored to Shariah-compliant products, and enhanced digital security, making online transactions safer.

3.1. Variables selection and data collection

To achieve a rich and multi-layered empirical analysis, this study exploits different variables organized into four pillars: Fintech, Islamic banking metrics, economic factors, and the financial sector, presented and described in Table 1. In addition, the study examines data for 2008-2022, which encompasses pre-pandemic, during a pandemic and post-pandemic era, where a dummy variable represents the COVID-19 pandemic crisis.

Table 1. Variables description

Category	*Variable*	*Description*	*Source*
Fintech	*FADi*	Fintech Adoption Index	Calculated using PCA
Islamic Banking Metrics	*ROA*	Return on Assets for Islamic Banking	S&P global, Capital IQ
	ROE	Return on Equity for Islamic Banking	S&P global, Capital IQ
Economic Indicators	*GDP*	Gross Domestic Product	Bank Negara Malaysia
	Unemp	Unemployment Rate	Asian Development Bank
	consumption	Household Consumption	
	Induryt	Industry's Share to GDP	
Financial Sector	*F&I*	Financial and Insurance Services	Asian Development Bank
	Corp_Tax	Corporate Tax Rate	Capital IQ

Source: Authors' elaboration

3.2. Construction FADi Using Principal Component Analysis (PCA)

Principal Component Analysis (PCA) is a statistical methodology used to convert original variables into a new set of variables, termed principal components, which capture the maximum variance from the original variables while being orthogonal to each other (Jolliffe, 2002). Given its capability to diminish dimensionality without compromising significant information, PCA serves as a pertinent tool for constructing the Fintech Adoption Index *FADi*

Components for *FADi* and Their Corresponding Fintech Pillars:

Fintech's multidimensional nature is represented by several core pillars: money alternatives, capital intermediation, Investech (Huong et al., 2021). Each of these pillars captures a range of services and innovations transforming the financial landscape. The components chosen are situated within these broader categories as follows:

E-money (Money Alternatives): E-money exemplifies the innovations under the money alternatives pillar. It transcends traditional transaction modes, encompassing cryptocurrency and external bank payment systems (Dahlberg et al., 2015).

ATM (Capital Intermediation Pillar): ATMs resonate with capital intermediation, given their critical role in facilitating physical access to digitalized banking services (Legowo et al., 2021).

Mobile Banking (Capital Intermediation and Investec Pillar): Mobile banking, a primary part of digital banking, aligns with capital intermediation. Additionally, the ever-expanding suite of services offered through mobile banking apps also intersects with investech, especially when considering functionalities like investment apps and financial intelligence (Tam & Oliveira, 2017). The computation of FADi, utilizing the PCA methodology, proceeds through various stages, as presented in Figure 4.

Figure 4. Steps of PCA

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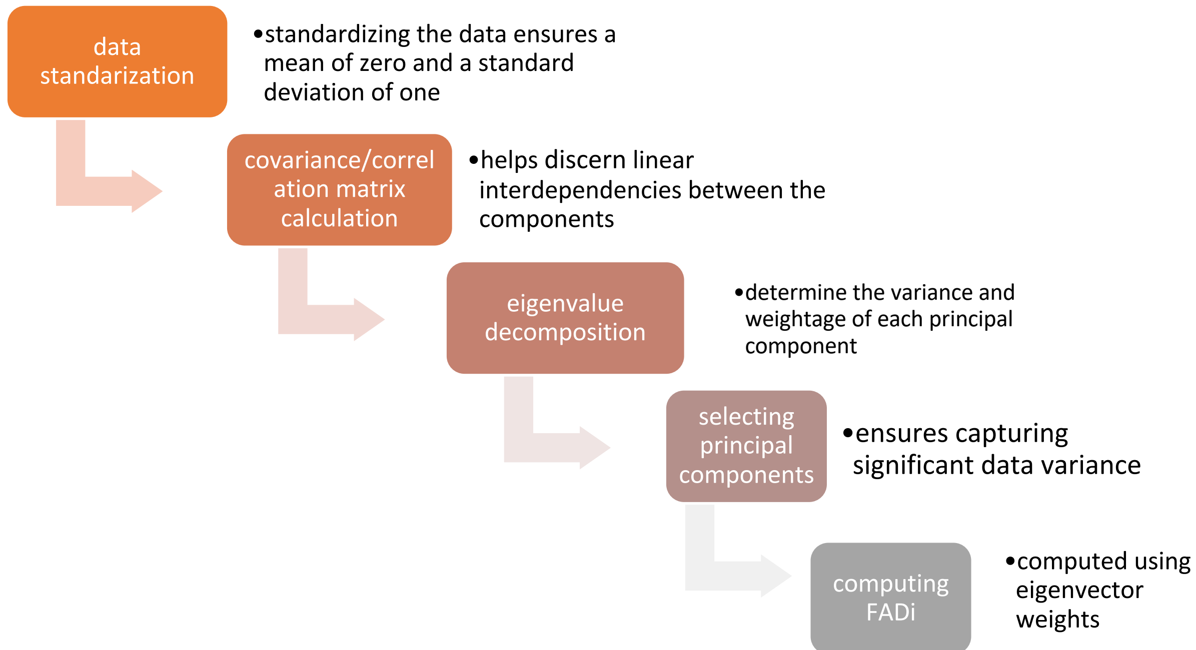

Source: Author's elaboration on Jaadi (2021)

3.3. Building the VAR model

The evolution of Islamic banking, influenced by the flutter of digitalization, merits a thorough investigation. Thus, it is paramount to opt for an approach that acknowledges the constrained dimensions of our dataset. The Bayesian VAR methodology emerges as an appropriate choice (Figure 5). It offers a holistic platform that judiciously melds prior information into the analytical process, allowing it to navigate the constraints of a smaller sample size while maintaining the precision of inferences (Tsagkanos et al., 2022).

Building upon insights from Ciccarelli & Rebucci (2003) and Tsagkanos et al. (2022), let the VAR model:
$Y_t = X_t\beta + \varepsilon_t \ldots (1)$

In this context

- Y_t is a $n \times 1$ vector of endogenous variables namely, the digital attributes within Islamic banking.
- ε_t is a $n \times 1$ vector of error terms that explains the random disturbances, identically and normally distributed with variance - covariance matrix $\Sigma, \varepsilon_t \sim \text{IIN}\,(0, \Sigma)$.
- X_t is a matrix $\text{n} \times nk$ and represents the set of independent variables.
- β is $nk \times 1$ and represents the coefficients that assess the relationship between variables.

The Bayesian structure, involving both prior and posterior distributions of the parameters $p(\beta, \Sigma)$ unfolds as:

$$L\langle Y \mid \beta, \Sigma\rangle \emptyset |\Sigma|^{-\mathbb{T}_2} \exp\left\{-\frac{1}{2}\sum_t (Y_t - X_t\beta)'\Sigma^{-1}(Y_t - X_t\beta)\right\} \ldots (2)$$

$$p\langle \beta, \Sigma \mid Y\rangle = \frac{p(\beta,\Sigma) LY|\beta,\Sigma\rangle}{p(Y)} \sigma p(\beta, \Sigma) L\langle Y \mid \beta, \Sigma\rangle \ldots (3)$$

By analyzing $p\langle \beta, \Sigma \mid Y\rangle$, the study extracts marginal posterior distributions based on the data, $p\langle \Sigma \mid Y\rangle$ and $p\langle \beta \mid Y\rangle$ can be obtained by segregating β and Σ from $p\langle \beta, \Sigma \mid Y\rangle$ respectively.

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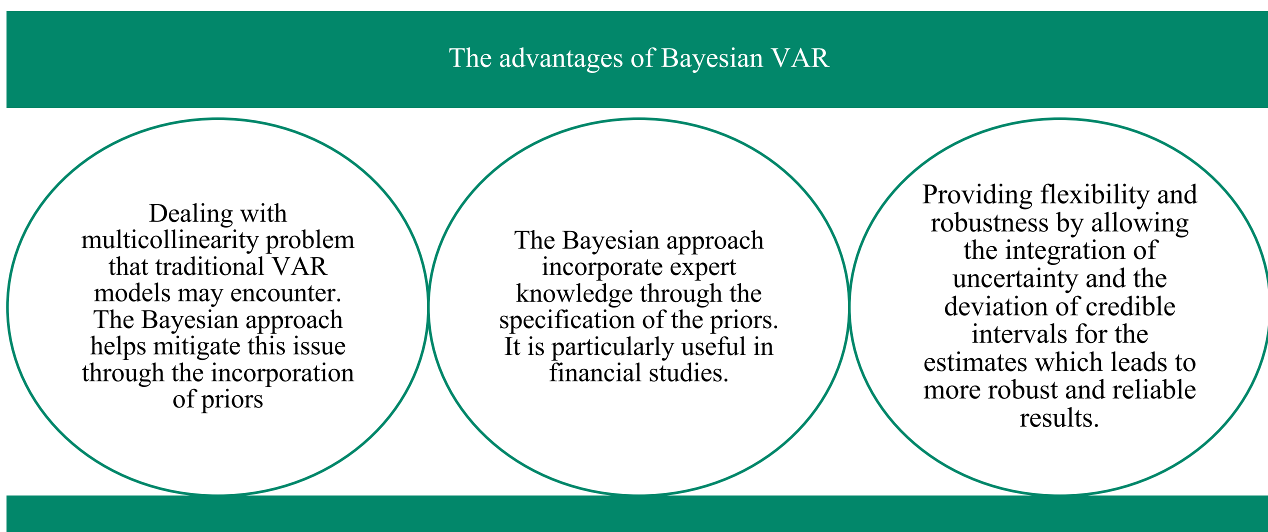
The parameters' posterior distribution combines the prior distribution with the likelihood function derived from the data. Bayes' theorem is used to update the prior beliefs with the observed data, resulting in the posterior distribution.

In addition, aligning with our focus on the digital nuances in Islamic banking, this study leverages the Minnesota prior, championed by Litterman (1986). This prior is particularly useful in small sample sizes as it introduces shrinkage, which helps obtain more stable estimates by pulling them towards a prior mean, often assumed to be zero for simplicity.

Figure 5. The benefits of Bayesian VAR



Source: Authors' elaboration

4. Results

4.1. Unit root test

To assess the stationarity properties of the variables under study, we have used the Augmented Dickey-Fuller (ADF) test commonly used in the literature. This test aims to determine whether a variable follows a unit root process, indicating its stationarity (at levels (I(0)) or non-stationarity (require differencing to achieve stationarity (I(1)) (Paparoditis & Politis, 2018).

Table 2. ADF unit root test results

Variables	ADF without Constant & Trend		
	Level	1st difference	Decision
FADi	0.9962	0.0320	I (1)
ROA	0.0001	0.0001	I (0)
ROE	0.0491	0.0014	I (0)
F&I	0.8760	0.0011	I (1)
GDP	0.8667	0.0004	I (1)
Unemp	0.8799	0.0004	I (1)
Consumption	1.0000	0.0457	I (1)
Corp_Tax	0.9184	0.0027	I (1)
Industry	0.0098	0.0000	I (0)

Source: Authors' elaboration

The Augmented Dickey-Fuller (ADF) test results through the p-values indicate the significance levels presented in Table 2, where ROA, ROE, and Industry are stationary at levels (I(0)), while FADi, F&I, GDP, Unemployment, Consumption, and

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Corp_Tax are (I(1)) and necessitate one-time differencing to achieve stationarity. Given the mix of I(0) and I(1) variables, appropriate modeling strategies should be considered to ensure robust and meaningful econometric results.

4.2. Johansen cointegration test

The Johansen cointegration test is a multivariate extension of the unit root tests. It is specifically designed to determine the cointegration relationships in a system of equations. It evaluates the presence of cointegrated vectors that indicate long-term equilibrium relationships among the variables (Dwyer, 2015). The trace statistics and corresponding probabilities are used to determine the number of cointegration relationships. In this case, Table 3 reveals the absence of significant cointegration vectors at the 5% level, suggesting that the variables do not share a long-term equilibrium relationship.

Table 3. Johansen cointegration results

Johansen test			
Hypothesized	**Eigenvalue**	**Trace statistics**	**Probabilities**
None	*0.915789*	*97.7128*	*0.0531*
At most one	*0.887433*	*52.1503*	*0.2998*
At most two	*0.234877*	*24.7823*	*0.2147*
At most three	*0.788580*	*31.2032*	*0.5030*

Source: Authors' elaboration

4.3. Bayesian VAR estimation

Bayesian Vector Autoregression (BVAR) estimation combines prior information with observed data to estimate model parameters and their posterior distributions (Miranda-Agrippino & Ricco, 2019). This approach is particularly useful for addressing the dense parameterization of VAR models through informative priors that impose shrinkage on coefficients (Kuschnig & Vashold, 2019). Bayesian VAR estimation, considering the prior information and the specific characteristics of the data, revealed different insights into the relationships and dynamics among the study's variables, as summarized in Table 4.

Table 4. Bayesian VAR estimation results

Bayesian VAR estimates									
	FADi	**ROA**	**ROE**	**F&I**	**GDP**	**Unemp**	**consmp**	**Corptax**	**Industry**
FADi	1.016722	4.94E-05	0.003679	0.001422	0.004755	-0.000140	0.001407	0.001407	0.076450
	(0.09788)	(0.00036)	(0.02709)	(0.03968)	(0.04913)	(0.00891)	(0.03118)	(0.0311)	(0.80882)
Covid	0.483969	-0.002782	0.014304	0.005479	-0.208194	-0.021233	-0.027352	0.097115	-0.613084
	(0.03493)	(0.00248)	(0.18861)	(0.14615)	(0.02625)	(0.08128)	(0.06214)	(0.2170)	(5.63034)
R^2	*0.929318*	*0.873896*	*0.98146*	*0.837394*	*0.975514*	*0.862051*	*0.987545*	*0.957491*	*0.887066*

Source: Authors' elaboration

Results underscore the digital butterfly effect, where minor digital shifts can lead to significant economic transformations. The Fintech adoption index (FADi) is a catalyst in this framework, showing significant effects across banking and macroeconomic landscapes. With every flutter in FADi, there's a significant positive sway in both Islamic banking metrics,

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ROA and ROE, emblematic of the transformative power of Fintech in reshaping financial outcomes. On the macroeconomic front, FADi positively impacts GDP, household consumption, and corporate tax while also hurting the unemployment rate.

While the ripples on ROA (4.94E-05) and Unemployment (0.000140) are almost imperceptible, suggesting these sectors may be insulated from immediate digital shifts, the industry sector feels a more pronounced wave (0.076450). This substantial influence, tempered by a higher standard error, mirrors the vast potential of the digital revolution, albeit with uncertainties.

Additionally, the R2 highest values, 0.98146, underscore its substantial explanatory power for most variables.

4.4. Bayesian Impulse Response function

Impulse response functions (IRFs) provide a valuable mechanism to comprehend the dynamic interplay among variables in a system, especially when considering how a shock in one variable might propagate and influence others over subsequent periods. Just as the butterfly effect underscores the sensitivity and interdependence of complex systems, our Bayesian IRFs demonstrate how small disturbances in one area of the economy can affect significantly various sectors.

The next **Figure 6** offers an interesting glimpse into the digital "butterfly effect" initiated by Fintech adoption. At the flap of FADi wings, a significant positive response merges across different economic pillars, starting with Islamic banking (ROA and ROE), GDP growth, and financial and insurance services hinting at enhanced financial inclusivity, household consumption and corporate tax; however, the same flutter drive to a negative response of unemployment rate probably due to shifting skill requirements. Additionally, the stabilization of the industry's contribution to GDP by a growth of 0.16 at t=10 paints a picture of an evolving economic landscape adapting to its new digital era.

4.5. Granger causality Wald tests

Given the nature of the digital butterfly effect, it is essential to determine if changes in FADi genuinely precede changes in these metrics or if it's merely coincidental using the Granger causality test to strengthen and complement the previous results by examining the causal relationship among the variables. By assessing the Wald test, we can determine whether one variable can be said to Granger and cause another (Shukur & Mantalos, 2000).

Table 7 summarizes the Granger causality test results, indicating the causal relationships between FADi and other key variables. The p-values suggest the significance of these relationships. For instance, there is a bidirectional causal relationship between FADi and both ROA and ROE, indicating that not only does Fintech adoption drive changes in financial profitability, but changes in these profitability metrics can also impact the rate of Fintech adoption. The table also shows causal relationships between FADi and GDP, unemployment, household consumption, and corporate tax, underscoring the extensive influence of Fintech adoption on economic indicators.

Figure 6. Bayesian ERF

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Response to Cholesky One S.D. (no d.f. adjustment) Innovations

Response of ROA to FADI Innovation

Response of ROE to FADI Innovation

Response of F_I to FADI Innovation

Response of GDP_GROWTH to FADI Innovation

Response of UNEMP to FADI Innovation

Response of CONSUMPTION to FADI Innovation

Response of CORP_TAX to FADI Innovation

Response of INDUSTRY to FADI Innovation

Source: Authors' elaboration

Table 7. Granger causality test results

<table>
<tr><th colspan="2">Variable</th><th>p-value</th><th>Decision</th></tr>
<tr><td colspan="4">The causal relationship between FADi and Islamic banking</td></tr>
<tr><td>FADi
ROA</td><td>ROA
FADi</td><td>0.0309
0.0482</td><td rowspan="2">Bidirectional causal relationship between FADi and both ROA and ROE. This means that not only (FADi) drive changes in financial profitability (ROA) and equity returns (ROE) but shifts in these financial metrics can also influence the rate of Fintech adoption.</td></tr>
<tr><td>FADi
ROE</td><td>ROE
FADi</td><td>0.0225
0.0125</td></tr>
<tr><td colspan="4">The causal relationship between FADi and economic and financial variables</td></tr>
<tr><td>FADi</td><td>GDP
Unemployment
Consumption
Industry
F&I services
Corp Tax</td><td>0.0375
0.0285
0.0110
0.8935
0.0259
0.0488</td><td>Causal relationships exist between FADi and GDP, Employment, Consumption, F&I services and corporate taxes illustrating how digital financial innovations shape economic health, consumer behaviors, and the dynamics of the finance sector. Intriguingly, FADi does not show a causal relationship with the industry’s share to GDP,</td></tr>
</table>

Source: Authors’ analysis based on data processing

5. Discussion

In the evolving digital butterfly effect, results revealed that innovations in the Fintech adoption index (FADi) have considerable influence across various sectors. The positive trajectories observed for metrics such as ROA, ROE, GDP Growth, and Financial & Insurance Services underline Fintech's potential to supercharge the economy.

Notably, these patterns suggest that increased Fintech integration might push the Islamic banking sector to another level, where ROA, a metric signifying the ability of assets to generate profits, exhibited an immediate surge with heightened FADi. This suggests that Fintech integrations, ranging from digital banking platforms to AI-driven financial tools, can optimize asset utility, enhancing profitability. ROE, on the other hand, gauges the profitability of shareholders' equity. Its positive response to FADi indicates that as Islamic banks adopt more Fintech solutions, they can generate higher returns on the capital invested by shareholders. These results agreed with the outcomes of the previous literature (Monika et al., 2021; Sidaoui et al., 2022; Siska, 2022). In addition, The effectiveness of Fintech adoption in promoting GDP growth finds validation in works by (Paparoditis & Politis, 2018) and (Yoon et al., 2023), who proposed a symbiotic relationship between digital finance innovations and macroeconomic resilience. Additionally, corporate tax revenue witnesses a positive uptick, possibly due to increased digital transactions. The continuous growth observed in the Financial and Insurance Services sector underscores Fintech's role in fostering greater financial inclusivity and streamlining services, propelling the sector to new heights, which aligns with (He et al., 2017). Additionally, households appear to benefit from the proliferation of Fintech solutions, experiencing heightened consumption, possibly due to enhanced access to diverse financial products and platforms.

Moreover, an encouraging sign was the decline in unemployment with the emergence of Fintech adoption. Contrary to concerns about digital transformation leading to job erosion (Ben Romdhane et al., 2023), our findings hint at Fintech's potential to forge new employment avenues. The tech sector, rife with innovations, seems to be emerging as a crucible for diverse job opportunities, assuaging fears tied to automation and rapid technological advancements.

On the other side, the pandemic ushered in an era marked by both chaos and digital evolution. As global economies grappled with disruptions, an intensified pivot towards digital solutions arose, with the Islamic Banking sector no exception. This shift underscores the potency of the "Digital Butterfly Effect". Our findings vividly illustrate this, revealing how Islamic Banking, underpinned by Fintech, exhibited resilience amidst adversity, with marked improvements in performance metrics such as ROA and ROE, which agreed with the findings (Aini et al., 2022; Karim et al., 2022). Furthermore, after the widespread job losses during the pandemic, the sector's digital metamorphosis seems to have unveiled a spectrum of new employment avenues in the

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post-pandemic era. As we navigate the post-pandemic landscape, it's evident that the synergy between Fintech and Islamic Banking is about surviving challenges and harnessing them as catalysts for transformative growth and resilience.

Therefore, businesses, regulators, and educators should pivot towards embracing Fintech innovations and harnessing their potential to drive resilience and growth in an interconnected economy.

6. Implications: Theory & practice

The findings have implications for theory and practice. The theoretical consequences contribute to the literature on conceptualising the Islamic banking activity as a system at the heart of chaos theory in finance that moves from chaos to order frequently due to the uncertainty of the market conditions. Hence, the Butterfly Effect can be diagnosed in this research through considering the effect of tiny external or internal initial events that may occur in the market (Lorenz, 2000), and the influence of such novelties on various operational and regulatory activities of the IBs. When IBs adopt Fintech tools, bank-specific profitability metrics such as return on assets and equity are increased, improving the IB system's placement in the market.

The practical implications are emphasised via two different points. Firstly, by offering a practical way to understand the complexity of the Islamic banking system, how the conceptualizing of the chaos theory and the butterfly effect of the Fintech adoption by the IBs where results underscore the "Digital Butterfly Effect," emphasizing how minor shifts in Fintech adoption can have cascading impacts across the economic landscape. This study draws initial outcomes to build informed decision making, in being proactive when assessing and implementing risk mitigating strategies and operational methodology in the banking industry because market is uncertain, and organization should expect the unexpected.

Secondly, looking into the digital Butterfly Effect, and considering the globalization and interconnectedness of markets, policymakers would be able to implement forecasting models to predict to a certain confidence level the outcomes that a given event might have on the larger scale of the local and international markets. The fintech adoption index, for instance, had a positive effect on economic growth and reduced the unemployment rate. Hence, despite Fintech not being directly implemented to foster employability in Malaysia, it has an indirect effect on the job market for a tech-savvy youth community, for instance.

7. Conclusion

In this context, the study examines the digital butterfly effect on the Islamic banking industry to promote tech-driven IBs through an empirical lens; the study constructs a Fintech adoption index (FADi) and uses a Bayesian vector Auto-Regressive model, causality tests and impulse response functions, for yearly data from 2008 to 2022, to examine the possible magnified effect of the adoption of Fintech by the Islamic banking industry in Malaysia. The findings highlight the role of Fintech in the Malaysian economy, which goes beyond the financial sector. The research's outputs argue that at the flap of FADi wings, a significant positive response merges across different economic pillars, starting with Islamic banking (ROA and ROE), GDP growth, financial and insurance services hinting at enhanced financial inclusivity, household consumption and corporate tax, however, the same flutter drive to a negative response of unemployment rate probably due to shifting skill requirements.

The study empirically contributes to the existing literature by investigating the Islamic banking system at the heart of the chaos theory; fintech adoption creates a non-linear response of different sectors of the Malaysian economy, which is emphasized in the transformative impacts of fintech tools. Our study's results highlight that the effects of fintech adoption are unpredictable and not always straightforward. Hence, our findings shed light on the fuller picture and give a holistic viewpoint to policymakers and stakeholders to embrace the inherent uncertainty of technological advancement in the financial industry. Policymakers and scholars within the field must thoroughly explore the complex impact of Fintech adoption on the economy, ensuring meticulous attention to all relevant details and involved stakeholders and sectors. A particular area requiring in-depth analysis is the role of fintech in enhancing transparency and fairness and fostering greater equity. Such a decentralized system integrated with an effective RegTech framework for efficient governance could promote an inclusive financial system.

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Challenges of Modernity: Issue of Interest and Establishment of Modern Financial Institutions by Bosnian Muslims (1878-1918)

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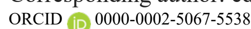
ORCID  0000-0002-5067-5538

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Abstract

After five centuries of living under the Ottoman Empire, Bosnian Muslims lived under a non-Islamic empire's governance in 1878. Life in a new environment brought numerous challenges and sparked debates, such as loyalty to a non-Islamic government, migration, and military service. One of the issues vehemently discussed was the issue of interest. The emergence of Islamic modernism, which sought to redefine the concept of interest (differentiating between interest and usury), did not find firm ground in the initial years of the 20th century in Bosnia and Herzegovina. However, a flexible interpretation of interest was offered according to the legal ruling (fatwa) specially issued for Bosnian Muslims by the central religious body of Muslims in the Ottoman Empire (*Mashihat)*. Namely, interest was still considered prohibited (*haram*), but in the specific socio-economic circumstances in which Bosnian Muslims lived, it was declared permissible. The legal argument of necessity (*darura)* was used as the primary justification. This was a revolutionary step since this *fatwa* opposed conventional Islamic wisdom on interest and thus legitimized the establishment of modern financial institutions.

Keywords: Bosnian Muslims, interest, modern financial institutions, legal ruling, modernism

1. Introduction

Studying economic history is a complex process since history itself can contain a distorted image, as the predominant economic trajectories of the past may significantly differ from those we know today. Therefore, research must be conducted with a questioning mind and cognitive curiosity. One of the most fateful moments in the history of Bosnia and Herzegovina (B&H) occurred when Austria-Hungary (A-H) occupied B&H in 1878, thus tying it to the European political and cultural circle for 40 years. This event was particularly shocking for Bosnian Muslims. Considered "leftovers" of the Ottoman Empire (OE) and faced with the fear of assimilation and losing their identity, they had to organize themselves accordingly. A significant gap in the literature covering this period can be noticed; political, cultural, and social dimensions were discussed, whereas the economic aspect is unjustifiably neglected. Even in these turbulent times, Bosnian Muslims established many banks, credit cooperatives, and other financial institutions. Poor socio-economic circumstances did not stop them from acting. Since the religion of Islam does not favor interest-based activities, it is compelling to see how Bosnian Muslims balanced their religious norms with real needs. This lesser-known history of Bosnian Muslims should reveal noteworthy facts about their economic organization during the A-H occupation. As Cicero defines history as "*testis temporum*" - *the evidence of times*, this research should help us better understand our present and future by following their historical legacy. The paper will proceed with an initial literature review and the theoretical framework. It is historical. Therefore, it continues with a brief methodology and a holistic historical contextualisation of all the facts.

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2. Literature review

The Ottoman Empire experienced an Era of Reorganization (Tanzimat) that aimed to modernize the Empire in all aspects of life during the 19th century. During that period, Dersaadet Bank and the Ottoman Bank were founded. Dersaadet Bank went bankrupt quickly, while the Ottoman Bank expanded its business activities to all major Ottoman Empire and Europe centres. Unfortunately, Bosnia Vilayet was an exception (Younis, 2013). Vujović (2015) points out that the general economic circumstances in B&H under the late Ottoman administration were impoverished. Thus, the formation of modern financial institutions was not a realistic outcome.

Crediting was not an unknown concept in Ottoman-administered B&H, although it lacked modern financial institutions. Church municipalities, monastery administrations, wealthy priests, and citizens assumed the role of financial creditors instead of banks. At that time, credit was personalized and was often based on altruistic motives. Wealthy individuals often lend money without interest to their family members, friends, and journeymen. However, they would stipulate only one condition: the debtor could not reveal the creditor's amount or identity. Church and monastery municipalities followed a similar pattern; they would charge interest to their members, but the interest rate was very favorable (Marković, 1938).

The Islamic endowment institution (waqf) assumed a significant role in crediting. According to Kreševljaković (1941), the first institution that charged interest on borrowed money was the *Gazi Husrev-bey waqf* in the 16th century. This institution had precise terms and conditions for third parties to borrow money. For example, it welcomed people of all religions, but trustworthiness was crucial for qualifying for a loan. Also, money was borrowed only to individuals who needed it to start or expand their business activities. However, these rules were not always followed, and the *waqf* institution became subject to numerous malversations, which led to its weakening (Younis, 2013).

Parallel to the decadence of the *waqf* institution, people were forced to seek loans from individuals who charged very high interest rates, ranging from 50% to 100% annually (Kreševljaković, 1941). Sometimes, usurers (*zelenaši, lihvari*) charge 10% weekly, 520% yearly. Besides monetary credit, commodity credit (*robni kredit)* was ubiquitous as the most primitive form. This form of credit occurred between retailers and wholesalers and was practised between peasants and retailers. In these cases, the creditor (wholesaler) would lend his goods. Still, he had to be financially compensated after a certain period, when the retailer sold his goods or after the harvest in the case of a peasant (Marković, 1938).

Although Islam and Christianity share the same negative attitude toward interest, many Muslims and Christians participated in this practice, along with Jews. Muslims and Christians who charged interest would use different tactics to cover up their participation in interest-based activities. One famous example is that they would often lend money without interest, but they would also sell an object of low value to a debtor for a high price, the amount of the charged interest (Marković, 1938). From these examples, we can see that money borrowing was practised on both individual and collective levels. Institutions mainly borrowed money from their members or the wider public who demonstrated good behaviour and needed money for their businesses.

Individuals, primarily wealthy merchants, also played an active role, many of them being Muslims. Therefore, interest in the Ottoman Empire was not an unknown subject, as many would assume. In contrast to classical Islamic jurists who stood against even low interest rates, which remains the mainstream opinion today, Ottomans clearly distinguished between interest (*ribh, faida*) and usury (*riba*). According to Ottoman legal scholars, Islam prohibited charging high interest rates, which often doubled or tripled if the debtor failed to repay his debt.

An interest rate of up to 15% per year (*ribh, faida*) was acceptable and was considered a reward to an individual who gave up his share of wealth (Cagatay, 1970). As noted, the decadence of waqf institutions in the 19th century and the proactive role of usurers placed peasants, the largest and most vulnerable category of the population, in a difficult position. To mitigate the effects of such a situation, the Ottoman Empire enacted a law on agricultural charitable foundations (*menafi-sanduci*) to save peasants from usurers. The law on *menafi-sanduci* in 1867 was one of the last effective measures introduced by the Ottoman Empire. The extent to which this law was beneficial is confirmed by the fact that even the Austro-Hungarian and later governments adopted and slightly modified its working patterns. This was the government's first systematic step to help the underprivileged. These loans were favorable; the monthly interest rate was only 1%, and the crediting period was 3-12 months (Kreševljaković, 1941).

Menafi-sanduci were agricultural credit that emerged after the Crimean War in 1856. They existed in 38 cities in *Bosnia Vilayet* and had multiple purposes (Marković, 1938). It is essential to mention that *menafi-sanduci* already existed in some parts of the Ottoman Empire (*Danube Vilayet*). The proclamation of the *law on menafi-sanduci* in *Bosnia Vilayet* resulted from proactive steps undertaken by Governor *Topal Osman-pasha*. The draft version of the law was prepared and published in the

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official gazette Bosna in 1866. It consisted of 29 paragraphs published in 4 separate issues of this gazette. These 29 paragraphs discussed four aspects: principal, management, eligibility for a loan, and bookkeeping. Finally, the law was enacted in the summer of 1867 after approval from the *Grand Vizier*. Soon after, the law on *menafi-sanduci* was passed across the entire territory of the Ottoman Empire, although with minor changes. These foundations were renamed "Homeland Funds" (*memleket-sanduci)*. Additionally, a new decree allowed the remaining money to be loaned to artisans and merchants (Kreševljaković, 1941). *Menafi-sanduci* were so effective that even Austro-Hungarian and later governments endorsed them. They were recognized as *"Kotarske pripomoćne zaklade"* in 1886, while in the Kingdom of Serbs, Croats, and Slovenes (later the Kingdom of Yugoslavia), they were recognized as *"Sreske pripomoćne zaklade"* (Marković, 1938).

Menafi-sanduci fulfilled their primary purpose; they saved peasants from the "claws" of usurers and thus prevented further degradation of society. An interest rate of 1% per month (with a maximum loaning period of 12 months) was a far better option than what usurers offered. *Menafi-sanduci* were a primitive form of credit since they only helped people avoid falling into the abyss and did not shape a significant crediting portfolio then. The initial years of the Austro-Hungarian (A-H) occupation were characterized by institutional disorientation and stagnation among Bosnian Muslims. Faced with the threat of cultural and religious assimilation in a new environment, some migrated to the remaining provinces of the Ottoman Empire (OE). A-H brought the European style of living and modern state institutions and initiated numerous reforms to redesign the previous Ottoman order. Reforms in the economic sector were the most visible. Bosnian Muslims lagged their countrymen regarding the development of banking activities. Besides the complex socio-economic circumstances of that period, the specific Islamic worldview, which does not look favorably on interest, also contributed to passivity in this matter. Muslims struggled to reconcile the condemnation of interest in Islamic sources with the challenges of modern life. The Islamic portrayal of interest represented an additional obstacle. The elites who were already involved in the political-cultural organization of Bosnian Muslims took vanguard steps. In 1906, they established the *First Muslim Credit Cooperative* in Tešanj. However, to legitimize this project, representatives of Bosnian Muslims, led by *Ademaga Mešić*, asked for a legal ruling (*fatwa*) from Islamic jurists in Istanbul beforehand (Galijašević, 1999).

According to the fatwa issued by *Professor Ibrahim Hakki Manastirli*, even low interest rates are prohibited. Since Bosnian Muslims live under a non-Muslim government, they can practice their interests according to the principle of necessity (*darura*) (Hasani, 2012). Therefore, while interest remains prohibited (*haram*), in the specific Bosnian context, it is treated as a "necessary evil" (*darura*). This fatwa was copied and later distributed to Muslim money offices (*novčani zavodi*) to generate support from the Muslim public (Đozo, 1943). According to this fatwa, Bosnian Muslims were the first Muslim community in the Balkans to establish modern financial institutions (Džemaludinović, 1982). The foundation of the *First Muslim Credit Cooperative* in 1906 was a groundbreaking event that triggered the establishment of similar financial institutions throughout the country.

2.1. Conceptual framework

A bank as an intermediary institution that collects deposits and channels money into credit activities was unknown in the Ottoman Empire (OE) until the mid-19th century and the formation of the Ottoman Bank (Pamuk, 2004).

Galijašević (1999) argues that waqf institutions could be considered forerunners of banks in the OE since they performed similar functions, although with a limited scope in line with the dominant spirit of the time (*Zeitgeist*). The people who endowed money to *waqf* were strictly careful and precise in defining the purpose of their wealth once it was given to the community. In many cases, the endowment charter (waqfnama) prescribed that a low interest rate should be charged upon request for a loan.

According to Kreševljaković (1941), the very first institution in the territory of present-day Bosnia and Herzegovina (B&H) that clearly stated that money could be borrowed at a specific interest (*ribh*) was the Gazi Husrev-bay waqf in 1534:

"The rest of the sum of 300,000 *drachms* should be loaned under interest (*ribh*) if a valuable pledge and a safe guarantor are provided so that the interest amounts to 1 drachm out of each ten *drachms* annually. This should be done according to Islamic law (*sharia*) so that this process does not turn into usury or that the very principle is turned into a loss. Let the money be borrowed from merchants, craftsmen, and farmers of all religions (without discrimination) who are well-known as wealthy and financially stable people, who show signs of trust, who are righteous and confident, who exercise good behavior in front of people, who do not lie, and who do not delay in debt repayment".

Interestingly, the *waqfnama* emphasized that money could be borrowed from followers of any religion if the remaining conditions were met. In most cases, waqf institutions' money was used for socially responsible projects according to the will expressed in the *waqfnama*. Since the government did not provide public services to the extent known today, private incentives

by people played a key role. Therefore, the institution of *waqf* was active in providing public goods such as roads, water wells, and educational facilities. Mujić (1977) mentions some cases where profit was used to promote science, art, and literature. In one instance, *Derviš-paša Bajezidagić* endowed 30,000 *dirhams* to his *waqf* for one specific purpose: this amount was to be given to businessmen under interest, and the profit earned was to be distributed to scholars for the translation and interpretation of the *Masnavi*.

Younis (2013) states that *waqf* was crucial in ensuring credit for economic activities in the OE. Usually, an interest rate of 15% annually was charged, and numerous examples in the literature prove this practice.

Kreševljaković (1941) mentions hundreds of debtors in one report covering crediting *waqf* activities in *Tešanj* over two years (1634 - 1636). Among the credit users were also Christian priests, whose interest rate was 15%.

Apart from *waqf*, wealthy individuals, primarily wholesalers, played an important role in crediting activities. Some famous wholesaler families, such as *Merhemić, Potogija,* and *Kumašin,* did not charge any interest. They would often lend money without any pledge or certification in court. Occasionally, individuals would leave real estate behind to be sold after their death. Money obtained from the sale of real estate was lent, and the interest earned was distributed to the destitute in the community (Younis, 2013). Usury was considered *malum in se*, but it was widely practiced. Individuals who borrowed money at usurious rates were despised in society by their fellow countrymen. One of the famous families in Sarajevo involved in money lending at very high interest rates was the *Očaktan* family. An interesting poem emerged at that time regarding *Očaktan's* high-interest rates:

"Good for you grey cuckoo bird, when you can sing in the forest on a tree branch, and you are not indebted to the *Očaktan* family!" (Kreševljaković, 1941).

At the end of the 19th century, Bosnia and Herzegovina (B&H) was predominantly an agrarian country where approximately 90% of the population, including those in urban areas, were employed. Mechanized agriculture was not developed, resulting in very low productivity. The primary agricultural tool remained the wooden plough (Juzbašić, 2002).

In 1880, the territory of B&H was incorporated into the common customs union of Austria-Hungary (A-H) (Imamović, 2007). Soon after, A-H initiated numerous infrastructural projects to exploit the country's natural resources. Forestry and mining development received particular attention, leading to the establishment of various companies such as steelworks, ironworks, and chemical plants (Buhin, 2012). Like late Ottoman B&H, usurious rates were prevalent under A-H rule. Consequently, the Provincial government enacted a law on June 30, 1907, setting the maximum interest rate at 10%. Any rate exceeding 10% was deemed a severe crime punishable by imprisonment, and the practice of compound interest was strictly regulated (Galijašević, 1999).

Initially, Austria-Hungary (A-H) banks did not pursue an expansion strategy into Bosnia and Herzegovina (B&H). The occupation was considered temporary, and investments were considered too risky, compounded by a financial crisis in the banking sector following the *Vienna Stock Exchange crash* on May 8, 1873 (Nametak, 2016).

In 1883, the *Union Bank from Vienna* established the *Privileged Department of the Union Bank in Bosnia and Herzegovina*, marking the first financial institution of its kind. Loans were primarily granted to landowners for consumption purposes, while peasants sought loans to purchase serf land or land from those who had emigrated to the Ottoman Empire. Due to the high demand for loans exceeding supply, the Provincial Government *(Zemaljska vlada)* established the Bosnia and Herzegovina Mortgage Office in 1889 (Marković, 1938). *The Privileged Land Bank of Bosnia and Herzegovina* was founded in 1885 with a total founding capital of 4,000,000 *forints*. This institution had significant political implications, as it was established partly in response to the founding of the *Serbian Bank in Zagreb* the same year (Marković, 1938).

A-H was apprehensive about potential national mobilization among its governed populations. It perceived strong financial institutions as potential sources of income for future separatist activities. Therefore, A-H prohibited the establishment of any bank whose name included adjectives like "Muslim," "Serb," or "Croat" until 1903. This restriction was lifted after introducing liberalisation measures in 1903 (Nametak, 2018). Marković (1938) argues that banking in B&H during the A-H occupation had economic and political motivations, leading to significant fluctuations in the banking sector within a relatively short period of 40 years. According to Vujović (2015), banking in occupied B&H was notable in Europe due to its distinct national affiliations. Banking activities followed similar organizational paths as other local establishments during that period. The years from 1903 to 1914 marked an economic renaissance, during which 50 money offices were established, representing Serbian, Muslim, Croat, and mixed institutions (Kosier & Ristić, 1924).

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2.2. Issue of riba (interest) in the international context of 19th and 20th century

Discussion on *riba* represents one of the most controversial topics in Islamic thought. Muslim scholars unanimously agree that *riba* is forbidden, but there is no universally accepted definition of what constitutes *riba*. According to the modernist interpretation, the only *riba* prohibited in Islam is *riba-al-jahiliyyah* (pre-Islamic usury). This type of *riba* was characterized by excessive interest rates that multiplied if a debtor defaulted on repayments (Farooq, 2009).

Asad (1980) summarizes the discussion on *riba*, noting the lack of consensus among Islamic scholars regarding its definition. He emphasizes that interpretations must adapt to changing social, technological, and economic environments. While the Quran unequivocally condemns *riba*, each generation of Muslims faces the challenge of reinterpreting its economic implications.

The late 19th and early 20th centuries witnessed the rise of Islamic modernism, which aimed to reinterpret Islamic teachings considering contemporary circumstances. One of the most prominent figures of this movement was *Muhammad Abduh* (1849-1905) from Egypt. Abduh advocated for a flexible and liberal approach to Islamic traditions, challenging dogmatism and superstition. His disciple *Rashid Rida* continued his progressive views on economics and other aspects of Islam (d. 1935). Rida's *fatwa* 1909 advising Bosnian Muslims not to migrate after Bosnia and Herzegovina's annexation by Austria-Hungary in 1908 significantly prevented mass migration from the region (Karčić, 2011).

Džemaludinović (1982) extensively analyzes Abduh's stance on *riba*, expressing disappointment that Abduh's interpretations were not widely accepted among Muslims. Abduh distinguished *riba-an-nasiya* (credit riba) and *riba-al-fadl* (surplus riba). While *riba-an-nasiya*, akin to *riba-al-jahiliyyah*, involved usurious practices condemned in the Quran, *riba-al-fadl* pertained to transactions involving unequal exchanges of goods, which some companions of the Prophet initially allowed but later considered prohibited in *Hadith* literature.

There is a historical belief that Abduh sanctioned the collection of interest earned through deposits at postal savings accounts. Still, this claim lacks direct evidence and relies on later accounts from Rashid Rida (Islahi, 2012).

During Abduh's time, many Muslims deposited their money in government-established post offices. Some religiously devout individuals declined to accept the interest earned on these deposits and sought guidance from Abduh on its permissibility under Sharia. Abduh initially disapproved but later suggested it could be permissible if aligned with the *mudaraba* principle, a form of profit-sharing. This suggestion did not satisfy the Egyptian governor, who sought religious validation for his project. Ultimately, Abduh's willingness to consider exceptions regarding interest collection differed from traditional interpretations (Khalil & Thomas, 2006).

2.3. Issue of riba (interest) in Bosnia and Herzegovina within Austro-Hungaria

Establishing financial institutions in Bosnia and Herzegovina in the early 20th century would be impossible without Ademaga Mešić (1868-1945). He marked the period of the national awakening of Bosnian Muslims in the political, economic and cultural fields. Filandra (1998) considers him the greatest philanthropist in the first half of the 20th century. He grew up in a traditional Muslim family with a solid work ethic. He invested money that he inherited from his father in trade. In 1906, his five companies had around 30 employees. Business obligations often required trips abroad, so Mešić visited major European, Asian and African cities. His experience in these visits has substantially shaped his views on democracy, parliamentarians, and human rights. (Kolanović, 2008).

Despite his businessman profile, he played a significant role in political and social life. Many Muslims were illiterate and conservative, so he invested a significant amount of energy and money in enlightening them. His relationship with Muslim clerics was complicated; on the one hand, he respected them; on the other, he was their fierce critic. Ademaga did not consider Islam a static religion isolated from the outside world but rather a driving force that encourages positive action and contributes to human progress. As a wholesaler who visited many countries, he understood the importance of crediting activities to develop economic life. Therefore, he expressed the intention to establish a credit cooperative in B&H. Muslim clerics from Mostar stood against this initiative. Moreover, they asked Hadži Halid ef. Sefić, the director of an Islamic high school (madrasa) in Tešanj at the time, confronted him and issued a fatwa that prohibited establishing such institutions. When Ademaga explained the rationale behind such an institution and its benefits for Muslims, Hadži Halid ef. Sefić approved it. In his comment, Hadži Halid ef. Sefić stated that interest is prohibited, but in the case of *darura* (necessity), it is preferred to pay interest to fellow Muslims rather than foreigners.

He also added that Muslims should follow modern times if they want to progress (Kolanović, 2008). After Ademaga received support from the local cleric, he wanted to authorize it with the fatwa from Istanbul. Namely, opposition embodied in a group

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of clerics from Mostar still existed, and Ademaga knew that a fatwa authorising the establishment of financial institutions from Istanbul would generate broader support among the Muslim public. Moreover, the *sultan* enjoyed sovereign rights over B&H, and Muslims were still emotionally attached to OE.

An inquiry was sent to Istanbul in 1906. The financial situation of Muslims was described in detail. The main argument was that none of the existing banks protected the interests of Muslims; therefore, establishing Muslim banks was necessary. (Hasani, 2012). It was argued that the very economic existence of Muslims was threatened in the long run. These banks often requested land (the most valuable resource) as a mortgage to obtain a loan. The banks have taken the land of those Muslims who failed to fulfil their credit obligations and sold it to non-Muslims. So, even in auctions, Muslims were discriminated against, and the land was lost permanently. The existence of a Muslim bank would have prevented this outcome, and Muslim artisans and merchants would have taken the loans from Muslim bank-it was further argued. *Ismail Haqqi Manastirli*, a prominent member of *Mashihat* in Istanbul, provided a positive answer with a detailed explanation of this inquiry (Džemaludinović, 1982).

He gave the following answer: “All schools of thought within Islamic jurisprudence (*madhabs*) agreed upon that interest (*riba)* is prohibited according to *sharia*. At the time of validity of *sharia*, a *fatwa* on interest is issued. Among Muslims living in non-Muslim countries (*dar-al-harb*), a ruling has been made on its permissibility, while it is not allowed in Islamic countries. There is no sharia ruling according to which interest-based activities can take place among Muslims in non-Islamic countries. Still, there is a principle that *"necessity makes forbidden things permissible"*, thus making some things permissible by applying general rules. In this way, the principle of "necessity renders the Sharia prohibition permissible".

There is no doubt that interest in the case of necessity also becomes permissible, analogous to the pronouncing words that disqualify from religion (in the event of life danger) or eating carrion (in the case of hunger). However, it is not easy to determine what a necessity is? Let this fatwa be applied among Muslims in non-Islamic countries, but the question is: is it a necessity for them to live there? If someone chooses to live in a non-Islamic state, he can also live in another way. It is up to each individual to determine these guidelines by himself. If the individual is not forced to do otherwise, he should act by sharia.” According to Hasani (2012), a few conclusions can be derived from this *fatwa*: (1) interest was permitted according to the necessity principle fatwa considered B&H as a non-Muslim country (*dar-al-harb*); (2) although it was issued two years before annexation of B&H by A-H; (3) the modernist approach was not applied (differentiation between interest and usury).

Islamic legal scholars often invoke the darura principle to justify breaking the Islamic principles. The author of Fatwa uses analogical reasoning (*qiyas*) to justify the interest. Namely, the Holy Qur'an permits Muslims to consume unclean food or deny God's existence if their survival is threatened. So, by employing the same analogy, non-practice of interest would be detrimental, and it would seriously jeopardize the existence of the Muslim community in B&H. However, *fatwa* from Istanbul did not close the debate on *riba*. This question stayed open and was a subject of fierce discussions among Muslim scholars in B&H throughout the 20th century.

Fejić (1914) argues that Muslims should participate in interest-based activities. He published a breakthrough article stating the reasons for such an attitude. Although he was an Islamic scholar, he understood economics and politics well in this article. However, he also supports the argument of *darura* and equates interest and *riba*. For him, the financial system occupies a central position in everyday life, like the role of the heart and bloodstream in the human body. He is also aware of globalization tendencies in the early 20th century, and he argues that the whole world is interdependent; if there is a crisis in one part of the world, it will be experienced in the other parts. Therefore, Muslims should not live isolated from the outside world.

Further, he knows interest's inevitability since a significant amount of money is necessary for investment, and only a bank can provide this amount. He summarizes that Muslims face a *Shakespearean dilemma* in this case: whether to ensure money for capital investments through banks or give up investment completely. Besides, he refutes the argument that Muslims should participate only in minor business activities to avoid the sin of interest. For him, it is questionable whether also, in that case, the sin of interest could be avoided. Economic consequences would be detrimental for the Muslims if such an isolation strategy is followed; it would lead to slow "economic suicide", and non-Muslims would dominate over Muslims in economic matters. Moreover, losing economic independence would be perilous for the religion itself. The issue of interest becomes then secondary if the very religion of Islam is lost. Muslims would be then non-desirable in society, and everybody would consider them as "scabby sheep". They would also become a target of proselytism, especially from the Catholic side. He also observes the importance of financial institutions for the states.

According to him, OE fell into the abyss because it had no money offices. Consequently, it was forced to ask for a loan abroad, often under "high-interest rates and shameful conditions." In his concluding remarks, he once again underlines that interest is a major sin in Islam. However, since interest is omnipresent and is a leading "weapon" used by Europe, Muslims should adopt the same strategy to protect their physical and economic existence. Karabeg (1914) discarded this opinion since

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he considered it an attempt to change the injunctions of Islam. The debate between Fejić and Karabeg was just the beginning of the clash between traditionalists and modernists. This clash gained momentum, especially during the interwar period. In 1939, a famous debate emerged between Fehim Spaho, who occupied the highest religious position (*Grand Mufti*) and Mehmed Handžić, the informal leader of a conservative circle of Muslim scholars. The cause of debate was an interpretation of interest provided by Handžić.

An inquiry was sent to the magazine *El-Hidaje*. According to Islamic sources, one merchant from Jajce asked for a detailed explanation of interest. Handžić cites numerous Qur'anic verses and Hadiths prohibiting interest-based activities in his answer. He also mentions Islamic scholars' consensus (ijma) on this matter. Consequently, those who deny the prohibition of interest are not Muslims anymore. However, those aware of the prohibition but still engage in interest-based activities commit a grave sin. He suggests they sincerely repent and give back interest to previous debtors or the community through charity (*sadaqah*) if their debtors have died. (Handžić, 1938)

Spaho (1939) briefly analyzes the issue of interest as a response to Handžić. Initially, Spaho argues that Islam is flexible and not conflicting with contemporary science and human progress. Moreover, the interpretation of Islam, according to the Zeitgeist, strengthens Islam rather than weakens it, as many conservatives argue. According to Spaho, discussing the issue of interest in the 20th century is redundant since banks play a vital role in economic life. So, in contrast to his conservative counterparts and modernists such as Fejić, he considers that time has abrogated interest, thus making it permissible. He also reminds Handžić of the money-lending practices by waqf institutions throughout history by citing numerous examples.

Handžić did not receive Spaho's review of interest well, so he wrote a whole treatise. He states that he cannot allow Muslims to perceive interest as permissible. Also, he staunchly rejects the notion that time and human progress have abrogated interest. Regarding money lending by *waqf*, Handžić argues that this practice only existed in the Ottoman Empire and that Spaho misinterpreted it. Finally, he concludes that if a concession is made in the case of interest, then *Pandora's box* would be opened. Consequently, the religion of Islam would gradually disappear. (Handžić, 1939).

3. Methodology

This research uses a combination of historical analysis, case study method, primary source examination, and interpretative analysis to understand the complex interplay between religion, culture, and economic development. The case study method explores a specific subject from a particular research area. In this study, the focus will be on one specific group of people—Bosnian Muslims at the exact period—the turn of the 19th and 20th centuries, emphasizing a specific subject—the issue of interest and establishment of modern financial institutions.

A historical method, as a systematic totality of principles and rules, is designed to effectively assist in collecting the original material from the past and critically evaluate and present it as a synthesis (usually in writing) of the results achieved (Garraghan, 1946). The author argues that a historical method consists of three operations:

- search for the material and sources of information for research (heuristics);
- evaluation of material and sources from the view of evidence-based value (criticism);
- formally stating the results of heuristics and criticism. This operation involves compiling historical data and presenting them (usually in writing) as objective truth and value (historical reasoning).

The historical method has several specific characteristics: evidence used in this method is mostly indirect; this evidence must be interpreted; the researcher needs to reconstruct the past, which can be difficult as the current knowledge of the researcher affects the form of a notion of the past; researchers are expected to discover the actual mechanism (usually causal) that will help to give meaning to the mass of evidence (Karčić, 2013). Through archival and primary source research encompassing key historical documents, financial records, and religious texts, content and thematic analysis are employed to interpret and synthesize data. At the same time, comparative studies are utilized to understand broader implications by comparing relevant historical contexts and contemporary practices in Islamic finance. The steps involved in this cross-section methodology are:

- Historical Contextualization
- Archival Research: Examination of archival documents from the Austro-Hungarian period, including government reports, economic data, and correspondence.
- Secondary Sources: Review historical accounts, scholarly articles, and books providing context and background information.

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- Primary Sources
- Official Records: Analysis of financial records, bank charters, and government policies related to establishing financial institutions.
- Community Documents: Examination of documents from Bosnian Muslim communities, including religious decrees (*fatwas*).
- Content Analysis
- Religious Texts: Interpretation of Islamic texts and scholarly writings that discuss the prohibition of interest and the conditions under which financial transactions can occur.
- Socio-economic analysis: The analysis of economic data to understand the impact of new financial institutions on the local economy and Muslim community.

Research on the past is focused on past events and phenomena and is retrospective in its core nature. Information will be gathered chronologically to examine the origins, causes, and effects of historical events according to different sources. Descriptive statistics are used to represent secondary data.

4. Discussion

To provide a genuine report of the period in which this process happened, a short overview of circumstances in the late Ottoman B&H was presented. Interest was pervasive and widely practised by Christians, Jews, and Muslims, whether on an institutional or individual basis. This widespread use of interest underscored its entrenched role in facilitating financial transactions and capital accumulation among diverse communities.

Menafi-sanduci (agricultural charitable foundations), introduced as a substitute for deteriorated *waqf* institutions, battled high usurious rates imposed by individuals. However, these institutions established in the late Ottoman period, which later governments also preserved, could not answer the challenges of the time.

Under Ottoman governance, waqf institutions, despite their charitable intent, struggled to adapt to changing economic conditions and combat usurious practices effectively. The Austro-Hungarian administration introduced liberalization measures aimed at modernizing the region's economic infrastructure, including the establishment of banks and credit cooperatives. With the A-H occupation, a new epoch for Bosnian Muslims has started. A cultural and political revival followed the initial disorientation of Muslims at the beginning of the 20th century. The rivalry between Muslim political factors and the general backwardness of Muslims had a tremendous effect on the economic revival. The personality of *Ademaga Mešić*, leader of so-called progressive Muslims, takes the greatest credit for establishing modern financial institutions. As an experienced merchant, he understood the importance of credit as a catalyst for economic development.

Firm in his beliefs, he did not hesitate to ask for permission from the highest religious body in OE for his initiative. He clashed with the religious conservatives but ultimately won the case. A-H also played a constructive role in developing these institutions after liberalization measures in 1903. The emergence of Islamic modernism coincided with the establishment of modern financial institutions in B&H. These institutions facilitated capital formation, investment in infrastructure, and entrepreneurship among diverse religious and ethnic communities. They provided avenues for savings, loans, and investment opportunities previously unavailable under traditional Islamic financial frameworks.

Islamic modernists differentiated between the Qur'anic term *riba* and interest. This interpretation would lose popularity after the ascent of interest-free banking in the second half of the 20th century. Nowadays, any interest transaction is prohibited, according to most Islamic scholars. However, in late A-H Bosnia and Herzegovina, modus vivendi between these opposite stances was reached; interest was still harshly condemned, but it was denoted as a necessary evil and accepted in specific socio-economic circumstances in which Bosnian Muslims have lived. This evolution reflects ongoing reinterpretations of Islamic law and ethics in response to global economic trends and challenges, emphasizing equity, fairness, and social responsibility principles in financial practices.

5. Conclusion

The argument of *darura* (necessity) proclaimed in a famous fatwa from Istanbul was also employed by Muslim scholars in B&H. Even today, this argument is used to justify the consumption of interest-based loans for Muslims living in the West if they do not have access to interest-free loans. It is peculiar that, although the *fatwa* considered interest a necessary evil, this

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aspect was not emphasized. In many ads published in the press, this was never the case. In most cases, a difficult situation for Muslims was described. Furthermore, their inexperience in modern economic matters was especially emphasized.

Despite its theological controversies, the introduction of interest-based banking served as a pragmatic response to the socio-economic challenges of the time. The fatwa from Istanbul, permitting interest under conditions of necessity, provided a legal framework that justified the establishment of conventional banks. These banks played a pivotal role in protecting the financial interests of Muslims amidst a rapidly changing economic landscape.

This era witnessed the consolidation of Muslim economic identity and a strategic move towards economic modernization in line with global trends. Ultimately, rather positive aspects of banks and consequently interest, as achievements of the modern world, were discussed. Arguments used for the adoption of interest-based banking were to move forward, to progress, not to lag the civilized world, to be children of the time, to save land and capital, to fight against foreign capital, and to step into a secure future. Based on this analysis, it is possible to say that establishing modern financial institutions was a rather reactive and defensive step. Although the *fatwa* mentioned above did not close the debate on interest, it was used as legal proof for establishing conventional banks.

Proponents of conventional banking designated usurious rates as the main source of problems for Muslims. In return, they offered them moderate interest rates and security since loans have been institutionalized through banks. Moreover, interest on deposits was mostly paid at 5%, making the opportunity for passive income very attractive for Muslims. Aside from anti-usury propaganda, the main tool used by proponents of conventional banking was consolidation under the term "Muslim".

On many occasions, it was proclaimed that Muslims founded these banks for Muslims. Support for these institutions was considered the ultimate act of patriotism, and many Muslims responded positively to this call. From this point of view, this was a very challenging period, and we can conclude that these banks played a crucial role in protecting the interests of Muslims. The old feudal order was gradually crumbling, and Muslims would have been the biggest losers if they did not unite around joint economic institutions. However, the legacy of Muslim banks in Austro-Hungarian Bosnia and Herzegovina presents both insights and challenges for contemporary scholars and practitioners. While these institutions are a testament to the resilience and adaptability of Bosnian Muslims in navigating economic challenges, their historical context cannot be divorced from the broader socio-political factors of the time. Today, the socio-economic environment differs significantly, with established alternatives such as Islamic interest-free banks offering a different approach to financial management. Nonetheless, the lessons from this historical episode remain pertinent. Bosnian Muslims can draw inspiration from their ancestors' cooperative efforts to strengthen community financial resilience. Moreover, further research into the operational dynamics of these banks, their impact on social cohesion, and their interaction with governmental policies would enrich our understanding of their historical significance.

The establishment of Muslim banks during the Austro-Hungarian period in Bosnia and Herzegovina stands as a testament to Muslims' adaptive capacity to reconcile religious principles with practical economic imperatives. It underscores the complex interplay between tradition and modernity and serves as a call to explore innovative approaches to contemporary economic challenges within the framework of Islamic finance principles.

This research, however, is subject to several limitations. The lack of prior research studies on the topic was the main limitation. A moderate overview of the debate on interest during the A-H rule was provided because of the lack of available data on this issue. There were also contrasting sources, especially regarding the name, year of establishment, and founding capital of financial institutions. Access to reliable data posed a significant challenge as well. Because of these obstacles, there is a high probability that we did not identify every financial institution in that period. The concept of Muslim banks in A-H is a virgin area, and therefore, numerous topics could be suggested for historians, economists, and theologians. First and foremost, the performance of these banks and the establishment of new banks during the interwar period should be discussed. The total impact of these banks on the social landscape and their corporate social responsibility requires special attention. The role of the government in ensuring support for these institutions could also be analyzed as a separate topic. Further research on Muslim savings banks and cooperatives could be conducted as well.

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