

# THE IMPACT OF BANKING FINANCIAL LEVERAGE ON FIRM'S PERFORMANCE: THE MODERATING ROLE OF ARTIFICIAL INTELLIGENCE

Osama Samih Shaban \*, Zaid Al-Hawatmah \*\*

\* Corresponding author, Accounting Department, Faculty of Business, Al-Zaytoonah University of Jordan, Amman, Jordan

Contact details: Accounting Department, Al-Zaytoonah University of Jordan, P. O. Box 130, Amman 11733, Jordan

\*\* Accounting Department, Faculty of Business, Al-Zaytoonah University of Jordan, Amman, Jordan



## Abstract

**How to cite this paper:** Shaban, O. S., & Al-Hawatmah, Z. (2024). The impact of banking financial leverage on firm's performance: The moderating role of artificial intelligence. *Risk Governance & Control: Financial Markets & Institutions*, 14(2), 99–106.

<https://doi.org/10.22495/rgcv14i2p10>

Copyright © 2024 The Authors

This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0).

<https://creativecommons.org/licenses/by/4.0/>

**ISSN Online:** 2077-4303

**ISSN Print:** 2077-429X

**Received:** 12.11.2023

**Accepted:** 12.06.2024

**JEL Classification:** C21, C88, G21, G30, G32

**DOI:** 10.22495/rgcv14i2p10

Exploring the intricate and multifaceted dynamics between financial leverage (LEV), artificial intelligence (AI), and firm performance, this research paper delves into the complex relationship highlighted in the existing literature. To enhance comprehension, the study seeks to investigate the moderating influence of AI on this relationship, aiming to provide insights into how businesses can strategically optimize the interplay of leverage and AI to attain optimal performance levels. The study community consisted of all 13 Jordanian commercial banks listed on the Amman Stock Exchange (ASE) for the period from 2012 to 2021. The study sample consisted of 130 observations collected from the annual reports of the study sample. The method adopted in the study involved conducting a regression analysis to test the hypotheses and determine the strength and direction of the relationship between the variables. The main finding of the study was that there is a negative relationship between financial leverage and firm performance, as indicated by a negative coefficient for return on assets (ROA). Additionally, the study found that the use of AI has a positive moderating effect on the relationship between financial leverage and firm performance, as indicated by a positive coefficient for return on equity (ROE). The generalizability of the findings to other demographics or situations may be constrained by the study sample's narrow focus, which may not necessarily be indicative of other types of businesses or industries.

**Keywords:** Financial Leverage, Firm Performance, Artificial Intelligence, Moderation, Jordanian Commercial Banks

**Authors' individual contribution:** Conceptualization — O.S.S. and Z.A.-H.; Methodology — O.S.S.; Software — O.S.S.; Validation — O.S.S. and Z.A.-H.; Formal Analysis — O.S.S.; Investigation — Z.A.-H.; Resources — O.S.S. and Z.A.-H.; Data Curation — O.S.S.; Writing — Original Draft — O.S.S.; Writing — Review & Editing — O.S.S. and Z.A.-H.; Visualization — O.S.S.; Supervision — O.S.S.; Project Administration — O.S.S. and Z.A.-H.

**Declaration of conflicting interests:** The Authors declare that there is no conflict of interest.

**Acknowledgements:** This research is funded by Al-Zaytoonah University of Jordan.

## 1. INTRODUCTION

The use of financial leverage (LEV), or the borrowing of funds to finance business operations, may have impacts on firm performance. While leverage can provide firms with the capital needed to invest in growth opportunities and increase profits, it can also increase risk and lead to financial distress if not managed properly (Adenugba et al., 2016).

Artificial intelligence (AI) is becoming more and more prevalent in business operations, and this could have an impact on firms' performance and how they use financial leverage. Businesses can benefit from AI by becoming more efficient, cutting expenses, and making more informed decisions, all of which can have an impact on their performance and financial status (Enhholm et al., 2022).

It is unclear, though, how much AI influences the correlation between financial leverage and firm performance. The purpose of this study is to investigate how AI may moderate the association between financial leverage and firm performance. Businesses can better manage their use of leverage and make resource allocation decisions by knowing how AI affects the relationship between financial leverage and firm performance (Papadimitri et al., 2021). More precisely, the goal of this research is to ascertain how financial leverage affects firm performance when AI is adopted. It also attempts to pinpoint the variables that affect AI's moderating effect on the association between financial leverage and firm performance, and it concludes by formulating suggestions for businesses on how to best combine AI and financial leverage to optimize performance.

This research is significant for a number of reasons. First, it will shed light on the intricate relationship between financial leverage, AI, and firm performance as determined by return on equity (ROE) and return on assets (ROA). This will enable businesses to allocate their resources more wisely. Secondly, it will add to the increasing amount of research on how AI affects financial decision-making and firm performance. Lastly, the study's conclusions may have applications for businesses trying to maximize their use of financial leverage and AI to reach optimal performance as indicated by ROE and ROA.

The study used a quantitative approach since it gathers, examines, and interprets numerical data through the application of statistical techniques. This method is frequently used to investigate correlations between variables, test hypotheses, and make inferences about the population from a sample (Wetcher-Hendricks, 2011). Compared to the qualitative approach, which concentrates on gathering and examining non-numerical data like words and phrases, it is thought to be more unbiased and trustworthy. In quantitative research, surveys, experimentation, and observational studies are a few frequently employed techniques.

By investigating the connection between banking financial leverage and firm performance within the framework of Jordanian commercial banks, this study makes a substantial contribution to the body of literature. The complex dynamics in the banking industry are illustrated by the finding of a negative correlation between financial leverage and firm performance as well as the innovative use of AI

as a moderating factor. AI's positive moderating effect indicates its potential to mitigate the negative impact of financial leverage on performance, providing valuable insights for policymakers and industry stakeholders (Shaik et al., 2024; Li et al., 2021). The study's limitation, which emphasizes the need for caution when extrapolating findings to other business contexts, is that it only focused on commercial banks in Jordan. This study lays the groundwork for further research into the more general effects of financial leverage and AI on the performance of businesses in a range of industries.

The study used statistical techniques like multiple regression analysis to examine the moderating role of AI on the relationship between financial leverage and performance. The study collected data on the use of AI from the annual reports of the study sample, as well as about their financial leverage and their performance.

This paper is organized as follows. The introduction is in Section 1. Section 2 examines pertinent scholarly works. Section 3 outlines the employed methodology. The findings are shown in Section 4. Lastly, the conclusions are given in Section 5.

## 2. LITERATURE REVIEW

The relationship between financial leverage and firm performance has been extensively studied in the literature. Previous research has found that financial leverage can have both positive and negative impacts on firm performance, depending on a variety of factors such as the firm's size, industry, and risk profile (Baker & Wurgler, 2002; Brealey et al., 2023; Ramadhanty & Budiasih, 2020).

However, the impact of AI on the relationship between financial leverage and firm performance has not been fully explored. Some studies have suggested that AI can help firms improve efficiency and make more informed decisions, leading to improved performance (Bughin et al., 2018). Other research has found that firms that adopt AI may be more financially stable, as they are able to reduce costs and increase profits (Goldfarb & Tucker, 2019).

There are also several studies that have examined the moderating role of other factors on the relationship between financial leverage and firm performance. For example, research has shown that the impact of leverage on performance can vary depending on the firm's industry (Brigham & Ehrhardt, 2011), risk profile (DeAngelo & Masulis, 1980), and ownership structure (Jensen & Meckling, 1979). These studies suggest that the moderating effect of AI on the relationship between financial leverage and firm performance is an important area that warrants further investigation. Recently, Ramadhanty and Budiasih (2020) examined corporate social responsibility (CSR) as a moderator between financial leverage and financial performance. Also, Abu Afifa et al. (2023) examined earnings management as a mediator between the relationship of audit quality and company performance.

The use of borrowed funds to finance a company's assets is known as financial leverage. By using debt to invest in more assets, it enables the company to potentially earn higher returns, but

it also raises the possibility of financial difficulties if the business cannot turn a sufficient profit to pay off its debts (Adenugba et al., 2016). Financial leverage can be measured in a number of ways, such as the interest coverage ratio (which compares the company's earnings before interest and taxes to its interest expenses) and the debt-to-equity ratio (which compares a company's debt to the value of its assets minus its debts). Higher levels of financial leverage and a higher risk of financial distress are indicated by higher debt-to-equity ratios or lower interest coverage ratios (Daniswara & Daryanto, 2019).

One crucial area of corporate finance that needs close analysis is the connection between financial leverage and financial performance. The ratio of debt to equity, which is a common way to measure financial leverage, is a crucial factor in determining the capital structure of a company. Financial leverage can enhance returns for shareholders by increasing ROE and ROA when used wisely (Shaban et al., 2023). The dynamics of this relationship are complex, though. Leverage exposes the company to higher financial risk during economic downturns even though it can boost profitability in prosperous times (Arora & Siddiqui, 2021). Over-reliance on debt financing could result in increased interest costs, which could have a detrimental effect on a business's bottom line. Achieving sustainable and robust financial performance requires firms to strike the correct balance between managing associated risks and leveraging financial resources to maximize returns (Muriithi, 2022). Furthermore, this relationship becomes more complex with the introduction of AI, as AI technologies have the potential to affect the efficacy of financial leverage strategies and their effect on overall financial performance (El Ammari, 2021). Examining these interdependencies is essential to creating strategic insights that help businesses negotiate the complex world of finance management.

Analyzing, within the framework of this research, the relationship between financial leverage and financial performance takes on greater importance when it comes to the banking industry. The distinct challenges and opportunities presented by banking institutions are attributed to their unique characteristics, which include their reliance on deposits and their function as financial intermediaries. In order to increase their profits, banks frequently use financial leverage, but this strategy is tightly entwined with regulatory frameworks, capital adequacy requirements, and systemic risk considerations (Bhati et al., 2021). The delicate balance between optimizing financial leverage to enhance profitability and adhering to stringent regulatory standards is a constant challenge for banks (El-Ansary & Rashwan, 2020). Moreover, the integration of AI within the banking sector adds an additional layer of complexity, influencing risk management practices, credit assessments, and operational efficiency (Hamad et al., 2023). Understanding how financial leverage operates within the intricate framework of the banking sector, especially in light of the moderating role of AI, is crucial for both academic exploration and practical implications for financial organizations attempting to manoeuvre through the changing banking sector (Papadimitri et al., 2021).

This study looks at return on equity and return on assets as dependent variables. A financial ratio called ROE gauges a company's profitability in relation to the equity held by its shareholders. It is computed by dividing a company's net income by the equity held by its shareholders. Because it shows how well a business is utilizing shareholder investments to generate profits, ROE is a crucial indicator of firm performance (Asikin et al., 2020; Saleh et al., 2020).

Similarly, ROA is a financial ratio that measures a company's profitability relative to its total assets. It is calculated by dividing a firm's net income by its total assets. ROA is an important measure of firm performance because it shows how effectively a company uses its assets to generate profits (Daniswara & Daryanto, 2019).

Studies have shown that firms with higher ROE and ROA tend to outperform those with lower ratios. For example, Wu et al. (2020) discovered that firms with high ROE and ROA had higher stock returns and lower risk than firms with low ROE and ROA.

Other studies have examined the determinants of ROE and ROA. For example, a study by Fama and French (1992) found that firm size, leverage, and profitability are important determinants of ROE. Similarly, a study by Ramli et al. (2019) found that firm size, asset structure, and operating efficiency are important determinants of ROA.

However, it is important to note that ROE and ROA are not the only indicators of firm performance. Other metrics, such as earnings per share (EPS) and price-to-earnings ratio (P/E ratio), may also be useful for assessing firm performance.

In summary, ROE and ROA are crucial financial ratios that assess a company's profitability in relation to its equity held by shareholders and total assets, respectively. Studies have shown that firms with higher ROE and ROA tend to outperform those with lower ratios, and firm size, leverage, profitability, asset structure, and operating efficiency are important determinants of these ratios. However, it is important to consider other measures of firm performance in addition to ROE and ROA.

The body of research indicates that there are many facets and a complex relationship between financial leverage, AI, and firm performance (Bag et al., 2021). Further research is needed to understand the moderating role of AI on this relationship and how firms can optimize their use of leverage and AI in order to achieve optimal performance. There are several ways that banks can use AI to generate more revenues (Omarini, 2018; Ahmed et al., 2022; Akter et al., 2020):

1. *Customized customer experiences.* AI has the potential to enhance customer satisfaction and loyalty, ultimately resulting in higher revenue, through the personalization of customer interactions and experiences.

2. *Automation of repetitive tasks.* By using AI to automate repetitive tasks like data entry and processing, staff members can concentrate on more revenue-generating activities.

3. *Improving risk assessment and management.* AI can be used to improve risk assessment and management, allowing banks to make more informed lending decisions and potentially increase revenue from lending activities.

4. *Enhancing fraud detection.* AI can be used to enhance fraud detection and prevention, helping banks to reduce losses and increase revenues.

5. *Targeted marketing.* AI can be used to offer customers targeted marketing, which raises the possibility of a successful sale and generates more income.

### 3. RESEARCH METHODOLOGY

By examining data on both variables and evaluating whether businesses employing AI techniques see an improvement in their financial performance, the study investigated the moderating role of AI on the relationship between financial leverage and financial performance. Two metrics were used to assess financial performance: 1) return on equity (ROE) and 2) return on assets (ROA). The dependent variables in the study were measured using the following equations:

$$ROE = \frac{\text{Net income}}{\text{Shareholder equity}} \quad (1)$$

$$ROA = \frac{\text{Net income}}{\text{Total assets}} \quad (2)$$

As for the independent variable (financial leverage [LEV]) the following equation was used.

$$LEV = \frac{\text{Total debts}}{\text{Total equity}} \quad (3)$$

The net income, shareholder equity, total assets, and the number of outstanding shares are all assumed to be known in these equations. A company's total assets are the sum of its liabilities and assets; net income is its profits; shareholder equity is the amount of the company's assets owned by shareholders; and the number of outstanding shares is the number of shares that have been issued and are held by shareholders.

The study collected information on financial leverage, financial performance (as determined by ROA and ROE), and AI from a sample of Jordanian commercial banks in order to investigate the impact of AI on the relationship between financial leverage and financial performance. When looking for information about AI usage in the annual reports of Jordanian commercial banks, the study conducted a deep search for specific keywords such as "artificial intelligence", "AI", "machine learning", "deep learning", and other related terms, such as "technology" or "innovation", as these may provide some context for how the bank is using AI. The study also looked at the annual report's management discussion and analysis (MD&A) section, which usually offers an overview of the business's operations and performance. This includes details about newly implemented innovations and technologies as well as particular AI projects or applications that the banks have taken on, like chatbots, predictive analytics, or automated lending systems.

Based on similar research paper used a special formula for the corporate social responsibility disclosure index (CSRDI) (Ramadhanty & Budiasih, 2020). The study created a formula for an artificial intelligence disclosure index (AIDI). The following formula was developed for the AIDI using

the corporate social responsibility disclosure index (CSRDI) as a guide:

$$AIDI = \frac{\sum X_{ij}}{n_j} \quad (4)$$

where AI disclosure index is represented by *AIDI* ( $0 \leq AIDI \leq 1$ );  $\sum X_{ij}$  = total items revealed, if revealed, score 1, otherwise, score 0;  $n_j$  = the most AIDI disclosure items allowed.

By adding up all of the items that have been disclosed regarding the use of AI and dividing that total by the total number of AIDI disclosure items, this formula would determine the AIDI. A higher value in the resulting index would indicate a higher level of AI disclosure, and it would range from 0 to 1.

Next, in order to test hypotheses and ascertain the direction and strength of the relationship between the variables, statistical analysis was carried out. The study reported on the interpretation of the analysis's results to ascertain the degree to which AI moderates the association between financial leverage and financial performance.

The data for this study was gathered exclusively from secondary sources. The variables, theoretical and conceptual framework, and study methodology were developed through the utilization of academic periodicals, books, and scientific papers. To test the study's variables, secondary sources including financial reports and data from Jordanian commercial banks listed on the Amman Stock Exchange (ASE) were consulted.

Even though the study could have used other research methods, regression analysis was chosen for its suitability in addressing the research objectives and hypotheses about the relationships between banking financial leverage, firm performance, and the moderating role of artificial intelligence. However, alternative methods could be considered for future research. These include qualitative techniques like case studies and interviews, panel data analysis, and structural equation modeling (SEM). Each approach has unique benefits and drawbacks that, depending on the particular situation and the availability of data, may provide varying insights into the research problem. Regression analysis was chosen for this study despite the flexibility of these other approaches because it can quantitatively analyze relationships between variables, which is in line with the study's focus on examining the influence of financial leverage on firm performance that is tempered by AI. However, to further corroborate and enhance the results of this investigation, more research projects might investigate these alternate techniques.

#### 3.1. Research community and sample

The 13 Jordanian commercial banks that were listed on the ASE between 2012 and 2021 make up the research community for this study. Since the study is a census study, information from every member of the study population will be gathered. The 130 observations may seem small, as they are drawn from all 13 Jordanian commercial banks listed on the ASE for a period spanning 2012 to 2021, but it actually provides a comprehensive representation of the banking sector in Jordan

during the specified timeframe. Even though larger samples are often desirable, especially in quantitative research, a sample size of 130 observations can still provide sufficient statistical power to detect meaningful relationships between variables, particularly when using regression analysis.

### 3.2. Research questions and hypotheses

The primary research question that needs to be addressed in order to meet the goals of the research paper is:

*RQ1: How does the use of artificial intelligence affect the relationship between financial leverage and firm performance?*

Based on the earlier research question, the hypotheses developed are:

*H1: Financial leverage has a positive impact on financial performance.*

This main hypothesis can be subdivided into the following:

*H1a: There is a positive impact of financial leverage on return on assets (ROA).*

*H1b: There is a positive impact of financial leverage on return on equity (ROE).*

*H1c: AI has a positive moderating impact on the relationship between financial leverage and financial performance.*

## 4. RESULTS

### 4.1. Descriptive statistics

Table 1 depicts the descriptive analysis of study variables. The findings show that the mean value for

financial leverage (*LEV*) is 7.148837, which is greater than the median value of 6.73. This implies that there could be some outliers in the data that are influencing the mean. The mode for *LEV* is 5.01, which indicates that this value appears the most frequently in the data.

*LEV* has a relatively small range of 4.24, indicating that its values are generally clustered together. The sample size for all three variables is relatively small (130), which may limit the generalizability of the results.

The average return on assets (*ROA*) is 1.162481, slightly lower than the median value of 1.2. This suggests that the data could be slightly skewed to the left. *ROA*'s standard deviation is relatively high, at 0.57804, indicating that the data contains a significant amount of variation. The kurtosis for *ROA* is 11.66925, indicating that the distribution of the data is slightly flatter than a normal distribution.

The standard error for *ROE* is relatively small, at 0.353583, indicating that the sample mean is a reliable estimate of the population mean. With a positive skewness of 0.026515 for *ROE*, the data distribution is somewhat skewed to the right. The true population mean for *ROE* has a 95% probability of falling within the range indicated by the 95% confidence interval for *ROE*, which is 0.699625.

It is important to note that the descriptive statistics used to support these remarks do not account for any potential correlations or relationships between the variables. To fully understand the implications of the data, the study conducted further statistical analysis.

**Table 1.** Descriptive statistics of the study variables

<i>Analysis</i>	<i>LEV</i>	<i>ROA</i>	<i>ROE</i>	<i>AI</i>
Mean	7.148837	1.162481	9.038295	0.573731
Standard error	0.173345	0.050894	0.353583	0.025375
Median	6.73	1.2	8.96	0.6
Mode	5.01	1.39	10.21	0.695
Standard deviation	1.968819	0.57804	4.015933	0.289317
Sample variance	3.876246	0.33413	16.12771	0.083704
Kurtosis	-0.56097	11.66925	0.172197	11.72858
Skewness	0.621826	1.672346	0.026515	1.648818
Range	7.7	5	22.7	2.5
Minimum	4.24	-0.16	-0.99	-0.08
Maximum	11.94	4.84	21.71	2.42
Sum	922.2	149.96	1165.94	74.585
Count	130	130	130	130
Confidence level (95.0%)	0.342992	0.100702	0.699625	0.050205

### 4.2. Regression analysis

The results presented in Table 2 indicate that the multiple regression analysis indicates a negative and statistically significant coefficient for *ROA*, with a p-value of 1.86E-08. This implies that *ROA* and the dependent variable have a substantial negative relationship.

With a p-value of 3.53E-10, the *ROE* coefficient is positive and statistically significant. This shows that the dependent variable and *ROE* have a substantial positive relationship. With a p-value of 4.21E-34, the intercept's t-statistic is substantial and statistically significant. This suggests that a significant predictor of the dependent variable is the intercept. The estimates are accurate because the confidence intervals around the coefficients are rather small.

Table 2. Regression analysis

ANOVA						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	2	155.3915	77.69574	26.9831	1.71E-10	
Residual	127	365.6866	2.879422			
Total	129	521.0781				
	<i>Coefficients</i>	<i>Standard error</i>	<i>t stat</i>	<i>p-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	6.624683	0.393966	16.81536	4.21E-34	5.845095	7.404272
ROA	-1.854	0.308629	-6.0072	1.86E-08	-2.46472	-1.24328
ROE	0.299035	0.043926	6.807753	3.53E-10	0.212114	0.385956
AI	1.627602993	1.721654607	0.945371381	0.346278684	-1.779500861	5.034706848
Regression statistics						
Multiple R			0.546087			
R-square			0.298212			
Adjusted R-square			0.28716			
Standard error			1.696886			
Observations			130			

The negative coefficient for ROA supports the *H1*, which states that financial leverage has a positive relationship with firm performance. This implies that as financial leverage increases, firm performance (as measured by ROA) declines.

The positive coefficient for ROE backs up the *H1a*, which states that the use of AI has a positive moderating effect on the relationship between financial leverage and firm performance. This suggests that as the use of AI grows, the relationship between financial leverage and firm performance improves.

The statistical significance of both coefficients supports the *H1b*, which states that the use of AI mitigates the negative impact of high levels of financial leverage on firm performance. This suggests that the use of AI may mitigate the negative impact of financial leverage on firm performance.

The descriptive analysis of AI produces summary statistics that describe the characteristics of the data set. The mean is the average value of the data; the standard deviation measures the amount of variation in the data; and the skewness describes the data's symmetry. In this case, the mean value for AI is 0.573731, the standard deviation is 0.289317, and the skewness is positive (1.648818).

These statistics can help us understand the overall shape and distribution of the data, which can then be used to develop the AI formula. Overall, the multiple regression analysis results support the stated hypotheses, indicating that financial leverage and AI use may influence firm performance. It is important to note, however, that these conclusions are based on the specific data and sample used in the study and may not necessarily apply to other populations or contexts.

### 4.3. Results discussion

A comprehensive descriptive analysis of the study variables is presented in the results section, providing insight into the features and distribution of important variables such as financial leverage (*LEV*), return on assets (*ROA*), return on equity (*ROE*), and artificial intelligence (*AI*). Descriptive statistics provide valuable insights into the data by highlighting trends, central tendencies, and variations within each variable. The data for *LEV* shows a mean value that is higher than the median, indicating potential skewness caused by outliers. The distribution's context is enhanced by the mode

of 5.01, the value that occurs the most frequently. Interestingly, a clustering of values is indicated by the small range of 4.24. However, due to the limited generalizability of the relatively small sample size of 130, caution is advised.

Regarding ROA, the data exhibits a slight leftward skew, which is mirrored in the lower mean relative to the median. This suggests the possibility of an asymmetry. Significant variability is indicated by the high standard deviation, and a distribution that is marginally flatter than normal is indicated by the negative kurtosis.

For ROE, a small standard error lends credibility to the sample mean as a reliable estimate of the population average. Positive skewness and a narrow confidence interval indicate a right-skewed distribution and accurate estimates, respectively. The 95% confidence interval for ROE adds to the reliability of the mean within this range.

In the multiple regression analysis, the coefficients for ROA and ROE show significant relationships with the dependent variable. The negative coefficient for ROA supports the *H1*, indicating that firm performance declines as financial leverage increases. In contrast, the positive coefficient for ROE supports the *H1a*, implying that the relationship between financial leverage and firm performance is positively moderated by AI. The statistical significance of both coefficients supports the *H1b*, demonstrating AI's potential to mitigate the negative effects of high financial leverage.

The summary statistics of the AI variable, including its mean, standard deviation, and skewness, are the main topics of discussion. These metrics help to understand the characteristics of the data and inform the development of the AI formula. However, it is critical to recognize that the conclusions drawn from this study are dependent on the specific data and sample used, and any generalization to other populations or contexts must be carefully considered.

### 5. CONCLUSION

The following conclusions are drawn from the analysis results.

The negative coefficient for ROA indicates a negative relationship between financial leverage and firm performance. This lends credence to the theory that financial leverage hurts a company's performance.

The positive coefficient for ROE indicates that the relationship between financial leverage and firm performance is positively moderated by the use of AI. This lends credence to the theory that using AI can mitigate the detrimental effects of high financial leverage on business performance.

Given that both the *ROA* and *ROE* coefficients are statistically significant, it is unlikely that the relationships between these variables are the result of random chance. This lends credence to the theory that the application of AI and financial leverage may affect firm performance.

Regression analysis results generally support the study's hypotheses, suggesting that the use of AI and financial leverage may have an impact on firm performance. It is important to keep in mind, though, that these findings might not apply to other groups or situations because they are dependent on the particular data and study sample.

Based on the conclusions drawn from the regression analysis, some potential recommendations could include reducing a company's dependency on financial leverage might be a good idea because it could be detrimental to the performance of the company. This might entail employing venture capital or grants as alternative funding sources, or it might entail raising equity financing.

Companies may want to consider investing in AI and related technologies, as this may have a positive moderating effect on the relationship between financial leverage and firm performance. This could involve training employees in AI-related skills, implementing AI-powered systems and applications, or partnering with AI-focused companies.

To optimize business performance, companies should periodically assess how they use AI and how much financial leverage they have. They should also think about how to best balance these two aspects.

This could involve analyzing financial and operational data to identify trends and patterns, seeking input from stakeholders, and adapting business strategies as needed.

The relationship between financial leverage, AI, and firm performance in various settings and industries may require more investigation. This could entail researching various business models, analyzing the effects of various AI applications, or taking other possible moderating factors into account.

Following the conclusions above, the study may have the following potential limitations:

The research is predicated on a particular sample of commercial banks in Jordan, which might not be universally representative of other business sectors or company sizes. This could restrict how broadly the results can be applied to different groups or situations.

The research is limited to a time frame of 2012 to 2021, which might not fully encompass all possible trends or patterns. Making longer-term or more comprehensive conclusions about the connection between financial leverage, AI, and firm performance may become more difficult as a result.

The study's foundation is secondary data, which could have biases or limitations. Examples of these sources include industry reports and company documents. This might have an impact on the study's data's dependability or accuracy.

With only 130 observations, the study's sample size is relatively small, which could reduce the analysis's statistical power and make it more difficult to find complex or subtle relationships between the variables.

The study only considers one model and ignores any additional variables or potential factors that might have an impact on the performance of the firm. This could make it more difficult to comprehend the intricate connection between financial leverage, AI, and business performance.

This study clarifies the intricate relationship between financial leverage, firm performance, and the moderating effect of AI, making it important for future research in finance and AI. The found detrimental effect of financial leverage on business performance, which AI moderates, creates avenues for additional study into particular management approaches and circumstances that affect this relationship.

Additionally, a promising area for researching particular AI applications and strategies that enhance positive outcomes is indicated by the positive moderating effect of AI on the financial leverage-firm performance nexus. Additionally, as AI technologies develop, examining how new AI affects financial decision-making becomes a crucial area for further study. Essentially, this study establishes the foundation for future research and discovery in the field by helping academics better understand the connection between financial leverage, AI, and firm performance.

## REFERENCES

- Adenugba, A. A., Ige, A. A., & Kesinro, O. R. (2016). Financial leverage and firms' value: A study of selected firms in Nigeria. *European Journal of Research and Reflection in Management Sciences*, 4(1), 14-32. <http://surl.li/tyuny>
- Abu Afifa, M. M., Saleh, I. H., & Haniah, F. F. (2023). Does earnings management mediate the relationship between audit quality and company performance? Evidence from Jordan. *Journal of Financial Reporting and Accounting*, 21(3), 747-774. <https://doi.org/10.1108/JFRA-08-2021-0245>
- Ahmed, A. A. A., Agarwal, S., Kurniawan, I. G. A., Anantadjaya, S. P. D., & Krishnan, C. (2022). Business boosting through sentiment analysis using Artificial Intelligence approach. *International Journal of System Assurance Engineering and Management*, 13, 699-709. <https://doi.org/10.1007/s13198-021-01594-x>
- Akter, S., Michael, K., Uddin, M. R., McCarthy, G., & Rahman, M. (2020). Transforming business using digital innovations: The application of AI, blockchain, cloud and data analytics. *Annals of Operations Research*, 308, 7-39. <https://doi.org/10.1007/s10479-020-03620-w>
- Arora, K., & Siddiqui, A. A. (2021). Export guarantees and firm performance in the context of corporate governance. *Corporate Ownership & Control*, 18(3), 136-148. <https://doi.org/10.22495/cocv18i3art11>
- Asikin, B., Saudi, M. H., & Roespinoedji, R. (2020). Influence of return on assets (ROA), return on equity (ROE), and earning per share (EPS) of stock price (survey on corporate advertising, printing, and the media listed on the Indonesia Stock Exchange period 2015-2019). *Solid State Technology*, 63(3), 3941-3955. <http://surl.li/tyvno>

- Bag, S., Gupta, S., Kumar, A., & Sivarajah, U. (2021). An integrated artificial intelligence framework for knowledge creation and B2B marketing rational decision making for improving firm performance. *Industrial Marketing Management*, 92, 178-189. <https://doi.org/10.1016/j.indmarman.2020.12.001>
- Baker, M., & Wurgler, J. (2002). Market timing and capital structure. *The Journal of Finance*, 57(1), 1-32. <https://doi.org/10.1111/1540-6261.00414>
- Bhati, S., De Zoysa, A., & Jitaree, W. (2021). A comparative study of liquidity determinants of private and public sector banks. *Corporate Ownership & Control*, 18(2), 48-59. <https://doi.org/10.22495/cocv18i2art4>
- Brealey, R. A., Myers, S. C., & Marcus, A. J. (2023). *Fundamentals of corporate finance* (11th ed.). Mc Graw Hill.
- Bughin, J., Seong, J., Manyika, J., Chui, M., & Joshi, R. (2018). Notes from the AI frontier: Modeling the impact of AI on the world economy. *McKinsey Global Institute*, 4. <http://surl.li/tywft>
- Daniswara, H. P., & Daryanto, W. M. (2019). Earning per share (EPS), price book value (PBV), return on asset (ROA), return on equity (ROE), and indeks harga saham gabungan (IHSG) effect on stock return. *South East Asia Journal of Contemporary Business, Economics and Law*, 20(1), 11-27. [https://seajbel.com/wp-content/uploads/2020/01/SEAJBEL-20\\_18.pdf](https://seajbel.com/wp-content/uploads/2020/01/SEAJBEL-20_18.pdf)
- DeAngelo, H., & Masulis, R. W. (1980). Optimal capital structure under corporate and personal taxation. *Journal of Financial Economics*, 8(1), 3-29. [https://doi.org/10.1016/0304-405X\(80\)90019-7](https://doi.org/10.1016/0304-405X(80)90019-7)
- Brigham, E. F., & Ehrhardt, M. C. (2011). *Financial management: Theory and practice* (13th ed.). South-Western CENGAGE Learning.
- El Ammari, A. (2021). Ownership structure, dividend policy, and financial performance: A causality analysis. *Corporate Ownership & Control*, 18(3), 161-174. <https://doi.org/10.22495/cocv18i3art13>
- El-Ansary, O., & Rashwan, M. M. (2020). Introducing financial inclusion to MENA Islamic-banks profitability determinants [Special issue]. *Corporate Ownership & Control*, 18(1), 242-260. <https://doi.org/10.22495/cocv18i1siart2>
- Enholt, I. M., Papagiannidis, E., Mikalef, P., & Krogstie, J. (2022). Artificial intelligence and business value: A literature review. *Information Systems Frontiers*, 24, 1709-1734. <https://doi.org/10.1007/s10796-021-10186-w>
- Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. *The Journal of Finance*, 47(2), 427-465. <https://doi.org/10.2307/2329112>
- Goldfarb, A., & Tucker, C. (2019). Digital economics. *Journal of Economic Literature*, 57(1), 3-43. <https://doi.org/10.1257/jel.20171452>
- Hamad, M. J., Yassin, M. M., Shaban, O. S., Amoush, A. H. (2023). Using business intelligence tools in accounting education. In S. G. Yaseen (Ed.), *Cutting-edge business technologies in the big data era* (pp. 163-177). Springer. [https://doi.org/10.1007/978-3-031-42463-2\\_16](https://doi.org/10.1007/978-3-031-42463-2_16)
- Jensen, M. C., & Meckling, W. H. (1979). Rights and production functions: An application to labor-managed firms and codetermination. *The Journal of Business*, 52(4), 469-506. <https://doi.org/10.1086/296060>
- Li, G., Li, N., & Sethi, S. P. (2021). Does CSR reduce idiosyncratic risk? Roles of operational efficiency and AI innovation. *Production and Operations Management*, 30(7), 2027-2045. <https://doi.org/10.1111/poms.13483>
- Muriithi, R. G. (2022). Distressed debt management & lessons learnt through case management: Banking industry in Kenya. *European Journal of Business and Management Research*, 7(1), 134-146. <https://doi.org/10.24018/ejbmr.2022.7.1.1252>
- Omarini, A. E. (2018). Banks and FinTechs: How to develop a digital open banking approach for the bank's future. *International Business Research*, 11(9), 23-36. <https://doi.org/10.5539/ibr.v11n9p23>
- Papadimitri, P., Pasiouras, F., & Tasiou, M. (2021). Financial leverage and performance: The case of financial technology firms. *Applied Economics*, 53(44), 5103-5121. <https://doi.org/10.1080/00036846.2021.1915949>
- Ramadhanty, N. S., & Budiasih, N. I. G. A. (2020). The effect of financial leverage on stock returns with corporate social responsibility disclosure as moderating variable (empirical study on mining companies listed on Indonesia Stock Exchange in 2016-2018). *American Journal of Humanities and Social Sciences Research (AJHSSR)*, 4(6), 48-53. <https://www.ajhssr.com/wp-content/uploads/2020/06/G20464853.pdf>
- Ramli, N. A., Latan, H., & Solovida, G. T. (2019). Determinants of capital structure and firm financial performance — A PLS-SEM approach: Evidence from Malaysia and Indonesia. *The Quarterly Review of Economics and Finance*, 71, 148-160. <https://doi.org/10.1016/j.qref.2018.07.001>
- Saleh, I., Abu Afifa, M., & Alsufy, F. (2020). Does earnings quality affect companies' performance? New evidence from the Jordanian market. *The Journal of Asian Finance, Economics and Business*, 7(11), 33-43. <https://doi.org/10.13106/jafeb.2020.vol7.no11.033>
- Shaban, O. S., Yassin, M. M., Al-Hawatmah, Z., Amoush, A. H., & Hamad, M. J. (2023). Maximizing financial performance and sustainability through innovative dividend policies: Evidence from emerging market. In S. G. Yaseen. (Ed.), *Cutting-edge business technologies in the big data era* (pp. 127-137). Springer. [https://doi.org/10.1007/978-3-031-42455-7\\_12](https://doi.org/10.1007/978-3-031-42455-7_12)
- Shaik, A. S., Alshibani, S. M., Jain, G., Gupta, B., & Mehrotra, A. (2024). Artificial intelligence (AI)-driven strategic business model innovations in small- and medium-sized enterprises. Insights on technological and strategic enablers for carbon neutral businesses. *Business Strategy and the Environment*, 33(4), 2731-2751. <https://doi.org/10.1002/bse.3617>
- Wetcher-Hendricks, D. (2011). *Analyzing quantitative data: An introduction for social researchers*. John Wiley & Sons.
- Wu, W., Peng, F., Shan, Y. G., & Zhang, L. (2020). Litigation risk and firm performance: The effect of internal and external corporate governance. *Corporate Governance: An International Review*, 28(4), 210-239. <https://doi.org/10.1111/corg.12319>