THE IMPACT OF DEBT RATIO ON FINANCIAL STABILITY THROUGH THE MEDIATING ROLE OF CAPITAL ADEQUACY: EVIDENCE FROM THE REGULATORY FRAMEWORK OF THE BANKING INDUSTRY

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Abstract

The main objective of this study is to examine the impact of debt ratios on financial stability through the mediating role of capital adequacy (CA) in Jordanian commercial banks from 2012 to 2022. This study employs a quantitative approach and utilizes Statistical Package for the Social Sciences (SPSS) and Analysis of Moment Structures (AMOS) v. 26 software to conduct a path analysis test within structural equation modeling (SEM) analysis for testing the study hypotheses and validating the model. The study finds that the debt ratio negatively affects financial stability, as supported by Shahriar et al. (2023) and Nazir et al. (2021). Moreover, capital adequacy negatively affects financial stability, as demonstrated by Usman et al. (2019) and Thoa and Anh (2017). Although capital adequacy positively affects financial stability as evidenced by Sang (2021). However, the debt ratio negatively affects financial stability through capital adequacy as an intermediary variable. The analysis did not explicitly consider external factors, such as economic conditions or regulatory frameworks, indicating the necessity for further validation and expansion of the findings. For future research, it is recommended to utilize qualitative methods or conduct case studies to delve deeper into the nuances of the topic.

Keywords: Capital Adequacy, Commercial Banks, Debt Ratio, Financial Stability

Authors' individual contribution: The Author is responsible for all the contributions to the paper according to CRediT (Contributor Roles Taxonomy) standards.

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1. INTRODUCTION

Financial stability is essential for the banking sector, as it not only helps banks absorb adverse shocks but also ensures long-term sustainability and fosters trust in the financial system (Al-Homaidi et al., 2018). With financial stability, banks can fulfill their role as intermediaries between surplus and deficit units, disrupting the movement of funds between various parties (Irfan et al., 2019).

Given the competitive environment and high risks in the banking sector, focusing on financial stability has become crucial, especially in the aftermath of significant global events such as

the global financial crisis of 2008 and the economic disruptions caused by the coronavirus pandemic (Shabir et al., 2023).

Following the global financial crisis, there was a concerted effort within the global financial system to increase its capital adequacy ratio by implementing stricter regulatory requirements and guidelines, aiming for a more sustainable financial system (Yakubu & Bunyaminu, 2021). Hence, the requirements for achieving capital adequacy are continually evolving to address challenges like economic uncertainties, regulatory reforms, and market fluctuations, which introduce risks to the financial sector. Moreover, an increase in capital adequacy requirements can elevate the cost of capital for banks, leading to higher borrowing costs for customers, as well as affecting the overall financial operations (Nguyen, 2020).

The financial stability index, ranging from zero to one, signifies the stability of a financial system, with a value closer to one indicating a more robust and stable system. Based on the Jordanian Central Bank's published annual reports on the financial stability rates of commercial banks from 2012 to 2022, the rates fluctuated as follows: 2012 — 0.36, 2015 — 0.57, 2018 — 0.46, 2019 — 0.55, 2020 — 0.44, and 2021 — 0.47. Accordingly, we noted fluctuations in financial stability indicators in Jordanian commercial banks for 2012–2021; therefore, it was necessary to study the factors that led to this fluctuation (Central Bank of Jordan, 2022).

Although previous research has investigated factors influencing financial stability in banks, there is a significant research gap at the local level concerning the specific relationship and interactions among debt ratio, capital adequacy, and financial stability in Jordanian commercial banks. The primary objective of this study is to bridge the research gap by conducting a comprehensive analysis of how the debt ratio influences financial stability through the intermediary variable of capital adequacy and to gain insights into the dynamics of the relationship among these factors. In addition to advancing the existing knowledge on this topic, this study provides valuable insights for policymakers and practitioners in the banking sector in Jordan, facilitating informed decision-making and strategic planning.

The primary goal of this study is to analyze and understand the intricate relationship between debt ratio, capital adequacy, and financial stability in Jordanian commercial banks over the period 2012–2022. The research questions that this study aims to answer are as follows:

RQ1: What is the impact of the debt ratio on financial stability?

RQ2: How does the debt ratio impact capital adequacy?

RQ3: What is the relationship between capital adequacy and financial stability?

RQ4: How does the debt ratio impact financial stability through the intermediary variable of capital adequacy?

The remainder of this paper is organized as follows. Section 2 begins with a review of the relevant literature and the development of study hypotheses. Section 3 outlines the study methodology, including the study model, population, sample, and data collection methods. Section 4 details the statistical analysis and study results. Section 5 delves into the discussion of the results, and Section 6 offers the conclusion, limitations, and recommendations.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. Debt ratio

One financial metric used to assess a company's reliance on debt financing is the debt ratio, which is the ratio of total debt to total assets. This measure provides information about a company's financing tactics and the size of its loan commitments. A high debt ratio could be a sign of unstable finances, including difficulties paying debts off and increased default risks. On the other hand, a low percentage can indicate restricted debt financing options or cautious financial management, which could result in missing growth prospects or excessive dependence on equity financing (Savina, 2020). To preserve a healthy balance between their assets and liabilities and guarantee long-term financial stability and sustainability, banks, in their capacity as financial intermediaries, must efficiently manage their debt levels (Shahriar et al., 2023).

Estimating the maximum level of debt an enterprise can handle is a complex issue because it is associated with such difficulties as determining the costs of bankruptcy, determining the shape of the function of these costs in relation to financial leverage, and indicating the probability of bankruptcy (Rudnicki, 2017).

According to Chou et al. (2023), there is a need for alternative measures to evaluate financial stability, as the debt ratio is not a dependable predictor for forecasting financial trouble in companies. Relying solely on the debt ratio to assess a company's stability and performance may not be sufficient because this measure overlooks crucial factors such as the company's asset quality and ability to repay debt. In order to shield unsecured creditors from unfavorable cash flows and asset value shocks, enterprises with higher asset values move to the secured debt market, while those with lower asset values raise their loan capacity (Giambona et al., 2016).

According to Arini et al. (2021), there is a counterintuitive positive correlation between the debt-to-assets ratio and financial distress. This relationship can be explained by the complex interplay between financial risk, asset quality, and leverage, whereby lower asset quality and higher leverage can increase financial risk and cause distress. According to their research, the most important financial statistic for determining financial difficulty is the total debt-to-assets ratio. A strong positive correlation between financial hardship and the debt-to-assets ratio was shown by Sembiring (2020), highlighting the link between increased leverage and increased financial vulnerability. In contrast, Gunawan and Putra's (2021) analysis revealed no statistically significant association between financial difficulty and debt-to-assets.

The effect of the debt ratio on financial stability varies greatly according to the kind of business, industry, and stage of development in which it operates. While businesses with erratic cash

flows should aim for a low debt ratio, those with consistent cash flows can sustain a high debt ratio without jeopardizing stability because debt provides businesses with the necessary funds for expansion and investment, which can greatly improve financial stability. This is especially advantageous for newly created and growing businesses. Furthermore, a high debt ratio might result in a lower credit rating, raising borrowing prices, and raising the possibility of insolvency and financial difficulties (Al-Shubiri, 2012).

Short-term debt has a significant positive impact on both return on equity (ROE) and return on assets (ROA) in Vietnamese non-financial listed joint-stock firms. Shahriar et al. (2023) found that the financial leverage ratio had a negative correlation with financial stability in the commercial banking industry across 12 East Asian nations. Nazir et al. (2021) found that long-term debt increases interest costs, while short-term debt hinders liquidity management, negatively impacting company performance and financial stability for 30 Pakistani firms on the Pakistan Stock Exchange (PSX).

Habib et al. (2016) found that total debt had a negative impact on the profitability of non-financial enterprises in Pakistan. Khanan et al. (2014) discovered that short-term debt negatively impacts the ROA but positively impacts the ROE in 49 feeder firms listed on the PSX. Maniagi et al. (2013) in their examination of 30 firms listed on the Nairobi Stock Exchange, discovered that the total debt-to-asset ratio had a negative relationship with ROA but a positive relationship with ROE. Roanne (2013) found that the short-term debt-to-total assets ratio negatively affected both ROE and ROA. Akinlo and Asaolu (2012) discovered that short-term debt has a higher impact than long-term debt in increasing a company's risk of insolvency and financial difficulty due to its higher interest rates and urgent repayment requirements. Khan (2012) discovered that long-term debt positively affected financial performance, whereas short-term debt had a negative impact on the performance of 36 engineering enterprises in Pakistan.

Usman et al. (2019) found that debt — especially high amounts of non-performing loans — had a detrimental effect on the capital adequacy ratio because it made it harder for the bank to use its capital to cover potential losses. The study examined 27 traditional banks that were listed on the Indonesia Stock Exchange (IDX) between 2007 and 2018. In a similar vein, Thoa and Anh's (2017) analysis of Vietnamese banks from 2011 to 2015 revealed a negative relationship between the loan-assets ratio and the capital adequacy ratio. Furthermore, in their analysis of the factors influencing capital adequacy in India's private banking sector between 2008 and 2012, Aspal and Nazneen (2014) also discovered a detrimental effect of loans on capital adequacy. Furthermore, Dreca (2014) discovered that during his six-year investigation into the factors influencing capital adequacy for 10 Bosnian banks, the loans-assets ratio had a negative effect on the capital adequacy ratio. Additionally, Büyükkşalvarcı and Abdioğlu (2011) found that non-performing loans had a detrimental impact on capital adequacy when they examined the factors that determine capital adequacy in Turkish banks between 2006 and 2011. On the other hand, Bateni et al. (2014) discovered in their study on Iranian private banks from 2006 to 2012 that the loan ratio positively influenced the capital adequacy ratio.

Based on this, the first hypothesis is formulated as follows:

H1: The debt ratio affects financial stability.

2.2. Financial stability

Financial stability is largely dependent on the efficient and steady operation of financial institutions, especially banks, to support economic progress. According to Almahadin et al. (2020), a robust banking sector promotes a stable financial system and economic growth. As a result, the banking sector plays a crucial role in maintaining the health of a country's financial system, highlighting the significance of bank financial stability according to Kato and Hagendorff (2010) and Almahadin and Tuna (2019). As a result, preserving the stability of the banking sector is essential to guaranteeing the general robustness and health of a country's financial system. Furthermore, as a major driver of economic growth, financial stability is essential for drawing in foreign investors, promoting the flow of foreign capital, and enabling the smooth transfer of funds from surplus to deficit units (Ratnovski, 2013).

Evaluating the safety and stability of banks involves considering a variety of intricate factors, as highlighted by Kocisova (2015). The two methods are distinguished in the literature. The Banking Stability Index (BSI) emphasizes the critical role of the banking industry as the cornerstone of the financial system. The financial stability index, as noted by Al-Rjoub (2021), incorporates indicators related to both the banking industry and the overall economy.

Financial stability necessitates not only the ability to decrease the likelihood of financial crises but also the ability to anticipate and mitigate their occurrence and take appropriate action to absorb their effects. Financial stability seeks to improve the ability of banks and other financial institutions to withstand risks and correct structural imbalances (Almahadin et al., 2020).

Garcia (2016) observed that the notion of financial stability is connected to how the financial system as a whole operates to distribute funds for investments and fend off shocks to the system. According to Petrovska and Mucheva Mihailovska (2013) and Kocisova (2015), financial stability means that all parts of the financial system work together smoothly within certain legal, tax, and accounting frameworks that allow for the most flexibility to handle possible shocks. Additionally, it symbolizes the financial system's capacity to tolerate shocks and mitigate their effects (Creel et al., 2015).

Since financial stability has several facets and depends on the interactions of various elements within the financial system, the literature admits the lack of a commonly agreed-upon definition (Morgan & Pontines, 2014). Consequently, industrialized and developing countries have different ideas about what financial stability is. Banks are crucial components of the financial system and serve as significant predictors of financial stability in developing nations, highlighting their pivotal role in economic stability. On the other hand, non-banking financial institutions like insurance and brokerage firms are essential to the financial stability of developed nations (Siddik & Kabiraj, 2018).

Using a pooled effects model, Kharabsheh and Gharaibeh (2022) investigate the local determinants influencing the financial stability of Jordanian banks between 2011 and 2018. They discovered that capital sufficiency and loans to small and medium-sized businesses have a positive impact on Jordanian commercial banks' stability.

The private-sector banks perform better than those in the public sector. Al Salamat and Al-Kharouf (2021) discovered a negative effect of the debt ratio on capital adequacy in their study of the factors influencing the financial stability of Jordanian commercial banks. Moreover, Ghayad and Noura (2022) found that the capital adequacy ratio did not significantly impact bank stability in Lebanon, possibly due to specific contextual factors or regulatory frameworks influencing the relationship. This suggests that the impact of the capital adequacy ratio on bank stability may vary depending on the country's specific circumstances.

Almahadin et al. (2020) found that capital adequacy is positively related to financial stability in their investigation of the correlation between Jordanian bank soundness and financial stability. AlAli (2019) indicates that the capital adequacy ratio positively impacts financial stability indices, while the debt ratio negatively impacts capital adequacy in his investigation of the impact of capital adequacy on financial stability indicators in Jordanian commercial banks.

Based on the above, the second hypothesis is formulated as follows:

H2: The debt ratio affects capital adequacy.

2.3. Capital adequacy

Adequate capital is essential for banks to proactively manage risks and protect themselves from insolvency. Therefore, banks are required to maintain a specific capital level in proportion to their operational risk, considering factors like operational complexity, institution size, and regulatory mandates (Pandey, 2015).

An elevated capital adequacy ratio signifies enhanced bank performance through better loss absorption and stability maintenance (Pramudyani & Hartono, 2018). Conversely, insufficient capital levels can result in financial instability, hampering banks' ability to fulfill financial commitments and effectively handle risks, thereby jeopardizing the stability of the entire banking sector.

Sang (2021) found a positive correlation between the capital adequacy ratio and financial stability in a study involving 18 Vietnamese commercial banks. Siddika and Haron (2020), in their study of 565 commercial banks across 52 countries, found that an elevated capital ratio notably diminishes risks. Moreover, Kamran et al. (2019) found a positive relationship between capital adequacy and financial stability in a study involving commercial banks in Pakistan.

Shaddady and Moore (2019) identified a positive correlation between increased capital regulation and bank stability in their study of 2210 banks across 47 European countries. Similarly, Abdul (2017) found that the capital adequacy ratio positively affects the financial stability of banks in Nigeria. Additionally, Bouheni and Hasnaoui (2017) found that capital increases positively and significantly affect bank stability. Lin and Yang (2016) discovered in their study of 347 commercial banks in 11 East Asian markets that banks with higher capital adequacy ratios were better equipped to sustain stability in times of financial turmoil. These examples highlight empirical evidence supporting a positive relationship between capital adequacy and financial stability.

In contrast, a study by Igbinosa and Naimo (2020) on banks in Sub-Saharan Africa indicated a negative effect of the capital adequacy ratio on financial stability. Likewise, Tan and Floros (2012), in their study of a sample of Chinese commercial banks, indicated that the relationship between risks measured by the financial stability scale and the level of capital is significant and has a negative impact.

Despite some studies, like those by Ghayad and Noura (2022) and Gou (2017), showing no significant impact of the capital adequacy ratio on financial stability, the collective empirical evidence underscores the critical role of capital adequacy in significantly influencing financial stability across diverse banking institutions.

Based on this, the third hypothesis is formulated as follows:

H3: Capital adequacy affects financial stability.

The debt ratio is a financial metric that measures the proportion of a company's total debt to its assets. It provides insights into a company's ability to meet its debt obligations and assesses its financial risks and how they may affect its financial stability. One explanation for the relationship between debt ratio, capital adequacy, and financial stability is that a higher debt ratio can strain a bank's capital resources, potentially reducing its ability to maintain sufficient capital adequacy levels. This may increase the bank's vulnerability to financial instability. As a result, an increased debt ratio can indirectly compromise financial stability by impeding a bank's capacity to uphold adequate capital adequacy, rendering it more vulnerable to financial shocks and instability. Based on this, the fourth hypothesis was formulated as follows:

H4: The debt ratio affects financial stability through capital adequacy as an intermediate variable.

3. RESEARCH METHODOLOGY

The study uses a quantitative approach because it allows us to collect numerical data that we can analyze statistically. The study employed the Statistical Package for the Social Sciences (SPSS) and Analysis of Moment Structures (AMOS) v. 26 software to conduct a path analysis test within structural equation modeling (SEM) to examine the complex relationships among multiple variables, ensuring the model validity and testing the study hypotheses. This analysis aimed to elucidate the direct and indirect effects of the independent variable on the dependent variable through the mediating variable (Karagoz, 2016). Alternatively, partial least squares SEM (PLS-SEM) can also estimate mediation analysis and determine the direct and indirect effects of the independent variable on the dependent variable (Hair et al., 2022).

3.1. Study population and sample

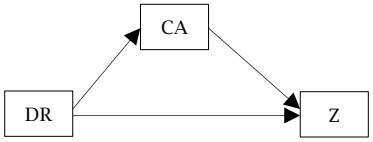
The study population consists of all 16 Jordanian banks listed on the Amman Stock Exchange (ASE) from 2012 to 2021, where we chose a sample that represented all 13 Jordanian commercial banks, excluding the three Jordanian Islamic banks due to their work nature which is different from commercial banks. The study covered a period of nine years from 2012 to 2021, enabling an in-depth analysis of long-term trends and potential changes in the relationship between the debt ratio (*DR*), capital adequacy (*CA*), and financial stability (*Z*).

Data for this study was gathered from various sources, including financial reports and annual statements of the 13 Jordanian commercial banks listed on the ASE.

3.2. Study model

Figure 1 shows the proposed model to measure the impact of the *DR* on *Z* through *CA* as an intermediary variable.

Figure 1. Proposed study model



Source: Author's elaboration.

The study variables were measured as shown in Table 1.

Table 1. Study variables measurement

Variable name	*Variable code*	*Equation*
Independent	Debt ratio (*DR*)	*DR* = Total liabilities (TL) / Total assets (TA)
Dependent	Financial stability (*Z*)	*Z*-score = (ROA + CAP) / σ (Standard deviation of ROA)
Mediate	Capital adequacy (*CA*)	*CA* = Total capital (C) / Weighted average cost of capital (WACC)

Source: Author's elaboration.

4. RESEARCH RESULTS

4.1. Descriptive analysis

Table 2 presents the results of descriptive analyses of the study variables.

Table 2. Descriptive analysis results

Variables	*Mean*	*Std. dev.*
DR	84.12	4.024
Z	24.09	5.110
CA	14.73	4.103

Source: Author's SPSS output.

We note from Table 2 above that the arithmetic means for the study variables (*DR, Z*, and *CA*) reached (84.12, 24.09, 14.73), with standard deviations of (4.024, 5.11, 4.103), respectively.

4.2. Correlation analysis

Before testing the study hypotheses, a Pearson correlation analysis was conducted, and the results are shown in Table 3.

Table 3. Pearson correlation matrix (SPSS output)

Variables	*Z*	*DR*	*CA*
Z	1.000		
DR	-0.640**	1.000	
CA	0.777**	-0.677**	1.000

*Note: ** Correlation is significant at the 0.01 level (2-tailed).*
Source: Author's SPSS output.

Table 3 demonstrates that the highest correlation between *CA* and *Z* was 77.7%. On the other hand, the lowest correlation between the *DR* and *Z* was 64%. All correlations were below 80%, suggesting no autocorrelation between the study variables (Gujrati et al., 2012).

4.3. Hypotheses testing

4.3.1. Testing the first hypothesis (H1)

As Table 4 shows, an R^2 value of 0.410 indicates that the *DR* explains 41.0% of the variation in *Z*. The Durbin-Watson (D.W.) value reached 1.238, which is within acceptable limits, indicating no autocorrelation problem. The *β*-value, at a significance level of $\alpha \leq 0.05$, is -0.813, indicating that the *DR* affects *Z*.

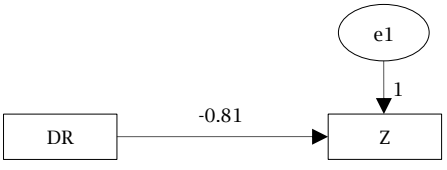
Table 4. Result of simple regression analysis to test *H1*

Variables	*AMOS output*						
	Estimate	***S.E.***	***C.R.***	***p***	***Effect type***	***Hypothesis***	***Support***
DR → Z	-0.813	0.086	-9.465	***	Direct	*H1*	Accepted
	SPSS output						
	β	***R***	***R²***	***Adj. R²***	***F***	***D.W. value***	***Sig.***
	-0.813	0.640	0.410	0.405	88.90	1.238	0.000

*Note: *** probability level of less than 0.05. S.E. — standard error, C.R. — critical ratio.*
Source: Author's elaboration.

Figure 2 shows the results of testing *H1* using a path analysis test within the SEM analysis. The estimated value reaches -0.813 at a probability level of less than 0.05 (p = ***), which shows that the results are correct. Based on the above, *H1* is accepted.

Figure 2. Estimated structural model of *H1*



Source: Author's elaboration.

4.3.2. Testing the second hypothesis (H2)

As Table 5 shows, an R^2 value of 0.458 indicates that the *DR* explains 45.8% of the variation in *CA*. The D.W. value reached 1.369, which is within acceptable limits, indicating no autocorrelation problem. The β-value, at a significance level of $\alpha \leq 0.05$ is -0.690, indicating that the *DR* affects *CA*.

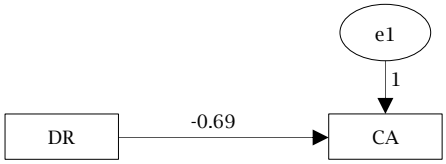
Figure 3 shows the results of testing *H2* using a path analysis test within the SEM analysis. The estimated value reaches -0.690 at a probability level of less than 0.05 (p = ***), which shows that the results are correct. Based on the above, *H2* is accepted.

Table 5. Results of the simple regression analysis to test *H2*

Variables	*AMOS output*						
DR → CA	***Estimate***	***S.E.***	***C.R.***	***p***	***Effect type***	***Hypothesis***	***Support***
	-0.690	0.066	-10.445	***	Direct	*H2*	Accepted
	SPSS output						
	β	***R***	***R²***	***Adj. R²***	***F***	***D.W. value***	***Sig.***
	-0.690	0.677	0.458	0.454	108.251	1.369	0.000

*Note: *** probability level of less than 0.05.*
Source: Author's elaboration.

Figure 3. Estimated structural model of *H2*



Source: Author's elaboration.

4.3.3. Testing the third hypothesis (H3)

As Table 6 shows, an R^2 value of 0.604 indicates that *CA* explains 60.4% of the variation in *Z*. The D.W. value reached 2.051, which is within acceptable limits, indicating no autocorrelation problem. The β-value, at a significance level of $\alpha \leq 0.05$ is 0.968, indicating that *CA* affects *Z*.

Table 6. Results of the simple regression analysis to test *H3*

Variables	*AMOS output*						
CA → Z	***Estimate***	***S.E.***	***C.R.***	***p***	***Effect type***	***Hypothesis***	***Support***
	0.968	0.069	14.020	***	Direct	*H3*	Accepted
	SPSS output						
	β	***R***	***R²***	***Adj. R²***	***F***	***D.W. value***	***Sig.***
	0.968	0.777	0.604	0.601	195.030	2.051	0.000

*Note: *** probability level of less than 0.05.*
Source: Author's elaboration.

Figure 4 shows the results of testing *H3* using a path analysis test within the SEM analysis. The estimated value reaches -0.968 at a probability level of less than 0.05 (p = ***), which shows that the results are correct. Based on this, *H3* is accepted.

Figure 4. Estimated structural model of *H3*

Source: Author's elaboration.

4.3.4. Testing the fourth hypothesis (H4)

To test the hypothesis of the mediating variable, Baron and Kenny's (1986) test was applied following the fulfillment of its prerequisites, as shown in the results of testing the *H1–H3*, which validate this approach.

Table 7. Results of regression testing of *H4* by AMOS

Variables	***Estimate***	***S.E.***	***C.R.***	***p***
DR → CA	-0.690	0.066	-10.445	***
DR → Z	-0.268	0.093	-2.890	0.004
CA → Z	0.790	0.091	8.692	***

*Note: *** probability level of less than 0.05.*
Source: Author's elaboration.

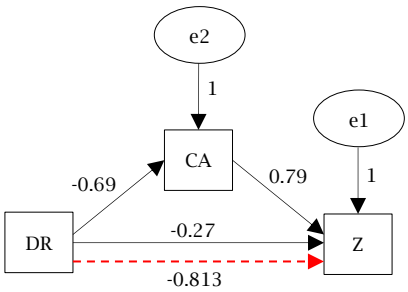
Table 8. Result of total effects testing

Variables	***DR***	***CA***
CA	-0.690	0.000
Z	-0.813	0.790

Source: Author's elaboration.

The results of the Baron and Kenny (1986) test, presented in Tables 7 and 8, indicate that the direct effect of the independent variable, represented by the *DR*, on the dependent variable, represented by *Z*, reached a value of -0.268, which is closer to 0 than the total effect with a value of -0.813 at a statistical significance of 0.004. This indicates the presence of partial mediation of the *CA* ratio in the relationship between the *DR* and *Z*, and Figure 5 confirms the results.

Figure 5. Estimated structural model of *H4*



Source: Author's elaboration.

Based on the previous results, *H4* is accepted.

To confirm the mediation of the *CA* ratio on the relationship between the *DR* and *Z*, a Sobel test was conducted using the website (https://quantpsy.org/sobel/sobel.htm). The results in Table 9 indicate that the t-value reached -6.6788 at a significance level of 0.000. This finding confirms that the *DR* affects *Z* through *CA* as an intermediary variable.

Table 9. Results of Sobel test

Test	*Test statistic*	*S.E.*	*p-value*
Sobel test			
Aroian test			
Goodman test			
α = -0.69 β = 0.79 s_α = 0.066 s_β = 0.091			

Source: Author's elaboration.

To further verify the validity of the previous results, Andrew F. Hayes's test was conducted (Hayes, 2022). As the test results appear in Table 10, we notice that the lower limit reached -0.8063 and the upper limit reached -0.3142 at a confidence level of 95%. Because 0 does not cut off these values, this confirms the validity of the previous results.

Table 10. Result of Hayes's test: Indirect effect(s) of *X* on *Y*

Variable	*Effect*	*Boot S.E.*	*Boot LLCI*	*Boot ULCI*
CA	-0.5451	0.1270	-0.8063	-0.3142

Note: LLCI — lower limit confidence interval, ULCI — upper limit confidence interval.
Source: Author's elaboration.

5. DISCUSSION OF THE RESULTS

This study investigates the effect of *DRs* on *Z* through *CA* as an intermediary variable.

The study finds that the *DR* negatively affects *Z*. A company with a high *DR* may struggle to meet its financial obligations, leading to potential financial distress, bankruptcy, and a decline in its credit rating. Additionally, a company's investments decrease because a significant portion of its profits are used to pay off debt. It also reduces a company's ability and flexibility to respond to changing market conditions, negatively affecting its *Z*. This finding is consistent with the results of Shahriar et al. (2023), Arini et al. (2021), Nazir et al. (2021), Habib et al. (2016), Roanne (2013), Khan (2012), Akinlo and Asaolu (2012), while conflicting with the findings of Chou et al. (2023) and Khanan et al. (2014).

The study finds that the *DR* negatively affects *CA*. As the *DR* in banks increases, it escalates financial leverage risks, magnifying both profits and losses and heightening vulnerability to substantial risks, especially in times of economic recession. This also leads to increased risk-weighted assets, which means decreased required capital for compliance. As capital is considered a buffer against unexpected losses, the higher the *DR*, the lower the bank's ability to face losses, thus exposing it to risk and affecting depositors' and stakeholders' confidence levels. The *DR* also affects a bank's profits in terms of higher interest expenses, which reduce net income, thus lowering profitability and limiting its ability to generate capital. In addition to the rise in the cost of borrowing, customer loans have higher interest rates. Finally, the impact on a bank's creditworthiness is a decreased ability to increase capital when needed. This finding is supported by Usman et al. (2019), Thoa and Anh (2017), Aspal and Nazneen (2014), Dreca (2014), and Büyükkşalvarcı and Abdioğlu (2011); however, it contradicts Bateni et al. (2014).

This study concludes that *CA* positively affects *Z*. *CA* is crucial for safeguarding bank depositors and investors, enabling banks to operate smoothly, prevent failure, absorb losses, and mitigate the impact of failure and bankruptcy. Furthermore, it enables banks to sustain lending activities even in cases of borrower default, contributing positively to economic growth in the country. It also enhances confidence in the financial system when individuals and companies deposit money in banks with good capital. This is reflected positively in their increased liquidity, which increases their ability to lend and finance operations. Additionally, banks with sufficient capital positively affect investors' desire to invest, which helps relieve borrowing costs, thereby increasing their *Z*. In contrast, banks that lack capital experience a loss of depositors' confidence, making them vulnerable to engaging in high-risk activities. This may expose them to failure and thus negatively impact their *Z*. This finding aligns with Sang (2021), Kamran et al. (2019), Shaddady and Moore (2019), Abdul (2017), and Bouheni and Hasnaoui (2017); however, it contradicts Ghayad and Noura (2022), Igbinosa and Naimo (2020), Gou (2017), and Tan and Floros (2012).

The study reveals that the *DR* negatively impacts *Z* through *CA* as an intermediary variable. A high *DR* indicates that a significant portion of a company's assets are financed through debt, leading to higher interest payments and financial strain. This diminishes the company's available capital for other business activities and investments, thereby exacerbating its vulnerability to financial instability. Nevertheless, the impact of this relationship can vary based on the company's unique financial situation and risk tolerance, highlighting the nuanced nature of the interaction. Companies must conduct a comprehensive assessment of their financial position and risk tolerance before setting *CA* levels, considering variations across industries and economic environments. This evaluation guarantees that companies possess the necessary capital to sustain their operations and withstand potential financial challenges. In contrast, not all companies with a high *DR* face financial instability; some companies may exhibit a higher risk tolerance or operate in industries characterized by high debt levels, deviating from the typical impact of high *DRs* on *Z*.

6. CONCLUSION

Understanding the relationship between debt ratio, capital adequacy, and financial stability is crucial for ensuring financial institutions' stability and resilience. The study finds that the debt ratio affects financial stability through capital adequacy as an intermediate variable. A strong capital adequacy ratio is essential for maintaining overall financial stability and offsetting the negative impact of the debt ratio on financial capacity.

This study illustrates the negative effects of a high debt ratio on financial stability and capital adequacy, underscoring the necessity of maintaining a low debt ratio to avoid financial distress, bankruptcy, and a diminished credit rating.

Even though maintaining a low debt ratio is crucial for ensuring financial stability, a high debt ratio may be necessary for banks to finance their operations and stimulate economic growth. However, a high debt ratio compromises financial stability when the bank lacks sufficient capital to offset potential losses and minimize their impact. Hence, insufficient Capital adequacy can lead to substantial ramifications for financial institutions. This increases institutions' susceptibility to potential losses and reduces their ability to withstand unexpected shocks or circumstances. Inadequate capital can lead to financial distress, bankruptcy, and a decreased credit rating, posing obstacles for institutions in obtaining funding and appealing to investors. Furthermore, low capital adequacy can erode investor confidence and result in a loss of trust in an institution's ability to manage risks effectively. Therefore, maintaining a strong capital adequacy ratio is crucial for ensuring financial institutions' resilience and long-term viability.

It is important for financial institutions to regularly assess their capital adequacy ratio and take the necessary measures to strengthen it. One strategy involves diversifying asset portfolios by investing in assets with different risk profiles. This can help mitigate potential losses' impact on asset classes. Another strategy involves retaining earnings instead of distributing them as dividends to bolster capital reserves and enhance capital adequacy. Retaining earnings is a way for financial institutions to fortify their capital reserves and enhance their capital adequacy ratio. Moreover, financial institutions can explore raising extra capital using methods like issuing new shares, debt instruments, or attracting new investors. Implementing these measures can strengthen the capital adequacy ratio and improve overall financial stability.

These findings contribute to the existing body of knowledge by providing empirical evidence on the relationship between debt ratio and financial stability, which can inform financial decision-making and risk management strategies in banking. The findings have important implications for regulators and policymakers in the financial sector. This underscores the importance of monitoring and regulating debt and capital adequacy ratios to ensure the stability of financial institutions and the overall financial system. Regulators can use these findings to establish guidelines and standards for capital adequacy and debt management to ensure that financial institutions operate within safe and sustainable limits. Policymakers can use these findings to inform their decision-making in crafting financial regulations or designing economic policies to promote a stable and resilient financial sector. Regulators and policymakers can improve the long-term stability and health of the financial system by aligning regulatory frameworks with the insights from this study.

However, while this study provides valuable insights into the relationship between debt ratio, capital adequacy, and financial stability, it is important to recognize specific limitations. The study's focus on a specific industry or sector may limit the generalizability of the findings to other contexts. Additionally, this study relies on quantitative data and statistical analysis, which may not capture the full complexity of the relationship between these variables. It would be beneficial for future research to incorporate qualitative methods or case studies to provide a more nuanced understanding of this topic. Finally, it is important to remember that the analysis did not explicitly address external factors, such as economic conditions or regulatory frameworks, which might impact the study's findings. These limitations underscore the necessity for additional research to confirm and extend the conclusions of this study.

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