A HYBRID APPROACH TO FINANCIAL SOLVENCY: A COMPARISON OF CONVENTIONAL AND ISLAMIC BANKING IN TURKEY[1]

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ABSTRACT

In this study, the financial soundness indicators of both conventional banks (referred to as deposit banks) and Islamic banks (referred to as participation banks) operating in Turkey are analyzed using different methods. The research utilizes financial ratios from the years 2017 to 2022, with the chosen financial ratios aligned with the Bankometer method. Ranking methods such as ARAS, CoCoSo, COPRAS, MABAC and TOPSIS are applied, and the ranking results are combined with the Borda Count method. The findings reveal a robust and healthy level of financial soundness among the analyzed banks, notably highlighting the superior performance of private conventional banks in financial soundness rankings. Importantly, this research makes a valuable contribution by showcasing the financial stability exhibited by both the conventional and Islamic banking sectors in Turkey, even when subjected to different methods, even in the face of adverse global conditions, such as those observed during the COVID-19 pandemic.

Keywords: *Financial soundness, Islamic banking, MCDM.*
JEL Codes: *G21, L25, L33.*

Scope: *Business administration*
Type: *Research*

[1] It has been declared that relevant study complies with the ethical rules.

FİNANSAL SAĞLAMLIĞA HİBRİT BİR YAKLAŞIM: TÜRKİYE'DEKİ KONVANSİYONEL VE İSLAMİ BANKALARIN KARŞILAŞTIRMALI ANALİZİ

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ÖZ | Çalışmada Türkiye'deki konvansiyonel (mevduat-ticari) bankalar ile İslami (Katılım) bankaların finansal sağlamlık performansı farklı yöntemlerle incelenmiştir. Yapılan analizlerde 2017-2022 yıllarına ait Bankometer yönteminde yer alan finansal oranlar kullanılmış ve ARAS, CoCoSo, COPRAS, MABAC ve TOPSIS sıralama metodları uygulanmıştır. Sıralama sonuçları BORDA Sayım yöntemiyle birleştirilmiştir. Bulgular, analiz edilen bankaların finansal açıdan sağlam ve sağlıklı olduğunu ortaya koymaktadır. Bunun yanı sıra finansal sağlamlık sıralamasında özel sermayeli konvansiyonel bankaların daha yüksek skorlara ulaştığı görülmektedir. Öte yandan çalışmanın sonuçları, ilgili analiz dönemi göz önüne alındığında, COVID-19 salgını süreci ve sonrasındaki olumsuz küresel koşullar karşısında dahi gerek konvansiyonel gerekse de İslami bankaların finansal sağlamlık göstergeleri açısından iyi durumda olduğunu göstermektedir.

Anahtar Kelimeler: *Finansal sağlamlık, islami bankacılık, ÇKKV*
JEL Kodları: *G21, L25, L33*

Alan: *İşletme*
Türü: *Araştırma*

1. INTRODUCTION

The economy of any nation is significantly influenced by the integral role played by the financial system, with a particular emphasis on the banking sector. Banks are the primary source of financing for individuals, businesses, and governments, and they contribute to economic growth and development. Over the years, both conventional and Islamic banks have emerged as important players in the global financial landscape. While conventional banks operate under man-made rules and regulations, namely interest-based lending system (Asad, Ahmad, Haider & Salman, 2018), Islamic banks follow two types of regulations; the first regulation is governmental, and the second regulation is the Shariah law (Salman & Nawaz, 2018, p. 156).

Financial stability is crucial for both conventional and Islamic banks, as it ensures their ability to withstand economic challenges and crises. It involves maintaining a strong capital structure, effective risk management, and stable operations. Central banks and financial regulators play a key role in preserving financial stability by implementing policies and oversight measures. Financial soundness is also vital for the stability and resilience of banks, regardless of whether they follow conventional or Islamic principles. Sound banks possess adequate capital, robust risk management practices, and the capacity to safeguard customer deposits. Compliance with financial regulations established by central banks and regulatory authorities is essential for achieving and maintaining financial soundness.

Conventional banking operating for the last three centuries (Khan & Ahmad, 2013, p. 31) is based on a purely financial model (Ismail, Majid & Rahim., 2013, p. 93). The primary objective of these banks is to lend funds at a higher interest rate while obtaining loans at a lower rate, with the resulting margin representing the banks' profit. Contrarily, Islamic banking is a banking system that adheres to Islamic or Shari'ah law, emphasizing principles like risk sharing and profit sharing between investors and entrepreneurs. It guarantees an equitable contribution from all parties, whether in profit or loss. This system promotes activities fostering entrepreneurship, trade, and societal development while prohibiting interest (riba), gambling (maisir), and speculative trading (gharar) (Asad et al., 2018, p. 58).

The cornerstone of financial markets in Turkey is the banking sector. This importance is more clearly demonstrated by factors such as the size of the sector's capital volume and the fact that a large portion of households invest their savings in bank deposits. Following the major crisis experienced by the sector in 2000, the banking sector in Turkey was placed on solid foundations with the "Transition to a Strong Economy Program" adopted after the financial crisis in

the country in 2001. The effects of this situation were seen in the Global Financial Crisis. Turkey and its banking sector survived the crisis with a milder severity compared to other countries (Çekin, 2019, p. 9). The sector was able to overcome the adverse contractionary effects of the Global Financial Crisis with a successful financial performance due to the strong structure it gained after the restructuring in 2001 (Kibritçi Artar & Atılgan Sarıdoğan, 2012, p. 4-7). Similarly, there were no problems in the financial soundness of the sector even during the COVID period following the currency crisis in 2018, which is the year covering the analysis period of this study.

The stability and effectiveness of banks serve as critical benchmarks for evaluating the overall well-being of the financial system. Assessing the financial health and efficiency of banks has received more attention in recent years, particularly in the wake of the global financial crisis of 2008. Various techniques have been created for gauging these aspects, including the Bankometer and Z-Score methods. The Bankometer model, rooted in multivariate discriminant analysis, was formulated in accordance with IMF guidelines aimed at enhancing banks' solvency (Evans, Leone, Gill & Hilbers, 2000). The Bankometer method is a frequently employed approach in literature for assessing bank stability. It consolidates various financial ratios into a unified score, delivering a holistic evaluation of a bank's stability. These ratios encompass capital adequacy, asset quality, earnings, and liquidity. Weightings are assigned to each ratio based on their significance, and these are combined into a single score using the Bankometer method. This score offers a comprehensive measure of a bank's overall stability, with higher scores signifying enhanced stability.

In this paper, various multi-criteria decision-making methods were employed to provide a comprehensive assessment of bank soundness performance. In this context, the ARAS, CoCoSo, COPRAS, MABAC, and TOPSIS methods were used, respectively. These methods are frequently used in literature and are found to be useful for analyzing financial performance. Although COPRAS and TOPSIS methods are older methods, they are used for solutions in different areas. ARAS and MABAC have shown themselves to be successful in solving the ranking problems. CoCoSo is a new method introduced in 2019.

The objective of this article is to assess and rank both conventional banks and Islamic banks concerning their financial soundness. To achieve this, it employed five distinct multi-criteria decision-making methods to rank these banks according to the criteria and weights established by the Bankometer formulation. Additionally, these methods were integrated with the Borda Count method, initially introduced by Jean-Charles De Borda in 1784. The Borda Count

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method is recognized as a technique for consolidating multiple rankings into a single ranking, facilitating the amalgamation of data (Çakır & Perçin, 2013, p. 452). Consequently, a unified ranking was generated for all banks.

This study contributes to the literature by conducting a comprehensive analysis of the financial soundness of both conventional banks (referred to as deposit banks) and Islamic banks (referred to as participation banks) in Turkey. The study's key findings emphasize a robust and healthy level of financial soundness in the examined banks, particularly underscoring the superior performance of private conventional banks in financial soundness rankings. Notably, this research stands out for demonstrating the financial stability exhibited by both the conventional and Islamic banking sectors in Turkey in terms of the assessment methodologies used. This insight offers valuable knowledge for both scholars and practitioners interested in understanding the resilience of these banking sectors in Turkey and their ability to weather economic adversity.

2. LITERATURE REVIEW

This section covers research on assessing bank performance in both Turkey and globally. It provides summarized information from various studies employing different methods, as presented in the table below.

Table 1: Summary of Related Research in the Literature

Author(s)	Aim of the Study	Examined Banks/Firms	Methods and Period	Findings
Jaffar & Manarvi (2011)	The study aims to evaluate the performance of Islamic and traditional banks.	Banks in Pakistan.	CAMEL (2005 - 2009)	The study revealed that Islamic banks had advantages in capital and liquidity but lagged in profitability, solvency, and efficiency compared to conventional banks. Additionally, Islamic banks' profitability was positively impacted by equity and loans.
Erari, Salim, Idrus & Djumahir (2013)	The study aims to analyze the precision and accuracy of different models.	Bank Papua	CAEL, Z-Score, and Bankometer (2007-2011)	Overall, the paper highlights the differences in assessment results between the CAEL, Z-Score, and Bankometer models and suggests the use of multiple models for a comprehensive evaluation of a bank's financial performance.

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Ginevicius & Podviezko (2013)	To evaluate the stability and soundness of commercial banks operating in Lithuania.	8 banks operating in Lithuania.	COPRAS, PROMETHEE, TOPSIS, SAW (2007-2009)	The evaluation of the Lithuanian commercial bank market highlighted a lack of a clear stability leader, with significant position fluctuations among banks. Two banks underwent substantial changes, one moving from the last place to the top and the other dropping from the highest to the lowest position.
Kattel (2015)	The study aims to assess the financial stability of banks.	28 banks.	Bankometer (2007 - 2012)	According to the study's findings, joint venture banks have less financial soundness than private sector banks. The Bankometer model recommends that joint venture banks take corrective measures in order to stay competitive and support managing internal control systems for improved financial efficiency at the operational level.
Wanke, Azad & Barros (2016)	The study aims to present a performance assessment using different financial criteria.	128 banks representing 23 OECD nations.	CAMELS, TOPSIS (2004-2013)	The findings emphasize the need for distinct approaches for banks with varying levels of efficiency, underscoring the significance of market segmentation in performance evaluation.
Beheshtinia & Omidi (2017)	The paper aims to present a hybrid MCDM approach for assessing and ranking banks.	4 banks in Iran.	AHP, MDL, FTOPSIS, FVIKOR (2017)	The study found that every technique provided a distinct bank ranking. Tejarat Bank gets a higher ranking than the other banks under consideration when the Copeland findings are integrated.

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Permata & Purwanto (2018)	To analyze the soundness of banking companies trading on the Indonesia Stock Exchange (IDX).	88 banks.	CAMEL, Z-Score and Bankometer (2012-2015)	The study concluded that CAMEL is the main reliable tool for assessing bank soundness in Indonesia, while Z-Score can complement its results, and further investigation is needed for the validity of Bankometer as an independent tool for assessing bank soundness, especially in the Indonesian context.
Selimler & Karadağ (2020)	To compare the banking sectors of countries that have joined the European Union and those that have become candidates after 2004.	Banking sectors of the member and candidate countries to the European Union.	Entropi weighted EDAS (2018)	When considering Turkey's comparison and rankings, the performance ranking in terms of 12 key financial indicators for institutions accepting deposits is found to be at a good level compared to many European Union member, candidate, and potential candidate countries.
Karadağ (2021)	To evaluate the financial soundness of deposit banks traded in Borsa Istanbul using TOPSIS and Entropy Methods.	10 deposit banks operating in the BIST.	Entropi weighted TOPSIS (2018)	According to results, in terms of financial soundness ranking, QNB Finansbank Inc. took the top spot. Yapı ve Kredi Bankası Inc. ranked second, and Türkiye İş Bankası Inc. held the third position. Among publicly owned banks, Türkiye Halk Bankası Inc. was in the 5th place, while Türkiye Vakıflar Bankası Inc. were in the 10th place.
Rao, Kalvakolanu & Chakraborty (2021)	To assess the performance of Indian private sector banks.	19 banks from Indian Market.	SDV (standard deviation), CRITIC, ARAS, MOORA (2020)	The study provides insights for bank stakeholders, promoting better understanding of bank performance, informed investments, and strategic planning for sustained growth. It advises private banks to focus on income-generating areas for improved profitability and competitiveness.

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Gül & Bektaş (2021)	To measure the financial stability performance of the banks.	9 commercial banks operating in Turkey.	Entropi weighted ARAS (2010-2020)	According to the results of the study, the top three banks with the most successful performance in terms of financial soundness were determined to be Halk Bank, Ziraat Bank and Garanti Bank, respectively.
Abdel-Basset, Mohamed, Elhoseny, Abouhawash, Nam & Abdelaziz (2021)	To performance analysis the top commercial banks in Egypt.	10 commercial banks.	VIKOR, TOPSIS, COPRAS (2020)	All of the findings indicated that CIB is performing the best, while Bank Audi and Faisal Islamic Bank are performing the worst.
Gülay, Öncü, Karşılı & Gündüz (2021)	To compare banking sector stocks that are included in the corporate governance index with those that are not.	Garanti BBVA, Halkbank, Yapı ve Kredi Bank, Şekerbank	MABAC (2018-2020)	The results showed that banks operating under the corporate governance index have a consistent level of efficiency and that banks with strong performance have continued to do so.
Özbek, Hazar & Babuşçu	To analyse the impact of the COVID-19 pandemic on the Turkish banking sector in terms of financial failure.	10 deposit banks in Turkey.	Bankometer (2011-2020)	Examined banks' financial soundness scores are satisfactory in the post-COVID-19 period.
Çiftaslan & Rençber (2022)	The aim of the study is to examine the performance of banks in terms of CAMELS variables.	8 banks are called systemic banks operating in Turkey.	IDOCRIW, CoCoSo (2010-2020)	According to performance scores Garanti, Akbank, and İş Bankası were ranked in the top three. Additionally, Ziraat Bankası, Garanti Bankası, and İş Bankası showed an increasing trend in performance scores, while Halkbank exhibited a decreasing trend in the calculated performance scores during that period.

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Çalış, Kevser & Sakarya (2022)	The aim of the study is to examine the financial stability and debt-paying capacity of the participation banking sector in Turkey.	Albaraka Türk, Kuveyt Türk, Türkiye Finans, Vakıf Katılım Bankası, Ziraat Katılım Bankası	Bankometer and Z-Score (2016-2020)	According to the study results, the S-Score results indicated that participation banks have been in the grey area during the examined period and have the potential to face financial difficulties. When the Bankometer results are evaluated overall, it is generally observed that privately owned participation banks are in the grey area, meaning they have a high potential for financial difficulties.
Sarıay (2023)	To examine multivariate models created with financial ratios comparatively.	Companies traded in the BIST Wholesale Trade Sector.	Altman Z, Springate S, Taffler T, Fulmer H and Zmijewski J (2017-2021)	According to the study's findings, it has been demonstrated that multivariate models can also be utilized to assess the financial stability of businesses.
Erben Yavuz (2023)	The aim of the study is to examine the financial performance of the banks operating in Turkish banking sector.	15 commercial banks operating in Turkey.	Bankometer (2006-2022)	According to the findings of the study, the banking sector in Turkey between 2006 and 2022 generally presents a positive picture in terms of financial stability. However, the declines observed in certain banks like Halkbank and Vakıfbank during the period of 2020-2021 indicate that there are areas of concern within the sector.

3. DATA AND METHODS

This research encompassed a sample comprising five Islamic banks and six conventional banks, specifically Turkish deposit banks. An Islamic bank that commenced operations in 2019 was omitted from the sample. The selection of conventional banks was based on their inclusion in the BIST Banks Index (XBANK) and their possession of assets exceeding TL 1.000 billion. The study leveraged financial data spanning from 2017 to 2022, which were sourced from independent audit reports and The Bank Association of Turkey database. The data

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range is arranged based on the date of operations of publicly owned Islamic banks, and the most recent publicly available data are used in the study. The primary decision-making matrix was established by computing the arithmetic mean over the course of six years (Table 2).

Table 2: Initial Decision Matrix for Multi-Criteria Decision-Making (MCDM) Methods

Alternatives	C1*	C2*	C3*	C4**	C5**	C6**
A1 +	0,150	0,059	0,065	0,054	0,600	0,588
A2 +	0,211	0,065	0,064	0,028	0,460	0,527
A3 +	0,180	0,079	0,081	0,055	0,467	0,586
A4 ×	0,161	0,087	0,083	0,017	0,570	0,620
A5 ×	0,144	0,075	0,066	0,018	0,639	0,688
A6 +	0,206	0,125	0,133	0,047	0,536	0,557
A7 +	0,187	0,116	0,124	0,043	0,478	0,618
A8 ×	0,145	0,066	0,071	0,034	0,748	0,640
A9 +	0,188	0,103	0,113	0,043	0,586	0,601
A10 ×	0,159	0,069	0,072	0,041	0,652	0,637
A11 +	0,176	0,092	0,103	0,055	0,571	0,601

Notes: *Benefit-based criterion, **Cost-based criterion, (+) Privately owned bank, (×) Publicly owned bank. A1-A5 Islamic Banks, A6-A11 Conventional Banks.

The components of the Bankometer method (C1-C6), proposed by the International Monetary Fund (IMF) in a 2000 report to measure the financial soundness of banks are used as financial soundness performance criteria in this study (Evans, Leone, Gill & Hilbers, 2000). The components of the method are as follows (Budiman, Herwany & Kristanti, 2017, p. 16):

> ➢ *Capital Adequacy Ratio (CAR)*
> ➢ *Capital to Assets (CA) – Capital (Tier 1) / Total Assets*
> ➢ *Equity to Total Assets (EA) – Total Equity / Total Assets*
> ➢ *Non-Performing Loans (NPL) – NPLs / Total Loans*
> ➢ *Cost to Income (CI) – Total Cost / Total Income*
> ➢ *Loans to Assets – Total Loans / Total Assets*

The mathematical form of the Bankometer method is given in Equation1.

> *S-Score: 1.50*CA +1.20*EA + 3.50*CAR + 0.60*NPL + 0.3*CI + 0.4*LA* (1)

The Bankometer score, i.e. solvency score (s-score), is obtained by multiplying the components (ratios) by the coefficient in front of them and summing. The score provides financial soundness information about the unit to be analyzed:

> If the s-score > 70; there is a healthy financial situation,
> If 50 < s-score > 70; this range of scores is called the gray area and is interpreted as banks' vulnerability to financial shocks,
> If the s-score < 50; banks face high financial risk and bankruptcy.

In this study, a decision-making matrix is constructed using the components of the solvency score, which provides information on the financial soundness of banks. Based on the coefficients in Equation (1), the importance weight of each component is calculated. If the total value of the coefficient in the equation is 7.50, the importance weights are as follows:

Table 3: Importance Weights of the Criteria

	CAR (C1)	CA (C2)	EA (C3)	NPL (C4)	CI (C5)	LA (C6)	Total
Coefficients	3.50	1.50	1.20	0.60	0.30	0.40	7.50
Weights	47%	20%	16%	8%	4%	5%	100%

The weights were used in MCDM methods CoCoSo (Combined Compromise Solution) introduced to the literature by Yazdani, Zarate, Zavadskas and Turskis (2019); MABAC (Multi-Attributive Border Approximation area Comparison) developed by Pamucar and Cirovic (2015); COPRAS (Complex Proportional Assessment) applied by Zavadskas, Kaklauskas and Sarka (1994); TOPSIS (Technique for Order Preference by Similarity Ideal Solution) proposed by Hwang and Yoon (1981); and ARAS (Additive Ratio Assessment) developed by Zavadskas and Turskis (2010) and ranking scores and results for each method were obtained. In the last stage, the methods were combined with the Borda Count Method. The steps of MCDM methods are given in Table 4.

Table 4: MCDM Methods and Process Steps

Methods	Description	Steps
CoCoSo	An initial decision matrix is created, and the matrix in terms of benefit-cost criteria is normalized. After calculating S_i and P_i values, scores for the three different evaluation strategies are obtained, and in the last step, these performance scores are combined, and the alternatives are ranked.	(1) $x_{ij} = \begin{bmatrix} x_{11} & x_{12} & ... & x_{1n} \\ x_{21} & x_{22} & ... & x_{2n} \\ ... & ... & ... & ... \\ x_{m1} & x_{m2} & ... & x_{mn} \end{bmatrix}; i = 1,2,...,m; j = 1,2,...,n.$ (2) $r_{ij} = \dfrac{x_{ij} - \min(i)x_{ij}}{\max(i)x_{ij} - \min(i)x_{ij}}$ $r_{ij} = \dfrac{max(i)x_{ij} - x_{ij}}{\max(i)x_{ij} - \min(i)x_{ij}}$ (3) $S_i = \sum_{j=1}^{n}(w_j; r_{ij})$ (4) $P_i = \sum_{j=1}^{n}(r_{ij})^{w_j}$ (5) $k_{ia} = \dfrac{P_i + S_i}{\sum_{i=1}^{m}(P_i + S_i)}$ $k_{ib} = \dfrac{S_i}{\min(i)S_i} + \dfrac{P_i}{\min(i)P_i}$ $k_{ic} = \dfrac{\lambda(S_i) + (1-\lambda)(P_i)}{(\lambda \max(i)S_i + (1 - \lambda \max(i)P_i)}; 0 \le \lambda \le 1$ (6) $k_i = (k_{ia}k_{ib}k_{ic})^{1/3} + 1/3(k_{ia} + k_{ib} + k_{ic})$

| **MABAC** | Calculating the geometric mean of the column components of the weighted matrix allows for the creation of a weighted standardized choice matrix and the construction of a border approximation area matrix. The options' separations from the boundary are measured, rated, and computed. | (1) $x_{ij} = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix}; i = 1,2,...,m; j = 1,2,...,n.$

 (2) $r_{ij} = \dfrac{x_{ij} - \min(i)x_{ij}}{\max(i)x_{ij} - \min(i)x_{ij}}$

 $r_{ij} = \dfrac{x_{ij} - \max(i)x_{ij}}{\min(i)x_{ij} - \max(i)x_{ij}}$

 (3) $r^{-}_{ij} = w_j + r_{ij}w_j$

 (4) $g_j = \left(\prod_{i=1}^{m} r^{-}_{ij}\right)^{1/m}$

 $q_{ij} = r^{-}_{ij} - g_j$

 (5) $Si = \sum_{j=1}^{n} q_{ij}$ |
| **COPRAS** | A weighted standard decision matrix is created, then relative importance values (Q_i) are calculated by sums of benefit (S_{+i}) and cost (S_{-i}) criteria. In the last, performance index values are calculated, and rankings are obtained. | (1) $x_{ij} = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix}; i = 1,2,...,m; j = 1,2,...,n.$

 (2) $r_{ij}^{*} = \dfrac{r_{ij}}{\sum_{i=1}^{m} r_{ij}}$

 (3) $r^{-}_{ij} = r_{ij}^{*} w_j$ |

$$(4) \quad S_{+i} = \sum_{j=1}^{g} r^-_{ij}$$

$$S_{-i} = \sum_{j=g+1}^{n} r^-_{ij}$$

$$(5) \quad Qi = S_{+i} + \frac{\min(i)S_{-i}\sum_{i=1}^{m} S_{-i}}{S_{+i}\sum_{i=1}^{m} \frac{\min(i)S_{-i}}{S_{-i}}}$$

| TOPSIS | The weighted choice matrix data is used to determine the positive ideal (A^+) and negative ideal (A^-) values. Euclidean distance is used to calculate the alternatives' departures from the positive and negative ideal metrics. The relative closeness and rankings are calculated by measuring the distance between each alternative to the positive and negative ideal solution. | (1) $A_{ij} = \begin{bmatrix} a_{11} & a_{12} & ... & a_{1n} \\ a_{21} & a_{22} & ... & a_{2n} \\ ... & ... & ... & ... \\ a_{m1} & a_{m2} & ... & a_{mn} \end{bmatrix}; i = 1,2,...,m; j = 1,2,$

 (2) $r_{ij} = \dfrac{a_{ij}}{\sqrt{\sum_{k=1}^{m} a^2_{kj}}}$

 $V_{ij} = w_i a_{ij}$

 (3) $A^- = \{(\min(i)v_{ij}\,\big|\,j \in J),(\max(i)v_{ij}\,\big|\,j$
 $A^+ = \{(\max(i)v_{ij}\,\big|\,j \in J),(\min(i)v_{ij}\,\big|\,j$

 (4) $S_i^+ = \sqrt{\sum(v_{ij} - v_j^+)^2}$
 $S_i^- = \sqrt{\sum(v_{ij} - v_j^-)^2}$

 (5) $C_i^+ = \dfrac{S_i^-}{S_i^+ + S_i^-}; 0 \le C_i^* \le 1$ |

ARAS	A weighted decision matrix and normalization are used to generate the Si optimality function. The degree of utility of the alternatives is determined and rated using the Si values.	(1) $x = \begin{bmatrix} r_{o1} & r_{oj} & \cdots & r_{on} \\ r_{i1} & r_{ij} & \cdots & r_{in} \\ \cdots & \cdots & \cdots & \cdots \\ r_{m1} & r_{mj} & \cdots & r_{mn} \end{bmatrix}; i = o,1,...,m; j = 1,...,n.$

$$(2) \quad \begin{aligned} r_{oj} &= \max(i)r_{ij} \\ r_{oj} &= \min(i)r_{ij} \end{aligned}$$

$$(3) \quad r_{ij}^{*} = \frac{r_{ij}}{\sum\limits_{i=0}^{m} r_{ij}}$$

$$(4) \quad \bar{r}_{ij} = r_{ij}^{*} w_{j}$$

$$(5) \quad S_{i} = \sum\limits_{j=1}^{n} \bar{r}_{ij}$$

$$(6) \quad k_{i} = \frac{S_{i}}{V_{o}}$$

BORDA	The ranking values for each method are scored. Given the number of alternatives n, the first-ranked alternative is given a score of (n-1); the second-ranked alternative is given a score of (n-2), and so on, and the last ranked alternative is given a score of zero. In the last, the scores of the alternatives in each method are summed up to obtain a final score, and in this way, the methods are combined.

Source: (Hwang & Yoon, 1981; Zavadskas, et al., 1994; Zavadskas & Turskis, 2010; Wu, 2012; Pamucar & Cirovic, 2015; Alinezhad & Khalili, 2019; Yazdani et al., 2019).

4. FINDINGS AND CONCLUSION

According to the Bankometer scores of the banks included in the sample, it can be stated that banks are provident against possible shocks in the market, have low bankruptcy risk, and have high solvency (Figure 1). Moreover, the scores of the banks are higher than the critical threshold, which explains that the Turkish banking system is healthy in terms of fundamental financial indicators.

In this study, the six components of the Bankometer method were weighted as criteria, and a hybrid MCDM method was created. As it is known,

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three different approaches based on objective, subjective, and equal weighting are presented in the literature to determine the criteria weights. At this point, the study differs from other MCDM applications. Table 5 shows the results of the hybrid application conducted.
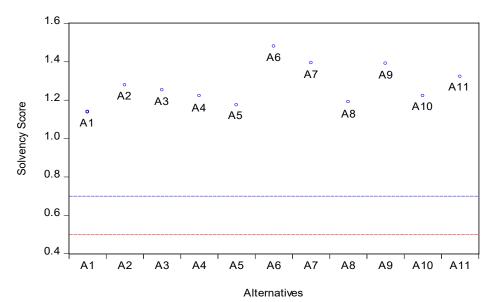

Figure 1: Solvency Thresholds and S-Scores of the Banks

Table 5: Results

Methods		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11
CoCoSo	Score	1.292	3.774	2.841	2.853	1.450	5.073	4.294	1.252	4.005	2.107	3.237
	Rank	10	4	7	6	9	1	2	11	3	8	5
MABAC	Score	-0.22	0.251	0.035	-0.015	-0.240	0.498	0.313	-0.290	0.246	-0.173	0.080
	Rank	11	3	6	7	9	1	2	10	4	8	5
COPRAS	Score	64.237	84.431	77.277	81.077	71.281	100	93.50	66.915	89.222	70.505	81.657
	Rank	11	4	7	6	8	1	2	10	3	9	5
TOPSIS	Score	0.072	0.509	0.388	0.381	0.249	0.813	0.708	0.151	0.643	0.203	0.473
	Rank	11	4	6	7	8	1	2	10	3	9	5
ARAS	Score	0.587	0.765	0.709	0.757	0.669	0.912	0.851	0.609	0.811	0.640	0.746
	Rank	11	4	7	5	8	1	2	10	3	9	6
BORDA	Score	1	36	22	24	13	50	45	4	39	12	29
	Rank	11	4	7	6	8	1	2	10	3	9	5

According to Table 5, the top three banks with the highest average financial performance over the analysis period are the conventional banks belonging to the private sector. Among these, A6 ranked at the top of the ranking with 50 points. Ranking fourth in the ranking, A2 was the best-performing Islamic bank. The second-best performance among Islamic banks was achieved by A4, which ranked sixth in the overall ranking. A4 was followed by A3, which ranked 7th overall, and A5, which ranked 8th overall. A1 ranked last both among Islamic banks and in the overall ranking. The features that make A2 stand out among Islamic banks are that it has the highest capital adequacy ratio among all banks included in the analysis, on an average of six years, and that it has the lowest level of expenditures to incomes. In the overall ranking, privately owned banks were found to perform better than publicly owned banks in conventional banks. This is mainly due to the support provided to businesses through public banks during the pandemic. Among Islamic banks, there is no public or private sector distinction in terms of performance ranking. In a general assessment, the Turkish banking sector appears financially stable, aligning with findings from studies by Selimler and Karadağ (2020), Özbek et al. (2021), Erben Yavuz (2023). Moreover, conventional private banks demonstrate strong performance,

consistent with Karadağ's study (2021). However, Gül and Bektaş (2021) placed public banks in the top positions in their research. Conversely, Çalış et al. (2022) discovered potential financial challenges for participation banks in Turkey, particularly those with private capital involvement.

As in the general financial system, the largest pillar of the Islamic finance ecosystem in Turkey is Islamic banking. The institutions, which were called Special Finance Institutions between 1985 and 2005, gained bank status with the amendment of the law in 2005. Thus, it has become easier and more meaningful to compare them with their conventional counterparts in terms of performance-financial soundness, both in the academic world and in other fields. In this study, a financial soundness ranking was conducted for a total of 11 banks, six conventional and five Islamic banks, covering the period 2017-22. According to the methodology applied, all the banks analyzed were found to be strong in terms of financial soundness. When the financial soundness ranking of the banks is analyzed, it is seen that the conventional banks belonging to the private sector have taken four of the first five places. There is no clear distinction between private and public Islamic banks in terms of financial soundness. Considering the MCDM and Borda scores and rankings, it is seen that banks with high financial soundness performance have a high capital adequacy ratio and high equity-to-assets ratio, low expenses, and core capital (tier 1) above the threshold value. In addition, it is observed that banks with low NPLs ratios stand out in ranking. In future studies, detailed analysis for different periods on the financial soundness of the banking sector can be conducted, and hybrid models can be used.

5. CONFLICT OF INTEREST STATEMENT

Authors don't have any competing interests.

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7. AUTHOR CONTRIBUTIONS

EB: Research proposal, data collection, analysis, text editing.
ÜHG: Literature research, composition of theoretical framework, language review.
SBY: Design, specifying methods, interpretation of the findings.
AEK: Revision and review.

8. ETHICS COMMITTEE STATEMENT

The study complies with ethical standards. Within the boundaries of

intellectual property and copyrights, there has never been a circumstance that called for authorization.

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