Comparison of Financial Performances of Banks by Multi Criteria Decision Making Methods: The Case of Turkey

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Abstract: The share of participation banking in the finance sector has been growing in recent years. This growth indicates that participation banking will be an important competitor for traditional banking in the banking system. In this context, the financial performances of traditional banking and participation banking are compared in this study. While measuring, primarily the data obtained from banks' financial statements were used. These data, consisting of 15 financial ratios in 5 different categories, have been obtained from banks' financial statements and income statements. In this study, the financial performance of 18 traditional banks and 3 participation banks operating in Turkey between 2010 and 2018 were analyzed with multivariate decision-making methods. The Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method was used to measure the financial performance. As a result of the analysis, it was determined which banks showed better financial performance and the results were commented.

Keywords: Financial Performance, Multi Criteria Decision Making, TOPSIS

Introduction

Banks are institutions that provide the funds they collect from people and institutions with excess funds as loans to people and institutions in need of funds in exchange for a certain interest. Besides intermediation activities between the real sector and the financial sector, banks are institutions that bring the idle funds in the economic life to the real economy (Bektaş, 2020: 794).

Banks have vital importance in delivering the funds required for individuals and institutions in the country's economy, and in this respect, they play an important role in the economic development and growth of countries. These features make them an indispensable element of economic life. Banks are also involved in other activities besides loan transactions such as investment consulting, mediation, guarantee and ownership, property assurance (Özkan and Deliktaş, 2020: 32) (Yetkin and Sandalcılar, 2017: 51).

There are serious groups of people in the world trying to stay away from the banks because of interest, especially in countries with a large Muslim population. Turkey is one of these countries. Although this system, which purposes risk sharing based on participation in profit and loss, is known as interest-free banking in the world, it is called participation banking in Turkey. Thanks to this system, which is an alternative to traditional banking, funds that are not directed to traditional banks because of the interest sensitivity of the savers are brought to the real economy (Parlakkaya and Çürük, 2011: 397). This alternative system, which has gained an increasingly important place in the financial system, has complemented traditional banks in recent years and adds depth and diversity to the financial sector (Özulucan and Deran, 2009: 86).

Since both traditional banking and participation banking are important actors of the financial sector, they significantly affect the national economies. For this reason, an accurate and reliable measurement of the financial performance of banks and realistic analysis of their financial structures are of vital importance for a sound banking system (Kaygusuz, Ersoy and Bozdoğan, 2020: 68). It is important to measure and evaluate their

financial performance, as participation banks have increased their shares in the Turkish banking sector in recent years. Monitoring the financial performance of banks in a comparative, holistic, and practical way can be done with multi-criteria decision making (MCDM) techniques (Sarı and Kabakçı, 2019: 371).

In this study, the financial performances of 18 traditional banks and 3 participation banks operating in Turkey between 2010-2018 were compared. We divided the data used in the study into 5 different categories comprises 15 financial ratios. We got these financial ratios from the financial statements of the banks. In our study, TOPSIS method, which is one of the Multi-Criteria Decision Making (MCDM) techniques often used in financial performance comparisons, was used.

Literature

The table below summarizes some studies in this field.

Table 1. Summary of Literature

Research	Year	Method	Result
Yudistira (2004)	1998-1999	DEA	As a result of the research, it was concluded that inefficiency in Islamic banks was low and Islamic banks performed very well during the 1998-1999 global crisis.
Demireli (2010)	2001-2007	TOPSIS	As a result of the study, it was concluded that state-owned banks were affected by local and global financial crises.
Özgür (2008)	2001-2005	DEA	As a result of the analysis, it was concluded that total factor productivity is closely related to efficiency.
Dinçer and Görener (2011)		VIKOR and TOPSIS	As a result of the study, they found that foreign banks had a better performance than other banks.
Çetin and Bıtırak (2010)	2005- 2007	AHS	As a result of this study, Akbank ranked first among commercial banks during the research period.
Yayar and Baykara (2012)	2005–2011	TOPSIS	As a result of this study, AlbaraTurk ranked first among participation banks in the research period.
Onour and Abdalla (2011)	2007-2008	DEA	It has been demonstrated that bank size is an important factor for scale efficiency.
Sakarya and Kaya (2013)	2005-2012	Panel Data Methods	According to the results of the research, it has been concluded that while the participation banks have higher equity and focus on financial intermediation activities, they do not differ from other banks in terms of efficiency and profitability.
Doğan (2013)	2005-2011	t test	As a result of the analysis, it has been determined that traditional banks have higher liquidity, solvency and capital adequacy and lower risk than participation banks. However; There is no statistically significant difference between the profitability of participation banks and traditional banks.
Kandemir (2016)	2004-2014	TOPSIS-VIKOR	As a result of the research; Vakıfbank was the bank with the highest financial performance and Şekerbank was the bank with the lowest financial performance.
Esmer and Bağcı (2016)	2005-2014	TOPSIS	As a result, financial performance analysis can provide the investor with opportunities to invest by providing tips on predicting the future.

Financial Performance

Performance is a concept that determines the output quantitatively and qualitatively in line with the determined target (Vural, 2013: 45). We can define the efficient use of resources in an enterprise and the financial position of the enterprise as financial performance. In other words, financial performance is a measure of how effectively resources are used rather than total output (Karaoğlan and Şahin, 2018: 63).

Financial performance plays an important role in determining the financial structures of enterprises, investments, and the efficiency and risk level of these investments. Business managers also need financial performance measurements for the realistic evaluation of past term activities and for future investments and financing decisions (Uygurtürk and Korkmaz, 2012: 96). In business life, that there is intense competition, it is necessary for the banks to make the best decisions, to continue their activities effectively, and to maximize profits. The effective operation of the banking sector, which determines the resource distribution and acts as a financial intermediary, unlike other sectors in the economy, is of great importance for the economy. This situation has brought the banking sector to a central position in the economic development of the countries (Ertuğrul and Karakaşoğlu, 2009: 20). Especially with the global crisis in the 2000s, it is an undeniable reality that financial performance measures are now important in the banking sector.

Financial performance is the measure of the level of achievement of financial targets for banks. By measuring their financial performance, banks make more accurate evaluations in terms of how much they achieve their profitability and growth targets, customer satisfaction levels, service quality, employee performance, and accordingly regulating wages (Latifi, 2015: 30). Therefore, analyzing financial performance is a vital issue for all banks.

TOPSIS Method

The TOPSIS method is one of multi-criteria decision-making methods developed by Hwang and Yoon in 1981 to solve multi-criteria decision-making problems. "The chosen alternative should have the shortest distance from the ideal solution and the farthest from the negative-ideal solution" (Yoon and Hwang, 1995: 75). With this method, it is possible to rank alternative options according to certain criteria and by analyzing their distance to the ideal solution between the maximum and minimum values that the criteria can take. Topsis method comprises the following steps and a series of mathematical calculations.

Step 1: Construct the decision matrix

The figure below shows the Decision matrix.

$$A_{ij} = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{bmatrix}$$

In matrix A_{ij}, m shows the number of decision points and n shows the number of evaluation factors.

Step 2: Normalized Decision Matrix (R)
The Normalized matrix is calculated according to the following formula:

$$r_{ij} = \frac{a_{ij}}{\sqrt{\sum_{k=1}^{m} a_{kj}^2}}$$

$$R_{ij} = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1n} \\ r_{21} & r_{22} & \cdots & r_{2n} \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ r_{m1} & r_{m2} & \cdots & r_{mn} \end{bmatrix}$$

$$i = 1, \ldots, m \; j = 1, \ldots, n$$

Step 3: Weighted Normalized Decision Matrix (V)

The weights are distributed so that the sum of the weight values is 1.

$$\sum_{i=1}^{n} w_i = 1$$

Then the elements in each column of the Matrix R are multiplied by W_i, creating The Matrix V.

$$V_{ij} = \begin{bmatrix} w_1 n_{11} & w_2 n_{12} & \cdots & w_n n_{1p} \\ w_1 n_{21} & w_2 n_{22} & \cdots & w_n n_{2p} \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ w_1 n_{m1} & w_2 n_{m2} & \cdots & w_n n_{mp} \end{bmatrix} \Rightarrow V_{ij} = \begin{bmatrix} v_{11} & v_{12} & \cdots & v_{1p} \\ v_{21} & v_{22} & \cdots & v_{2p} \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ v_{m1} & v_{m2} & \cdots & v_{mp} \end{bmatrix}$$

Step 4: Determination of Ideal (A^+) and Negative Ideal (A^-) Solution
At this stage, the maximum and minimum values in each column in the weighted decision matrix are determined.

$A^+ = \{v_1^+, v_2^+, \ldots, v_n^+\}$ (Max Values)

$A^- = \{v_1^-, v_2^-, \ldots, v_n^-\}$ (Min Values)

Step 5: Calculation Of Distance Measures Between Alternatives

In this step, the distance values to the maximum and minimum ideal points are calculated using the following formulas.

$$S_i^* = \sqrt{\sum_{j=1}^{n}(v_{ij} - v_j^*)^2}$$

$$S_i^- = \sqrt{\sum_{j=1}^{n}(v_{ij} - v_j^-)^2}$$

Step 6: Calculation of the relative closeness to the ideal solution

The relative closeness of each decision point to the ideal solution is calculated according to the formula below.

$$C_i^* = \frac{S_i^-}{S_i^- + S_i^*}$$

The value of C_i lies in the range 0 to 1. $C_i=1$ shows the ideal solution, $Ci=0$ shows the negative ideal solution (Ömürbek and Kınay, 2013:352-355).

Application

In this study, the financial performance of 18 traditional banks and 3 participation banks operating in Turkey between 2010 and 2018 was examined with multivariate decision-making methods. The figure1 below shows the financial ratios used in the study.
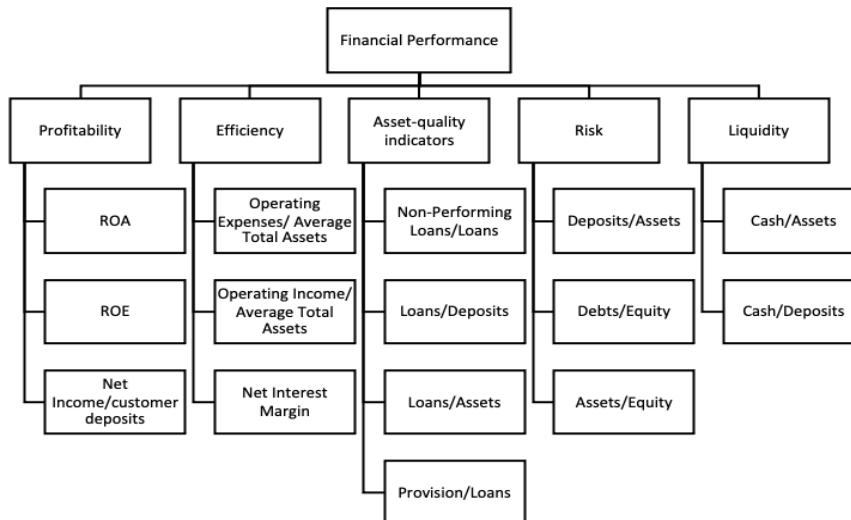

Figure1. Financial performance ratios

Banks whose financial performances were calculated in the study are shown in Appendix. There are two steps in the study. In the first step, we got an overall ranking of all banks. In the second step, banks were grouped as conventional public banks, conventional private banks and participation banks and then sorted. All stages of the TOPSIS method are shown in the Appendix. The last stage, the ranking table, is shown below. According to this table;

Table 2. TOPSIS Ranking Results

	Si*	Sİ-	Ci*	Rank
Akbank T.A.Ş.	0.022890514	0.053203738	0.699182091	1
Türkiye Garanti Bankası A.Ş.	0.024511167	0.053428983	0.685512962	2
Türkiye Cumhuriyeti Ziraat Bankası A.Ş.	0.025455672	0.053690506	0.678371432	3
Türkiye İş Bankası A.Ş.	0.027128045	0.050050708	0.648503713	4
Anadolubank A.Ş.	0.029776015	0.048547491	0.619832964	5
Türkiye Halk Bankası A.Ş.	0.033150335	0.048498452	0.59398864	6
KVYT	0.030428258	0.044491173	0.593853588	7
Yapı ve Kredi Bankası A.Ş.	0.0312249	0.045550475	0.593295372	8
Citibank A.Ş.	0.03660039	0.052784105	0.590528647	9
Denizbank A.Ş.	0.030809651	0.044121487	0.588827132	10
Türk Ekonomi Bankası A.Ş.	0.031376977	0.043001772	0.578145946	11
TF	0.032807265	0.041012664	0.555577127	12
ING Bank A.Ş.	0.034118523	0.040472286	0.54259079	13
Türkiye Vakıflar Bankası T.A.O.	0.035030401	0.04046617	0.536000103	14
ALB	0.036526271	0.039832633	0.521650145	15
Fibabanka A.Ş.	0.04034131	0.040989603	0.503985525	16
Turkish Bank A.Ş.	0.040256662	0.037165972	0.480040143	17
Alternatifbank A.Ş.	0.042226715	0.033033065	0.438920562	18
Şekerbank T.A.Ş.	0.041958285	0.032783199	0.438621193	19
HSBC Bank A.Ş.	0.046263847	0.025486478	0.355210624	20
Turkland Bank A.Ş.	0.055156928	0.027749041	0.334704985	21

Akbank is the most successful bank according to our calculations. It is followed by Garanti Bank and Ziraat Bank. According to the report published by Brand Finance, these three banks are in the list of the most powerful Turkish banks between 2014-2020. The last three banks are Şekerbank HSBC Bank and Turkland Bank.

As a second step, banks were grouped as conventional public, conventional private and participation, and ranked using the same methods. As seen in the table, the most successful bank group is state banks, secondly to participation banks and third to private banks.

Table 3. TOPSIS Ranking Results (Group)

	Si*	Sİ-	Ci*	Rank
Public Conventional	0.024296859	0.037735749	0.608321181	1
Private Participation	0.036537564	0.029478287	0.446533471	2
Private Conventional	0.039451644	0.028353273	0.418159541	3

Conclusion

In this study, we analyzed the financial performance of conventional banks and participation banks operating in Turkey using the TOPSIS method. According to the results of the first analysis, Akbank took first place. According to the results of the second analysis, public banks took first place. According to the results of the study, while the positive performances of public banks were similar to the studies of Demireli (2010) and Kandemir (2016), opposite results with the studies of Dinçer and Görener (2011). The result is not surprising. Because public banks can find deposits more easily and provide services to more customers compared to other banks. The reason private banks are in the last place is that banks such as Turkland Alternatifbank and Turkishbank and Fiba bank have tiny volumes and limited banking transactions. These banks lowered the average of the private bank's group.

In future studies, contributions to the literature can be made by adding new participation banks, removing small volume private banks, and using different financial ratios.

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Appendix

1) Normalized Decision Matrix

	ROA	ROE	Net Income/Depo	Ope.exp/Asset	Ope. Inc/Asset	Net.In.M	Non-per lo/loans	Loan/Depo	Loan/Asset	Pro/Loan	Depo/Asset	Debt/Equity	Asset/Equity	Cash/Asset	Cash/Depo
Türkiye Cumhuriyeti Ziraat Bankası A.Ş.	0.291	0.331	0.273687681	0.188246527	0.208088905	0.205051769	0.104454778	0.181796978	0.190852635	0.108801026	0.229309847	0.226951883	0.226469395	0.230109907	0.210203851
Türkiye Halk Bankası A.Ş.	0.287	0.323	0.257053992	0.199659951	0.214817842	0.181751451	0.180945945	0.200080488	0.219995967	0.199995216	0.235276549	0.237026086	0.235521399	0.148708634	0.137115301
Türkiye Vakıflar Bankası T.A.O.	0.219	0.25	0.227601893	0.204854148	0.218399701	0.18345768	0.234167142	0.232741237	0.225331165	0.299808701	0.207075658	0.236247295	0.23482163	0.181174352	0.171510215
Akbank T.A.Ş.	0.296	0.256	0.323058622	0.177165166	0.205747078	0.18725826	0.114954935	0.211414379	0.195592289	0.155253075	0.196903378	0.172550285	0.177587762	0.250635171	0.241423117
Anadolubank A.Ş.	0.287	0.221	0.271128622	0.262423112	0.275099287	0.256679668	0.171695121	0.210921578	0.230275388	0.185597074	0.233513114	0.153300483	0.160291179	0.171596052	0.168966095
Fibabanka A.Ş.	0.099	0.146	0.102419267	0.240649008	0.219665976	0.188830618	0.106534104	0.240615729	0.260543172	0.062142025	0.232879239	0.277229697	0.271645672	0.153055884	0.14641666
Şekerbank T.A.Ş.	0.144	0.143	0.136224725	0.292651108	0.282214726	0.251324707	0.31316723	0.216142627	0.23005549	0.254520712	0.226868443	0.219383425	0.219668885	0.150936452	0.142474474
Turkish Bank A.Ş.	0.04	0.031	0.036321019	0.214328792	0.179612525	0.184618954	0.142378104	0.175053084	0.189971817	0.114634357	0.228714365	0.146769318	0.154422711	0.293862505	0.282478442
Türk Ekonomi Bankası A.Ş.	0.187	0.207	0.185418616	0.244968707	0.236507517	0.226629106	0.150998974	0.23334448	0.237879998	0.13981694	0.216939687	0.224146666	0.223948815	0.190888258	0.186650514
Türkiye İş Bankası A.Ş.	0.269	0.252	0.285479279	0.194067685	0.209066528	0.185897374	0.125279623	0.225014339	0.211232319	0.15261941	0.201052589	0.185635311	0.18934509	0.194918473	0.192571916
Yapı ve Kredi Bankası A.Ş.	0.256	0.249	0.274387511	0.190458942	0.209366795	0.182918461	0.219256057	0.235137372	0.220912469	0.222791094	0.199906018	0.200234827	0.202463237	0.169292791	0.175739276
Alternatifbank A.Ş.	0.105	0.152	0.12413991	0.230787837	0.227387828	0.193650004	0.265560031	0.269769472	0.232798951	0.2076432	0.184154364	0.305392382	0.296950773	0.155445045	0.149353274
Citibank A.Ş.	0.336	0.237	0.29247405	0.253024615	0.258399291	0.329097303	0.360989913	0.118465321	0.136057751	0.46103808	0.243203037	0.139051279	0.147487799	0.421930577	0.416550576
Denizbank A.Ş.	0.248	0.264	0.263600517	0.227338474	0.235757229	0.237937214	0.249293119	0.226070399	0.21573216	0.249161039	0.203254359	0.223955755	0.223777275	0.195834316	0.198375987
HSBC Bank A.Ş.	0.061	0.043	0.06077844	0.25324999	0.235220883	0.248471042	0.377550325	0.205912232	0.195992698	0.366678836	0.205488182	0.226378237	0.225953955	0.29409049	0.293657133
ING Bank A.Ş.	0.143	0.147	0.169009975	0.235855121	0.22984772	0.269028554	0.171601861	0.290453649	0.245373275	0.155899331	0.180101496	0.209303701	0.21061192	0.175360712	0.17092116
Turkland Bank A.Ş.	-0.08	-0.07	-0.059243932	0.311865592	0.265458294	0.194301377	0.284931325	0.185498081	0.217717007	0.168731474	0.250464575	0.162502836	0.168559797	0.219430552	0.20879675
Türkiye Garanti Bankası A.Ş.	0.305	0.273	0.338914621	0.189089022	0.218013906	0.210827329	0.140822214	0.22778851	0.206575045	0.161476983	0.193106122	0.176467527	0.181107533	0.211544123	0.208194075
ALB	0.17	0.224	0.144735116	0.104725163	0.109292472	0.183630128	0.201440649	0.199204815	0.233263958	0.179523517	0.24898243	0.28373079	0.277675787	0.183040361	0.200789195
KVYT	0.191	0.241	0.174900236	0.113159532	0.119522907	0.200598632	0.134587259	0.197371083	0.217085207	0.15287552	0.233956122	0.261148556	0.257316274	0.223543444	0.260327938
TF	0.189	0.197	0.187612011	0.116287779	0.12149034	0.212921616	0.218798632	0.241498956	0.238187595	0.197009295	0.211276121	0.218724635	0.219162375	0.173311226	0.225334467

2) Weighted Normalized Decision Matrix

	ROA	ROE	Net Income/Depo	Ope.exp/Asset	Ope. Inc/Asset	Net.In.M	Non-per lo/loans	Loan/Depo	Loan/Asset	Pro/Loan	Depo/Asset	Debt/Equity	Asset/Equity	Cash/Asset	Cash/Depo
Türkiye Cumhuriyeti Ziraat B.	0.019214898	0.021832706	0.018063387	0.012424271	0.013733868	0.013533417	0.006894015	0.011998601	0.012596274	0.007180868	0.01513445	0.014978824	0.01494698	0.015187254	0.013873454
Türkiye Halk Bankası A.Ş.	0.018921224	0.021344478	0.016965563	0.013177557	0.014177978	0.011995596	0.011942432	0.013205312	0.014519734	0.013199684	0.015528252	0.015643722	0.015544412	0.00981477	0.00904961
Türkiye Vakıflar Bankası T.A.O.	0.014454619	0.016492517	0.015021725	0.013520374	0.01441438	0.012108207	0.015455031	0.015360922	0.014871857	0.019787374	0.013666993	0.015592321	0.015498228	0.011957507	0.011319674
Akbank T.A.Ş.	0.01954129	0.01687924	0.021321869	0.011692901	0.01379307	0.012359045	0.007587026	0.013953349	0.012909091	0.010246703	0.012995623	0.011388319	0.011720792	0.016541921	0.015933926
Anadolubank A.Ş.	0.01892113	0.014566078	0.017894489	0.017319925	0.018156553	0.016940858	0.011331878	0.013920824	0.015198176	0.012249407	0.015411866	0.010117832	0.010579218	0.011325339	0.011151762
Fibabanka A.Ş.	0.006544728	0.009609433	0.006759672	0.015882835	0.014497954	0.012462821	0.007031251	0.015880638	0.017195849	0.004101374	0.01537003	0.01829716	0.017928614	0.010101688	0.0096635
Şekerbank T.A.Ş.	0.009513601	0.009427064	0.008990832	0.019314973	0.018626172	0.016587431	0.020669037	0.014265413	0.015183662	0.016798367	0.01497317	0.014479306	0.014498146	0.009961806	0.009403315
Turkish Bank A.Ş.	0.002617215	0.002067289	0.002397187	0.01414457	0.011854427	0.012184851	0.009396955	0.011553504	0.01253814	0.007565868	0.015095148	0.009686775	0.010191899	0.019394925	0.018643577
Türk Ekonomi Bankası A.Ş.	0.012360373	0.013665026	0.012237629	0.016167935	0.015609496	0.014957521	0.009965932	0.015400736	0.01570008	0.009227918	0.014318019	0.01479368	0.014780622	0.012598625	0.012318934
Türkiye İş Bankası A.Ş.	0.017738727	0.016599394	0.018841632	0.012808467	0.013798391	0.012269227	0.008268455	0.014850946	0.013941333	0.010072881	0.013269471	0.012251931	0.012496776	0.012864619	0.012709746
Yapı ve Kredi Bankası A.Ş.	0.01690566	0.016465931	0.018109576	0.01257029	0.013818208	0.012072618	0.0144709	0.015519067	0.014580223	0.014704212	0.013193797	0.013215499	0.013362574	0.01173324	0.011598792
Alternatifbank A.Ş.	0.006951047	0.010057385	0.008193234	0.015231997	0.015007597	0.0127809	0.017526962	0.017804785	0.015364731	0.013704451	0.012154188	0.020155897	0.019598751	0.010259373	0.009857316
Citibank A.Ş.	0.022200037	0.015632976	0.019303287	0.016699625	0.01705353	0.021720422	0.023825334	0.007818711	0.008979812	0.030428513	0.0160514	0.009177384	0.009734195	0.027847418	0.02749238
Denizbank A.Ş.	0.01634335	0.017418531	0.017397634	0.015004339	0.015559977	0.015703856	0.016453346	0.014920646	0.014238323	0.016444629	0.013414788	0.01478108	0.0147693	0.012925065	0.013092815
HSBC Bank A.Ş.	0.004009384	0.002846768	0.004011377	0.016714499	0.015524578	0.016399089	0.024918321	0.013590207	0.012935518	0.024200803	0.01356222	0.014940964	0.014912961	0.019409972	0.019381371
ING Bank A.Ş.	0.009452448	0.009674302	0.011154658	0.015566438	0.01516995	0.017755885	0.011325723	0.019169941	0.016194636	0.010289356	0.011886699	0.013814044	0.013900387	0.011573807	0.011280797
Turkland Bank A.Ş.	-0.005186142	-0.004522056	-0.003910099	0.020583129	0.017520247	0.012823891	0.018805467	0.014369322	0.014369322	0.011136277	0.016530662	0.010725187	0.011124947	0.014482416	0.013780586
Türkiye Garanti Bankası A.Ş.	0.020144584	0.018027757	0.022368365	0.012479875	0.014388918	0.013914604	0.009294266	0.015034042	0.013633953	0.010657481	0.012745004	0.011646857	0.011953097	0.013961912	0.013740809
ALB	0.011241711	0.014772127	0.009552518	0.006911861	0.007213303	0.012119588	0.013295083	0.013147518	0.015395421	0.011848552	0.01643284	0.018726232	0.018326602	0.012080664	0.013252087
KVYT	0.012593925	0.015896609	0.011543416	0.007468529	0.007888512	0.01323951	0.008882759	0.013026491	0.014327624	0.010089784	0.015441104	0.017235805	0.016982874	0.014753867	0.017181644
TF	0.012456411	0.012991163	0.012382393	0.007674993	0.008018362	0.014052827	0.01444071	0.015938931	0.015720381	0.013002613	0.013944224	0.014435826	0.014464717	0.011438541	0.014872075

Ideal (A⁺) and Negative Ideal (A⁻) Solution

	ROA	ROE	Net Income/Deposits	Ope.exp/Asset	Ope. Inc/Asset	Net.In.M	Non-per lo/loans	Loan/Depo	Loan/Asset	Pro/Loan	Depo/Asset	Debt/Equity	Asset/Equity	Cash/Asset	Cash/Depo
S*	0.022200037	0.021832706	0.022368365	0.006911861	0.018626172	0.021720422	0.006894015	0.019169941	0.017195849	0.004101374	0.011886699	0.009177384	0.009734195	0.027847418	0.027492338
S-	-0.005186142	-0.004522056	-0.003910099	0.020583129	0.007213303	0.011995596	0.024918321	0.007818711	0.008979812	0.030428513	0.016530662	0.020155897	0.019598751	0.00981477	0.00904961

3) Distance Measures Between Alternatives

	Si*	Si-
Türkiye Cumhuriyeti Ziraat Bankası A.Ş.	0.025455672	0.053691
Türkiye Halk Bankası A.Ş.	0.033150335	0.048498
Türkiye Vakıflar Bankası T.A.O.	0.035030401	0.040466
Akbank T.A.Ş.	0.022890514	0.053204
Anadolubank A.Ş.	0.029776015	0.048547
Fibabanka A.Ş.	0.04034131	0.04099
Şekerbank T.A.Ş.	0.041958285	0.032783
Turkish Bank A.Ş.	0.040256662	0.037166
Türk Ekonomi Bankası A.Ş.	0.031376977	0.043002
Türkiye İş Bankası A.Ş.	0.027128045	0.050051
Yapı ve Kredi Bankası A.Ş.	0.0312249	0.04555
Alternatifbank A.Ş.	0.042226715	0.033033
Citibank A.Ş.	0.03660039	0.052784
Denizbank A.Ş.	0.030809651	0.044121
HSBC Bank A.Ş.	0.046263847	0.025486
ING Bank A.Ş.	0.034118523	0.040472
Turkland Bank A.Ş.	0.055156928	0.027749
Türkiye Garanti Bankası A.Ş.	0.024511167	0.053429
ALB	0.036526271	0.039833
KVYT	0.030428258	0.044491
TF	0.032807265	0.041013

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