

INVESTIGATING BANKS' PERFORMANCE FOR TURKEY: AN APPLICATION OF PROMETHEE METHOD

Semin PAKSOY¹

Mehmet Fatih TIRAŞ²

Abstract

Bank failures bring high costs to every part of a country's economy. If the necessary early warnings regarding the performance of the banks can be taken on time by the officials, policy makers and intuitions concerned, bank failures can be prevented and a more robust financial environment can be sustained. Therefore, the objective of this paper is to measure the performance and failure risk of Turkish deposit banks and to obtain ranking of the banks based on their financial ratios. To this end, we benefit from a data set which allows us to compare the current banks not only on the basis of their present relative position, but also on the basis of their position to the banks failed between 1997 and 2003. Our principal findings show that, some of privately owned and all of publicly owned current banks are quite sound in terms of their financial ratios while some of privately and foreign-owned banks have significantly poorer performance in terms of the ratios considered. Besides, our results unexpectedly show that two of previously failed banks are found to rank in a better position compared to some of currently operating banks in Turkey.

Keywords: Multicriteria analysis, Promethee method, Ranking, Predicting risk, Performance evaluation

Türkiye'deki Banka Performanslarının İncelenmesi: Promethee Metot Uygulaması

Özet

Banka iflasları bir ülkenin tüm ekonomisine büyük maliyetler yüklemektedir. Eğer banka performanslarına yönelik gerekli erken uyarılar politika yapıcılar, yetkililer ve kurumlarca zamanında elde edilirse banka iflasları engellenebilir ve daha sağlam bir finansal zemin sürdürülebilir hale gelir. Bu nedenle bu çalışmanın amacı Türkiye'deki mevduat bankalarının performansı ve iflas riskinin ölçülmesi ve finansal rasyolara dayanarak bankaların performans sıralamasını elde etmektir. Bu bağlamda çalışmada hali hazırda faaliyet gösteren bankaların hem 1997 ve 2003 yılları arasında batan bankalar ile hem de kendi aralarında kıyaslanmasını sağlayan bir veri seti kullanılmaktadır. Temel bulgularımız bazı özel bankaların ve tüm kamu bankalarının finansal rasyolar bağlamında oldukça güçlü durumda olduğunu ve bazı yabancı sermayeli bankaların ise önemli ölçüde zayıf performans sergilediğini göstermektedir. Bunun yanı sıra batmış olan iki özel sermayeli bankanın günümüzde faaliyet gösteren bazı bankalardan daha iyi pozisyonda olduğu sonucu da çalışmanın ilginç bulguları arasındadır.

Keywords: Çok kriterli analiz, Promethee metot, Sıralama, Risk tahmini, Performans değerlendirme.

¹ Çukurova Üniversitesi, İİBF, Ekonometri Bölümü, Adana, spaksoy@cu.edu.tr.

² Çukurova Üniversitesi, İİBF, Ekonometri Bölümü, Adana, mfras@cu.edu.tr.

INTRODUCTION

Bank failure studies are important in detecting the financial problems early enough, which would allow regulatory parties to take necessary actions on time to prevent banks from possible failure, to monitor the bank's positions in its own market and therefore to minimize the cost to the public and the government. According to Laeven and Valencia (2012) a banking crisis can be defined in terms of two conditions. The first condition states that there must be significant signals of financial distress in the banking system. This condition can be translated into bank runs, weaknesses in the banking system and bank insolvencies. Second condition for a banking crisis to be in question is the response of involved officials and regulative institutions against severe losses in the banking system.

Crisis and weaknesses in the banking systems have serious implications on national economies as a whole. Bennett and Unal (2015) stress that the Federal Deposit Insurance Corporation (FDIC) estimates the total cost to the deposit insurance funds of resolving failed banks is around \$30 billion as of the end of 2013. Also, according to Jiangzhong (2001), two third of IMF members have experienced banking crisis more than once and most of these members have lost almost all of their capitals.

In this study, preference ranking organization method for enrichment evaluation (PROMETHEE) is used to predict the performance of the banks in Turkey since there has been a great interest in constructing models to explain bank failures over the recent years (Özel, 2013). PROMETHEE method may only be applied if the decision maker can express the importance of the criteria on a ratio scale and may only be used with criteria where the differences between evaluations are meaningful (Keyser and Peters, 1996:458). PROMETHEE method, one of the multi-criteria decision making (MCDM) methods, uses the outranking principle to rank the alternatives.

MCDM is a well known branch of a general class of operations research models which deal with decision problems under the presence of a number of decision criteria. A decision-maker needs to choose the best or compromise alternative as a solution, considering all criteria. MCDM methods have popularity since it provides solutions to the problems involving conflicting criteria and multiple objectives. The solution is highly dependent on the preferences of the decision-maker. The best alternative is usually selected by making comparisons between alternatives with respect to each attribute (Pohekar and Ramachandran, 2004:367).

The aim of this study is to observe the performance of the Turkish deposit banks and also to capture the banks which have the healthy or non healthy banking services and activities by using a well-known MCDM method. Our approach is to

use PROMETHEE method employing ratios of failed banks, as the criteria to differentiate sound banks and troubled ones.

At the beginning of this study, we assumed the hypothesis that the low performance banking is the forerunner of the subsequent bank failures. The data of failed and survived banks' common ratios provide a good opportunity for exploring possible bank's problems or risk of failure. In order to make authentic interpretation, previously failed banks, taken over by deposit and savings insurance fund between 1997-2003 are used as dummy banks to reveal the position of current banks whether they are far away from the failed banks or not. If the bank, still not transferred to the fund is very close to the failed banks, it can be interpreted as an early warning signal. By this way, PROMETHEE ranking may help to identify the non healthy bank and it may be possible whether the bank has the capability of the healthy / non healthy banking activity and service. By means of ranking score, decision maker may plan to reduce gap of the bank for achieving aspired level. On the other side high score implies that the bank has operated banking activities in efficient way.

The reminder of this study is as follows. In the second section we summary the relevant literature. In the third section, methodology and data used are discussed. In the following section we present our empirical findings, and in the fifth section, we conclude.

I. RELATED LITERATURE

Bank failures and bank performances have been of great interest in literature and extensively studied. Presenting a multivariate statistical analysis of several financial ratios of the banks, Sinkey (1975) tests the group mean differences of the failed and non-failed banks in the United States and finds that measures of banking factors such as asset composition, loan characteristics, capital adequacy, sources and uses of revenue are the ratios exhibiting significant differences with among groups. Furthermore, regression analysis is also used in assessing bank performances and failures. Among these, Martin (1977) proposes a methodology in which a logit regression approach is used. In an attempt to construct an early warning model for bank failures, Martin (1977) associates the current bank ratios with future failure probabilities and finds that a bank is more likely to fail if its net worth becomes negative, or if it is unable to continue its operations. In relation to bank solvency, Doumpou et. al. (2002) investigate corporate credit risk assessment decisions in Greece for the period 1994-1997, using discriminant analysis, logit analysis and probit analysis, to explore the performance multi-group hierarchical discrimination and find that this new method outperforms traditional statistical and econometric methods in obtaining credit risk estimates. In another study Lopcu and Kılıç (2012) employ a joint analysis where ANOVA test, factor analysis and logit regression are involved for the assessment of the failure risk of 25 Turkish

commercial banks for the period 2002-2012, using the data set covering the period 1996-2000, where a large number of bank failures occurred in Turkish banking sector and conclude that almost all 25 commercial banks in Turkey are far from failure.

In the literature, banking failures are also investigated using PROMETHEE method. Some of these studies focused on supplier selection (Dağdeviren and Eraslan, 2008; Taş et.al, 2008; Murali et.al,2014) and outsourcing selection (Abath and De Almeida, 2009; Chen et.al. 2011). Some others investigated personnel, machine or container selection (Yılmaz and Dagdeviren, 2011; Organ, 2013). On the other side, some authors have introduced and tested new preference function, called as logistic preference function, to employ in PROMETHEE method (Amponsah et. al., 2012). Furthermore, Tomic et. al. (2011) has employed the PROMETHEE method for the logistic comparison of ten countries of Balkan Peninsula, according to 20 evaluation criteria.

As the studies about banking are considered closely, the bankruptcy prediction literature is very rich since various methods are examined. The multivariate statistical analysis and econometric methods: discriminant (Cox and Wang, 2014), logit and probit analyses (Lopcu and Kılıç, 2012; Liu , 2015) are among the most widespread methods in the previous bank failure studies. Some other bankruptcy studies have employed non-parametric multicriteria methods (Kılıç, 2006) whereas recent studies have considered new non-parametric methods such as neural networks (Kılıç et.al. 2014; Erdal and Ekinci, 2013) and support vector machines (Boyacıoğlu et al.,2009). Some others (Shen and Tzeng, 2015) used Vikor method, Dametel based artificial neural process and neural network to identify the financial performance improvement of commercial banks. Furthermore, PROMETHEE method has been employed to investigate the bankruptcy predictions of the banks (Hu and Chen, 2011).

II. DATA AND METHODOLOGY

A. DATA

Data used in this study is obtained from the web site of Turkish Banking Regulation and Supervision Agency. Selected bank ratios reflect the assets quality, liquidity, profitability, income-expenditure structure; share in group, branch ratios and activity ratios of the related banks. Financial ratios which distinguish banks as healthy and failure are initially determined. The banks are compared not only on the basis of their relative position to the current banks, but also on the basis of their position to the banks failed between 1997 and 2003.

The number of financial ratios published between 1988-2000 for the banks operating in the Turkish banking sector is 49 ratios (Kılıç,2006:124), while the present number of financial ratios published is 66. But 29 ratios, among them are common for comparison. For that reason, firstly, only 29 common ratios, shown in Table 1, of Turkish deposit banks are included in the study. Secondly, 27 deposit banks without missing data and 22 failed banks are pooled, and then they are grouped into 2 groups as failed and non failed banks. The latter group consists of the banks currently operating in Turkey. Data about failed banks is selected according to the declaration of bankruptcy year and one year earlier from the bankruptcy is considered as the data for the analysis. Table 2 includes the failed banks with the failure date. As shown in Table 2, for some banks, the bankruptcy year is 2001, two year earlier from the bankruptcy year is considered as the data since Turkey was of financial and economic crisis in 2001 in which whole ratios are not obtainable. On the other side, for the current banks, the data of 2014 is considered since subsequent data has not fully published in the beginning of the study. Furthermore, for comparison purposes, all monetary variables are expressed in real terms using 2003 based producer price index (PPI).

Lastly, PROMETHEE method is performed to obtain bank ranking, and to explore the risk of the current banks.

Table 1. Ratios

Code	Ratio Categories and Names	Code	Ratio Categories and Names
Assets Quality, %		R15	Total Loans
R1	Total Loans/Total Assets	R16	Total Deposits
R2	Non Performing Loans/Total Loans	Share in Group, %	
R3	Permanent Assets/Total Assets	R17	Total Assets
	Liquidity, %	R18	Total Loans
R4	Liquid Assets/Total Assets	R19	Total Deposits
R5	Liquid Assets/(Deposits+Non-deposit Funds)	Branch Ratios, Million TRY	
R6	Fx* Liquid Assets/Fx Liabilities	R20	Total Assets / No. of Branches
Profitability, %		R21	Total Deposits / No. of Branches
R7	Net Income(Loss)/Average T.Assets	R22	TL Deposits / No. of Branches
R8	Net Income(Loss)/Shareholder's Equity	R23	Fx Deposits / No. of Branches
R9	Income Before Tax / Average Total	R24	No. of Personnel / No. of

Assets		Branches	
Income-Expenditure Structure, %		R25	Total Loans / No. of Branches
R10	Interest Income/ Total Income	R26	Net Income / No. of Branches
R11	Interest Income/Interest Expenses	Activity Ratios	
R12	Non-Interest Income/Non-Interest Expenses	R27	(Salary and Emp'ee Bene.+Res. for Retire.)/No.of Pers.(Billion TL)
R13	Total Income/Total Expenditure	R28	Reserve for Seniority Pay/No.of Personnel (Billion TL)
Share in Sector, %		R29	(Salaries and Employee Benefits+ Reserve for Retirement)/T.Assets
R14	Total Assets		

* Fx: Foreign Exchange, TL: Turkish Lira Source: Lopcu and Kılıç, 2012: 359.

Table 2. Failed banks

No	Failed Banks	Date of Transferred Funds
1	Türk Ticaret Bankası A.Ş.	November 1997
2	Bank Ekspres A.Ş.	December 1998
3	Interbank	January 1999
4	Sümerbank A.Ş.	December 1999
5	Türkiye Tütüncüler Bankası Yaşarbank A.Ş.	December 1999
6	Yurt Ticaret ve Kredi Bankası A.Ş.	December 1999
7	Egebank A.Ş.	December 1999
8	Eskişehir Bankası T.A.Ş.	December 1999
9	Bank Kapital Türk A.Ş.	October 2000
10	Etibank A.Ş.	October 2000
11	Demirbank T.A.Ş.	December 2000
12	Ulusal Bank	February 2001
13	İktisat Bankası T.A.Ş.	March 2001

<i>14</i>	Bayındırbank A.Ş.	July 2001
<i>15</i>	Ege Giyim Sanayicileri Bankası A.Ş.	July 2001
<i>16</i>	Kentbank A.Ş.	July 2001
<i>17</i>	Sitebank A.Ş.	July 2001
<i>18</i>	Milli Aydın Bankası T.A.Ş.	July 2001
<i>19</i>	Emlakbank	July 2001
<i>20</i>	Toprakbank A.Ş.	November 2001
<i>21</i>	Pamukbank T.A.Ş.	June 2002
<i>22</i>	Türkiye İmar Bankası T.A.Ş.	July 2003

B. METHODOLOGY

PROMETHEE method is one of outranking methods in the multicriteria analysis. The method deals with the problem from a different perspective and uses the outranking methodology (Cristobal, 2013). It consists in ranking of each alternative from the best to the worst ones, and so thus, produces compromise solution considering all criteria.

PROMETHEE method starts with general comments on multicriteria problems, stressing the additional information for each criterion to gather the ranking score; they are only the weights (priorities) and preference function of all criterion. The method consists in a preference function associated with each criterion as well as weights describing their relative importance. Therefore the preferences and the priorities of decision makers are reflected to the PROMETHEE ranking score.

For the ranking problem, PROMETHEE I has provided a partial ranking for alternatives and PROMTHERE II has provided a complete ranking which is "agreeable" to the decision maker (Brans and Vincke, 1985:647).

In PROMETHEE I, both the leaving flow and entering flow for each alternative are calculated to gather the net flows in order to construct the outranking relation. Leaving flow is the measure of the outranking character while entering flow is the measure of outranked character of an alternative. They represent how an alternative dominates the others and how an alternative is dominated by all other alternatives respectively. Alternatives can be ranked considering both the dominating and dominated power. Difference of the dominating power from dominated power gives the net flow or in other words PROMETHEE ranking score.

Decision problem statement to find the best alternative is stated as follows: given a finite set of alternatives $A = \{A_j, j = 1 \dots n\}$ against a set of criteria, $C = \{C_i, i = 1 \dots m\}$ and weights $w_i, i = 1 \dots m$. The method performs a pair-wise comparison of alternatives in order to rank them with respect to a number of criteria and preference function. To apply the PROMETHEE method for ranking the alternatives, initially data table is constructed including input data of alternatives' performances as well as characteristics of each criterion as weight and preference function with its characteristic. The characteristic of a criterion can be either maximum or minimum. In the initial data table with $m \times n$ dimension, alternatives are located at the column; criteria are located at the row.

The preference function P_i for i . criterion returns a value for the distance of an alternative pair (A_k, A_l) in the interval $[0, 1]$. The distance $d_i = (x_{ik} - x_{il})$ between two alternatives, A_k and A_l is a deviation between two alternatives (between ratios of bank) for a criterion. For each criterion and all possible alternative pairs, $P_i(d_i(A_k, A_l))$ is calculated according to equations (1). As a consequence of this, the decision maker must be able to express the magnitude of his preference, between alternatives on a criterion. Brans and Vinche (1985) have offered six generalized criteria functions for preference namely, usual criterion, quasi criterion, criterion with linear preference, level criterion, criterion with linear preference and indifference area, and Gaussian criterion. One of these functions can be defined for each criterion initially (Brans and Vinche, 1985: 649).

To determine PROMETHEE ranking score, in a visible manner to evaluate the net flows between alternative pairs, PROMETHEE algorithm is given as following steps (Amponsah et.al.2012:114; Brans and Vincke,1985):

1) At the beginning of this analysis, we have determined equal weights and Gaussian preference functions for all criterion. Of five criteria (or ratios) is the minimization type while others are the maximum. They are the ratios R2, R24, R27, R28 and R29. Gaussian preference functions for both maximum and minimum type of criterion is shown in equation (1). After all these, the input table, shows x_{ij} of each alternative A_j on each criterion C_i is prepared.

For maximization criterion

For minimization criterion

$$P_i(A_k, A_l) = \begin{cases} 0, & d \leq 0 \\ 1 - e^{\frac{-d^2}{2\sigma^2}}, & d > 0 \end{cases} \quad P_i(A_k, A_l) = \begin{cases} 1 - e^{\frac{-d^2}{2\sigma^2}}, & d \leq 0 \\ 0, & d > 0 \end{cases} \quad (1)$$

2) Distance d between each alternative pairs is calculated for all criteria with the equation,

$$d_i = (x_{ik} - x_{il}) \quad (2)$$

3) For each criterion and all possible alternative pairs, preference values, $P_i(d_i(A_k, A_l))$ are calculated to reflect the intensity of the decision maker's preference for the alternative A_k over A_l on the same criterion.

4) Calculate the aggregate preference index of alternative pairs for each of all criteria C_i by using the equation (3).

$$\pi_i(A_k, A_j) = \sum_{j=1}^n w_i P_i(A_k, A_j), \quad \text{for } i=1 \dots m \text{ and } k=1 \dots n \quad (3)$$

5) Perform partial ranking PROMETHEE I: Compute the positive outranking flow and the negative outranking flow for alternative A_j using equation (4) and (5) respectively.

$$\phi^+(A_j) = \sum_{i=1}^m \sum_{k=1}^n \pi_i(A_j, A_k) \quad \text{for } j=1 \dots n \quad (4)$$

$$\phi^-(A_j) = \sum_{i=1}^m \sum_{k=1}^n \pi_i(A_k, A_j) \quad \text{for } j=1 \dots n \quad (5)$$

6) Perform complete ranking PROMETHEE II: Compute the net outranking flow for each alternative A_j .

$$\phi(A_j) = \phi^+(A_j) - \phi^-(A_j), \quad \text{for } j=1 \dots n \quad (5)$$

In equation (4), the sum of indices $\pi(A_j, x)$, is sometimes called as the ‘‘leaving flow’’, and shows how ‘good’ alternative A_j is. Therefore, the alternative with the highest leaving flow is superior. On the other side, the sum of indices, $\pi(x, A_j)$, indicates the preference of all other alternatives compared to A_j . This is sometimes called as the ‘‘entering flow’’, and shows how ‘inferior’ alternative A_j is. Therefore, the alternative with the lowest entering flow is superior (Yen et.al., 2011).

The value of the net outranking flow, $\phi(A_j)$ in equation (5), obtained by the difference of sum of leaving and entering flow permits a complete ranking, therefore used as PROMETHEE ranking score. The alternative with the highest net flow (or highest Promethee score) is superior. According to this score, all banks are ranked in order from the most to least preferred and banks' performances come to light in sequence or in order. The alternative at the top of list is therefore the best one which represents the bank is of higher performance than remaining banks. Depending on ranking of banks' performances, includes the failed banks' ranking, enables to extract the failed or no failed risks of the banks in evaluating the performance of deposit banks, considering their bank ratios.

III. EMPIRICAL FINDINGS

PROMETHEE method begins with the process of preparing decision matrix consisted of alternatives and criteria. The alternatives in matrix comprise of banks and criteria comprises of banks' ratios. Therefore, the data table with 49x29 dimensions has been initially prepared for the failed and non failed banks to illustrate the alternatives (banks) in rows and criteria (bank ratios) in columns. The analysis is performed using PROMETHEE GAIA software's academic edition.

In the analysis, Gaussian preference function is selected for all criteria and each ratio is given an equal weight. For all of the ratios, the higher scores imply a better performance of the banks except for R2, R24, R27, R28 and R29. In the analysis we refer to current banks on a code basis starting from B1 to B27. Besides, failed banks are labeled as their original name.

We present the results of PROMETHEE in the form of negative, positive and net flows by ranking scores in the ascending order in Table 3. Given the results of composite solution, private bank B5 is in the best position. Private bank is followed by the public bank B1. Three of private banks, B12, B13 and B14 are at the following order, ranking in the top 5 of the list. Additionally, two of previously failed banks, Pamukbank and Bank Ekspres have taken a place in top ten. This is very interesting result in our study and there can be various reasons. First, the bank, probably, has healthy banking activities in previous year and in turn, its management decisions may cause to turn down in performance because of lack of performance management system. Second, bank holding companies, in contrast to depository and commercial banks, frequently operate in multiple markets and therefore some financial ratios can be dominated by others (Rivard and Thomas, 1997: 69). Additionally, these banks had given importance to the financial improvements in the short run. Finally, the year 2014 can be considered as an unstable year for some banks relatively.

On the other side, only one foreign owned bank, B21 has taken a position in top ten. Private bank, B4 has taken a position nearly at the bottom, before two of remaining failed banks. Some of privately owned banks and of foreign owned banks are distributed everywhere in the list; in the middle or near the bottom of the list.

The banks, having positive net flows, have dominated the other banks with their performances on 29 banking ratios. Contrarily, the banks having the negative net flows have been dominated by the other banks. In Table 3, current 13 banks after 23th row have the negative net flows. The current public banks seem to be very strong since there are no public banks among the banks with negative net scores. Half of the banks with negative scores are private banks and the other half are foreign owned banks.

Table 3. PROMETHEE ranking of the banks

Rank	Banks	ϕ	ϕ^+	ϕ^-
1	B5	0,3544	0,5237	0,1693
2	B1	0,3341	0,5226	0,1885
3	B12	0,289	0,4893	0,2003
4	B13	0,2697	0,4774	0,2076
5	B14	0,268	0,4709	0,2029
6	B3	0,2466	0,4598	0,2132
7	B2	0,2374	0,4591	0,2217
8	B21	0,2093	0,4454	0,2362
9	Pamukbank TAŞ.	0,1814	0,4536	0,2722
10	Bank Ekspres AŞ	0,1798	0,4363	0,2564
11	B16	0,1462	0,4047	0,2585
12	B19	0,1445	0,4109	0,2663
13	Demirbank	0,1368	0,4171	0,2802
14	B17	0,1085	0,3809	0,2724
15	Egebank Aş	0,0839	0,3481	0,2642
16	Eskişehir Bankası TAŞ	0,0739	0,3564	0,2826
17	B20	0,0559	0,3302	0,2742
18	Türk Ticaret Bankası	0,0399	0,3498	0,3099
19	B11	0,0369	0,317	0,2801
20	B22	0,03	0,3153	0,2854
21	Türkiye Tütüncüler Bankası-Yaşarbank AŞ	0,0268	0,3336	0,3068
22	Sümerbank AŞ.	0,0028	0,316	0,3132
23	B25	-0,0064	0,3076	0,314
24	B27	-0,0085	0,2842	0,2926
25	Kent Bank AŞ	-0,0339	0,2735	0,3074
26	B15	-0,0363	0,2676	0,3039
27	B7	-0,0419	0,2628	0,3047
28	B24	-0,0691	0,2524	0,3215
29	B6	-0,0731	0,2427	0,3158
30	Interbank	-0,0826	0,3708	0,4533
31	Etibank AŞ.	-0,0834	0,2593	0,3427
32	Yurt Ticaret ve Kredi Bankası AŞ.	-0,0922	0,2847	0,3769
33	B23	-0,0967	0,2476	0,3444
34	B26	-0,098	0,2918	0,3897
35	B10	-0,1024	0,232	0,3343
36	Bayındır Bank AŞ.	-0,1069	0,249	0,3559

37	Bank Kapital Türk AŞ.	-0,1079	0,2372	0,3451
38	B18	-0,1138	0,2357	0,3494
39	B8	-0,1231	0,2293	0,3524
40	B9	-0,1474	0,212	0,3593
41	Toprak Bank AŞ.	-0,1757	0,2227	0,3984
42	B4	-0,1929	0,2399	0,4328
43	Ulusal Bank	-0,198	0,2693	0,4674
44	Türkiye İmar Bankası TAŞ.	-0,2051	0,195	0,4001
45	Türkiye Emlak Bankası AŞ.	-0,2067	0,2796	0,4863
46	İktisat Bankası TAŞ	-0,2374	0,2425	0,4799
47	Ege Giyim Sanayicileri AŞ	-0,2503	0,2141	0,4644
48	Milli Aydın Bankası TAŞ.	-0,2597	0,2297	0,4894
49	Sitebank AŞ.	-0,3066	0,1986	0,5052

Should PROMETHEE ranking results generally interpreted, there are two specific and interesting cases. In the first place, contrary to our expectations, results show that some of privately and foreign-owned banks are placed either in the middle or near the bottom of the list. In the second place, two of previously failed banks far outperform some of the public, private and foreign-owned banks operating currently in Turkey.

Net flows of the banks have been illustrated in Figure 1 as demonstration purposes of overall picture of banks' position. Figure 1 gives the relative position of the banks in Gaia plane. In this plane, the similar banks are expected to have a close position to each other. Besides, ratios reflecting similar performances are represented by axis orienting in similar directions. Furthermore, ratios close to decision axis which reflects the PROMETHEE II ranking are considered the most effective ratios in determination of banks performances. On the other hand, ratios orienting in opposite direction compared to decision axis are considered as conflicting ratios. Last but not least, the length of the criterion axis has important implications on the position of the banks, as the longer a criterion axis is, the more selective power that criterion axis has on the results.

According to the Figure 1, it can be seen from the general pattern that the banks failed between 1997-2003 are clustered as their position is substantially close to each other. However, one of the failed banks, namely Pamukbank, is segregated from all other failed banks. According to the decision axis bank B5 is in the best bank position in terms of composite solution. This bank is followed by B1, B12, B13, B14, B3 and B2. These banks in particularly have better performance in ratios relating sector shares and branch ratios. Besides, ratio 29 ((Salaries and Employee Benefits+ Reserve for Retirement)/T.Assets) also has a significant influence on

determining the decision axis and relatively better banks accordingly, although its effect is lower compared to R1, R21, R22 and R23.

Figure 1 in which, the banks are introduced with respect to net flows and positive outranking flows. The bank B26, which is one of the privately owned banks, has dominated the others with the best performance on 29 banking ratios. Other privately owned current bank B4 takes a place in second order at the top. This bank is followed by the foreign-owned banks B17 and B21.



Figure 1. The banks in the GAIA plane

In figure 2, the bank ratios are presented in detail to define the effective ratios on determining the composite solution. As shown in figure 2, main liquidity ratios, R4, R5 and R6 are not dominant ratios while constructing the PROMETHEE ranking, similarly some of the ratios related to the activity, R3, R10, R24, R27 and R28. The ratios, some of them are R1, R12, R21, R23 and R29 within the same

direction with the decision line are dominant ratios in constructing the PROMETHEE ranking.

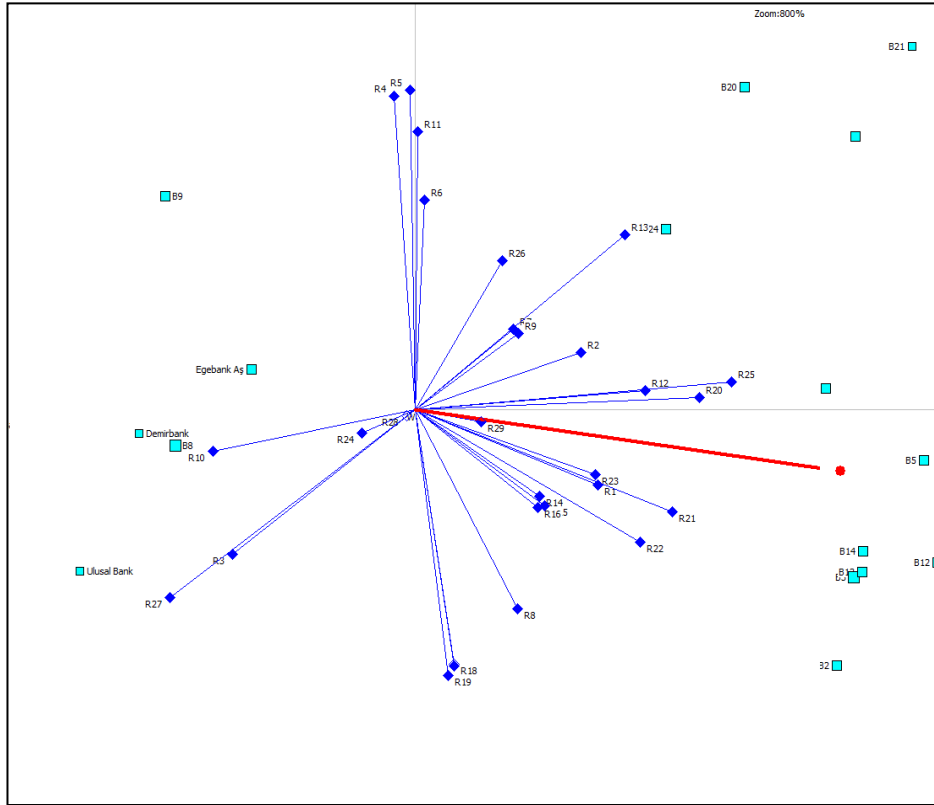


Figure 2. The Ratios and Their Effects in Determining the Composite Solution

CONCLUSION

Performance of the banks in an economy constitutes one of the most important aspects of economic activities, not only because they provide the funds necessary for further development, but because they are highly integrated with the whole economy. This important role and characteristic of the banks highlight the importance of early warning systems for bankruptcy and performance evaluations. The principal concern of this study is then to evaluate the performance of banks in Turkish banking system and to obtain a ranking based on their financial ratios, by using a multi-criteria decision making method. To this end, we have employed

PROMETHEE method, using data extracted from Banking Regulation and Supervision Agency's website.

Our results can be interpreted in two ways. In the first place, we obtain a ranking of the current deposit banks in Turkey, which can be used to assess about the relative position and performance of each bank. Secondly, merging the failed and non-failed banks, we also present possible early warnings for bank failure, depending on the PROMETHEE scores.

Our principal findings show that some of privately owned and all of publicly owned current banks are quite sound in terms of their financial ratios. On the other hand, our results indicate that some of privately and foreign-owned banks have significantly poorer performance in terms of the 29 ratios considered. In particular, given the data set and the methodology employed, we conclude that especially some small scale private banks and two public banks in Turkey are more likely to experience financial problems. Some of private banks in poor performance are B4, B6, B7, B8, B9 and B10. The foreign owned banks in poor performance are B18, B23, B26. Most surprisingly, two of previously failed banks, Pamukbank and Bank Ekspres A.Ş. are found to rank in a better position compared to some of currently operating banks. According to findings, all current public banks such as B1, B2 and B3 seem to be very strong and they lead the way at top 7 like to some of the privately owned banks, B5, B12, B13 and B14 in the PROMETHEE ranking.

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