



EFFICIENCY MEASUREMENT OF THE TURKISH LEADING BANKS BY USING DATA ENVELOPMENT ANALYSIS

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Abstract: Data Envelopment Analysis is a method based on linear programming and used to evaluate the relative effectiveness of decision making units which are responsible for setting the inputs or outputs by using similar outputsⁱ.

In this paper, the relative efficiency of Turkish Banks measured according to five main indicators in 2013, 2014 years. Ten leading banks which ranked at top ten largest banks according to asset size, used in this study. Efficiency concept divided into two groups; Organisational Efficiency and Pricing Efficiency defined by input and output variables. To solve the models DEA Solver™ software was used.

Key Words: Data Envelopment Analysis, Efficiency, Performance, Financial Sector

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Introduction :

Data Envelopment Analysis (DEA) was named because of the way it "envelops" observations in order to identify a "frontier" that is used to evaluate observations representing the performances of all of the entities that are to be evaluated. Uses of DEA have involved a wide range of different kinds of entities that include not only business firms but also financial sector, government and non-profit agencies including schools, hospitals, military units, justice systems as well as countries, regions, etc. The term "Decision Making Unit" (DMU) was therefore introduced to cover, in a flexible manner, any such entity, with each such entity to be evaluated as part of a collection that utilizes similar inputs to produce similar outputs. These evaluations result in a performance score that ranges between zero and unityⁱⁱ.

In this study, we used Turkish Leading Banks financial and organisational data which available publicly in year 2014 and 2013.

In alphabetical order, Ten leading banks used in this study are; AKBANK, DENİZBANK, FİNANSBANK, GARANTİ, HALKBANK, İŞ BANKASI, TEB, VAKIFBANK, YAPI KREDİ, ZİRAAT.

Number of Branch, Number of Personel, Deposit, Credit and Profit are the five selected figures to measure the efficiency of banks during the years of 2013 and 2014.

2014 Selected Figures of Leading Turkish Banks

	Number of Branch	Number of Personel	Deposit (Mio.TL)	Total Credit (Mio.TL)	Profit (Mio.TL)
AKBANK	991	16.305	113.373	158.778	3.160
DENİZBANK	716	13.187	43.101	63.000	566
FİNANSBANK	658	12.830	42.075	58.838	877
GARANTİ	1.002	19.036	120.308	170.173	3.200
HALKBANK	900	17.314	103.708	133.260	2.206
İŞ BANKASI	1.358	24.308	133.551	198.131	3.382
TEB	551	10.142	39.439	56.852	623
VAKIFBANK	893	14.920	91.757	132.977	1.753
YAPI KREDİ	1.003	17.457	105.120	169.013	1.845
ZİRAAT	1.707	23.617	153.255	182.167	4.051

TABLE - 1

2013 Selected Figures of Leading Turkish Banks

	Number of Branch	Number of Personel	Deposit (Mio.TL)	Total Credit (Mio.TL)	Profit (Mio.TL)
AKBANK	986	16.249	105.277	141.042	2.942
DENİZBANK	689	12.822	35.632	56.583	454
FİNANSBANK	674	13.967	38.322	49.334	734
GARANTİ	998	18.738	106.474	151.330	3.006
HALKBANK	877	14.798	100.756	111.452	2.751
İŞ BANKASI	1.309	24.129	120.975	172.855	3.163
TEB	545	10.002	34.288	49.137	535
VAKIFBANK	859	14.943	81.533	109.838	1.586
YAPI KREDİ	949	15.683	86.308	132.484	3.203
ZİRAAT	1.661	24.725	141.735	140.468	3.330

TABLE - 2

In this study two efficiency measurements run by using different combination of data above as input and output in models. The number of Decision Making Units selected according to number of inputs and outputs. ⁱⁱⁱ

	INPUTS	OUTPUTS
Model 1-) Organisational Efficiency	- Number of Branch - Number of Personnel	- Deposit - Credit - Profit
Model 2-) Pricing Efficiency	- Deposit - Credit	- Profit

TABLE - 3

In Model 1, "Organisational Efficiency" is defined as the relative Deposit, Credit and Profit outcome by using two Organisational inputs; number of branch and personel.

In Model 2, "Pricing Efficiency" is defined the relative Profit outcome by using two financial inputs; credit and deposit.

The Model 1 outcomes that the three privately owned banks keep the relative Organisational Efficiency level frontier in consecutive years. Surprisingly, three state owned banks have higher Organisational efficiency level compared to four private banks.

	2014		2013	
Decision Making Units	Rank	Score	Rank	Score
YAPI KREDİ	1	1	1	1
AKBANK	1	1	1	1
GARANTİ	1	1	1	1
HALKBANK*	4	0,96	1	1
ZİRAAT*	5	0,933	7	0,842
VAKIFBANK*	6	0,917	5	0,883
İŞ BANKASI	7	0,874	6	0,878
TEB	8	0,613	8	0,601
FİNANSBANK	9	0,533	10	0,517
DENİZBANK	10	0,521	9	0,544

TABLE - 4

*: state owned banks

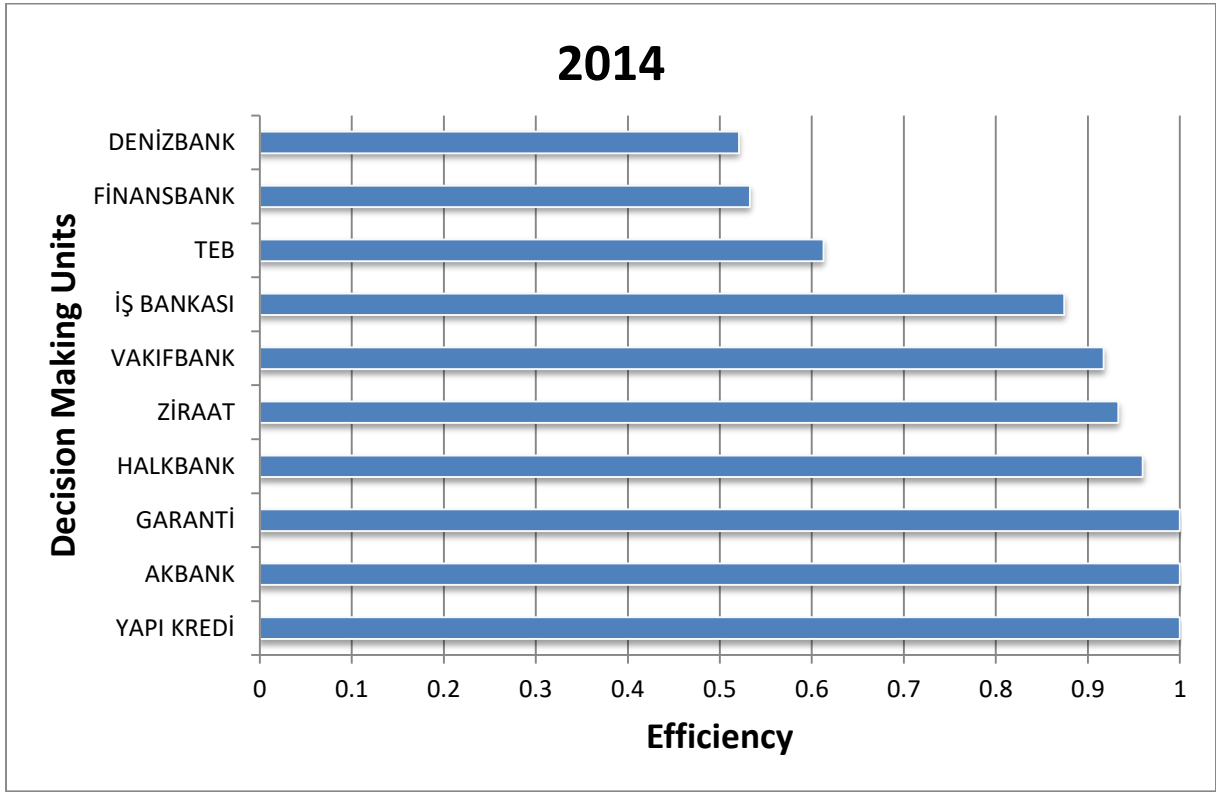


TABLE - 5

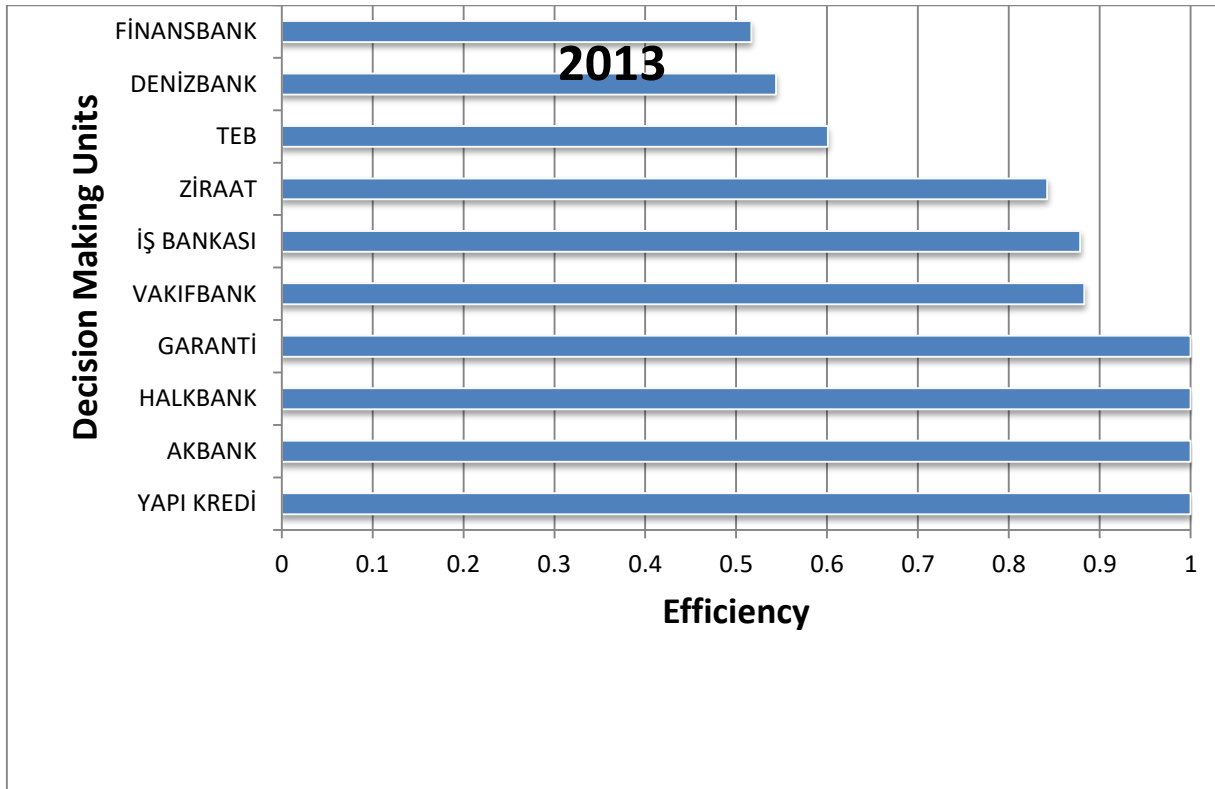


TABLE - 6

“Pricing Efficiency” In Model 2, shows slightly volatile structure compared to previous year. Thats is probably due to the factors not retated to credit and deposit pricing but has strong effect on profit.

2014			2013	
DMU	Rank	Score	Rank	Score
ZİRAAT	1	1	3	0,960
AKBANK	1	1	4	0,856
GARANTİ	3	0,954	5	0,818
İŞ BANKASI	4	0,909	6	0,754
HALKBANK	5	0,785	1	1
FİNANSBANK	6	0,749	7	0,609
VAKIFBANK	7	0,686	8	0,593
YAPI KREDİ	8	0,630	1	1
TEB	9	0,566	9	0,449
DENİZBANK	10	0,471	10	0,343

TABLE - 7

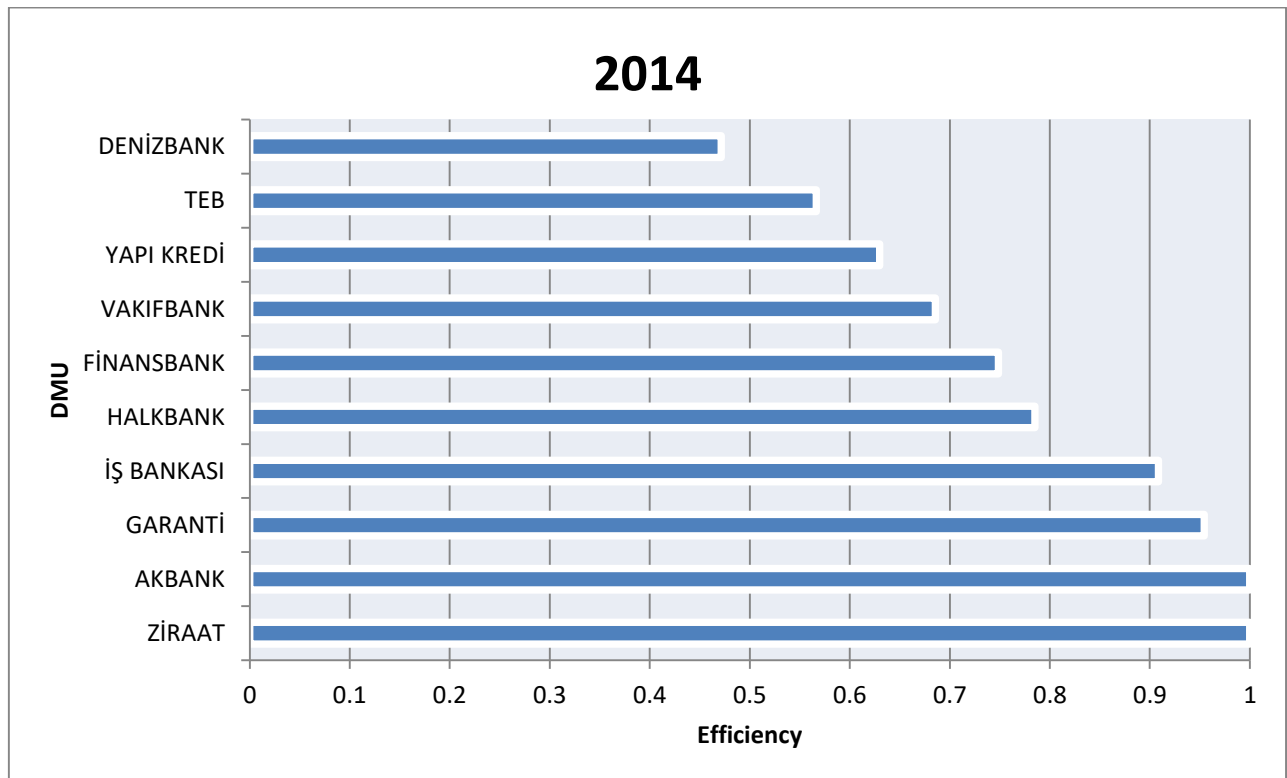


TABLE - 8

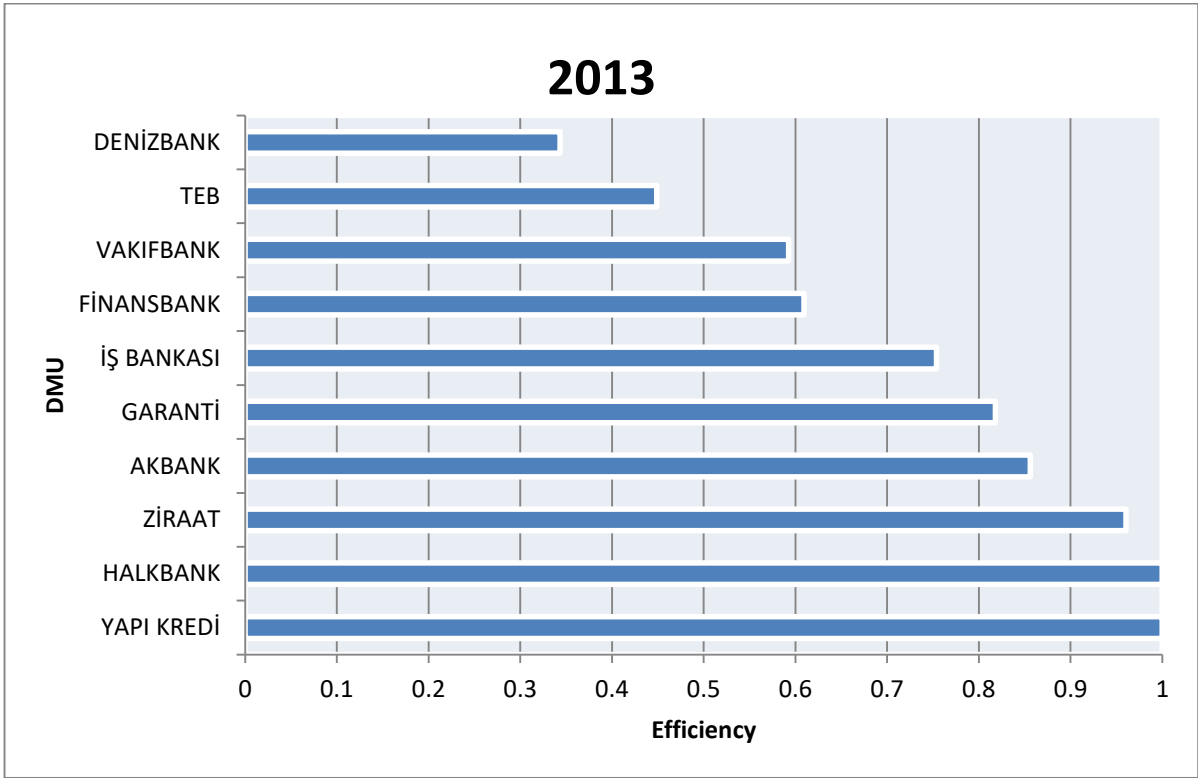


TABLE - 9

		2014	
Pricing	efficient	Ziraat	Akbank
	inefficient	<div style="background-color: red; color: black; padding: 2px;">İş Bankası</div> Halkbank <div style="background-color: red; color: black; padding: 2px;">Finansbank</div> Vakıfbank TEB Denizbank	Garanti Yapı Kredi
		inefficient	efficient
		Organisational	

		2013	
Pricing	efficient		Halkbank Yapı Kredi
	inefficient	Ziraat <div style="background-color: red; color: black; padding: 2px;">İş Bankası</div> Finansbank Vakıfbank TEB Denizbank	Akbank Garanti
		inefficient	efficient
		Organisational	

TABLE – 10

Red color hightled banks keep their position in consecutive two years

Conclusion :

5 leading Banks, İş Bankası, Finansbank, Vakıfbank, TEB, Denizbank seem to be both Organisational and Pricing inefficient compared to other banks, in 2013 and 2014.

Halkbank was the most efficient bank both organisational and pricing in 2013. In 2014, bank became organisational and pricing inefficient relative to other banks.

Garanti Bank kept its pricing inefficient-organisational efficient position in two years.

Yapı kredi Bank, moved from full efficient position to pricing inefficient-organisational efficient position.

Ziraat Bank, moved from full inefficient position to pricing efficient-organisational inefficient position.

Akbank, in 2014, moved from pricing inefficient to organisational efficient position.

As Data Envelopment Analysis implies inefficiency is not an absolute inefficiency but its relative and frontiers financial figures have great impacts on the results.

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TABLE – 5 : Sorted DMU Graph According to Model-1 Score - 2014

TABLE – 6 : Sorted DMU Graph According to Model-1 Score - 2013

TABLE – 7 : DMU, Model – 2 Pricing Efficiency Scores 2014-2013

TABLE – 8 : Sorted DMU Graph According to Model-2 Score - 2014

TABLE – 9 : Sorted DMU Graph According to Model-2 Score - 2013

TABLE – 10 : Pricing Efficiency vs Organisational Efficiency (2014-2013)

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Bank list in alphabetical order ;

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www.denizbank.com.tr

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www.garanti.com.tr

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Endnotes :

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