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The Efficiency of Participation and Conventional Banks in Turkey: Using Data Envelopment Analysis*

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Abstract

The comparison of performances of participation banks operating through profit and loss sharing (PLS) paradigm with conventional banks is a matter of discussion in international literature. This study analyzes the efficiencies of 26 private conventional banks and 4 participation banks in 2006 and 2009 through the data envelopment analysis (DEA) method. The DEA results reveal that while 3 out of 10 banks, identified inefficient in 2006, were participation banks, in 2009, only 1 out of 11 banks, identified inefficient, was a participation bank.

Keywords: Interest-free Banking, Profit and Loss Sharing, Bank Efficiency, Banking System
JEL Classification Codes: G21, C14

1. Introduction

The activities of participation banks operating in reliance on interest-free banking method are also defined as *Islamic Banking* in international literature. Islamic banks are interpreted as financial institutions which base their whole "loan" business on the principle of Profit and Loss Sharing (PLS) with the entrepreneurial partners (Nienhaus, 1983, p. 31). In a sense, they can be defined as alternative to modern banks (Van Schaik, 2001, p.46). Under Shariah principles, the Islamic financial institutions must observe four fundamental principles.

- All transactions must be interest-free.
- Must avoid speculation.
- Must recognize the practice of alms (zakat)
- Must avoid operations supporting the production and consumption of goods and services not compatible with the Islamic view (Samad, 2004).

There are currently over 300 institutions in 80 countries involved in interest-free banking. The interest-free funds have amounted from only 150 billion dollars in the 1990s to over 1 trillion dollars in the last 5 years. This represents a 23 pct annual growth; analysts also expect that the volume of these

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funds will reach to 1.5 trillion dollars by 2013 (Participation Banks, 2009, p.29). Both Muslim and non-Muslim countries now allow interest-free banks to operate considering the growing interest in their activities. Although the history of interest-free banking dates back to time, the first modern Islamic Bank was established in Egypt in 1963; the first example in a non-Muslim country is the Islamic Bank of Britain (2004) (Chong and Liu, 2009). It is also now possible to see interest-free financing devices among the instruments of conventional banks in many countries. Conventional banks operating in reliance on domestic capital as well as international banks including Citi Bank, American Express Bank and HSBC employ such devices and mechanisms in their operations (Shaikh and Jalbani, 2008, p.1).

The participation banks are the institutions that operate based on PLS paradigm. The term of Islamic PLS means that the relationship between the borrower, lender and intermediary depends upon financial trust and partnership (Yudistira, 2003, p.2). The basic difference between the participation banks that are not only subject to conventional legislation but also have to consider Islamic rules and the conventional banks is the obligation to observe PLS paradigm and the Islamic rules. This means that the participation banks are subject to double restriction and control compared to the conventional banks.

The evaluation of performances of both conventional and participation banks is important for the consideration of regulatory authorities, the bank management and the depositors. Moreover, the performances of participation banks as equal partners and players in the banking system will be effective for financial stability (Majid, 2010: p.52). In case of a difference between the performances of Islamic and conventional banks, such difference should be noticed immediately so that proper measures are taken to straighten the system up (Majid, 2010: p.52).

Some discrepancies are observed when comparing the performances of participation banks with those of conventional ones. The following are the explanations of possible causes of these discrepancies that can be observed in performances.

Thanks to their PLS paradigm, the participation banks are able to deliver their resource allocation more effectively because the selection of investment alternatives is determined based on their productivity and the expected rate of return (Iqbal, 1997, p.42). Operating through the PLS paradigm, the participation banks have the opportunity of reflecting their financial losses to the customers. This may mean they are able to balance exogenous shocks more effectively (Errico and Farahbaksh, 1998, p.11; Khan and Mirakhor, 1990, p. 356-357). But operating through the PLS may also put the participation banks at greater risk when the borrowed funds are returned. This requires further efforts to distinguish the good-faith customers from the ill-faith than the conventional banks do. The participation banks have to carefully monitor the borrowers and the investments to ensure truthful reporting of profit and losses. In the same way the depositors also have to follow their banks more closely and more carefully than the customers of conventional banks with a concern of fund returns (Chong and Liu, 2009). Therefore, PLS paradigm is able to make the participation banks work more effectively than the conventional banks.

The participation banks may skip fairly profitable investment opportunities due to the obligation to ensure compliance of the operations with Islamic rules (Samad, 2004). It has been found in many empirical researches that the change in interest rates may affect not only the deposits in conventional banks but also the deposits kept in participation banks.[1] The existence of such an arbitrage can have negative influence on the performances of participation banks. The performance of the participation banks may fall behind the performance of the conventional banks due to some major factors including their competition with the conventional banks offering interest-free products, their failure to have an extensive interbank market and their inexperience in integrating with the international markets.

[1] The examples of studies which have found this result; Kaleem and Isa (2006), Kassim, Majid and Yusof (2009), Haron and Ahmad (2000) Kasri and Kassim (2009), Sukmana and Kassim (2010)

There are many studies in literature in which the performances of participation banks are analyzed by comparison between each other (Yudistira (2004), Hassan and Bashir (2003), Saleh and Zeitun (2006), Al-Delaimi and Al-Ani (2006)) or with conventional banks.[2] But the empirical results of these studies do not suggest any agreement concerning in which groups the efficiency is higher.

In his study where he compared the activities of Islamic banks with conventional banks with ratio analysis for Malaysian economy, Samad (1999) found that the conventional banks are superior in terms of management efficiency but the results of production efficiency are not clear. In another study by Samad and Hassan (1999), a full-fledged Islamic bank was compared with 8 conventional banks in terms of profitability, risk and solvency, liquidity and contribution to the economy and Muslim community. The authors have identified that the participation banks are less risky, have greater amounts of liquidity and feature poorer profitability than other banks. Kamaruddin, Safa and Mohd (2008), in their review on Malaysian national economy, compared two banks operating only through the interest-free banking in terms of cost and efficiency of profitability with 12 domestic and foreign banks offering also interest-free banking instruments; they found that the efficiency of profitability of Islamic banks is better than their cost efficiency. The authors compared the efficiency results with the studies examining the performances of conventional banks in the west in the same period and expressed that the Islamic banks operate twice ineffective as the conventional banks in cost efficiency.

Samad (2004) evaluated the performances of 15 conventional and of 6 Islamic banking institutions for Bahrain economy in terms of profitability, liquidity and credit risk through the ratio analysis and found that there is no significant difference between profitability and liquidity; however, there is a significant difference in terms of credit performance. In the study, Samad noted that the Islamic banks operate with lower credit risk than the conventional banks. Hussein (2004), in a study focusing on the Bahrain economy, compares 8 Islamic banks – one is conventional and other seven are investment banks –with 8 non-Islamic banks – 5 conventional and remaining three investment banks. He finds that the profitability efficiency is higher in Islamic banks than the conventional ones. But it is underlined that the difference stems from conventional banks rather than the investment banks. Grigorian and Manole (2005) checked the performance of banking system in Bahrain against 3 countries from the Gulf Region and Singapore using DEA method. The study found that there is not any significant statistical difference between the efficiency of Islamic and conventional banks in Bahrain economy.

In another ratio analysis study comparing the liquidity performances of conventional and Islamic banks made for Bangladesh economy, Islam and Chowdhury (2009) found that the Islamic banks have a better liquidity performance than the conventional ones.

Mohammad, Hassan and Bader (2008) examined the cost and profitability efficiency of 37 conventional and 43 Islamic banking institutions in 21 countries that are members of Organization of Islamic Conference (OIC) using Stochastic Frontier Approach (SFA) method. They came to the conclusion that there are not any significant differences between the two groups in terms of total efficiency. The same authors also analyzed the cost, income and profitability efficiency of 18 conventional and 22 Islamic banking institutions in 11 countries that are members of (OIC) using DEA method and found similar results (Hassan, Mohammad and Bader, 2009). In another cross-country study by Johnes, Izzeldin and Pappas (2009), the efficiency of 19 Islamic and 50 conventional banks operating in the Gulf Region was compared through DEA method and ratio analysis. The authors found that while the Islamic banks, according to the ratio analysis, are more efficient in terms of profitability and income but less efficient in terms of cost efficiency, they are less efficient in terms of average efficiency according to DEA results. Majid (2010) compared the Islamic banking with conventional banks in terms of efficiency and scale for 10 countries and tried to locate a relation with peripheral factors. According to the scale, he found that the rate of return is lower in conventional

[2] The ratio analysis and DEA are among the most frequently used methods while searching an answer to this question in empirical studies.

banks than the Islamic ones (except the economies of Jordan and Malaysia). Moreover he came to the conclusion that the efficiency scores of Islamic banks are higher than the conventional ones.

This study intends to compare the participation banks with private conventional[3] banks operating in Turkish banking system in the years 2006 and 2009 in terms of efficiency using DEA method. It seeks to evaluate their performance 2006 when the participation banks became subject to the same regulations as conventional banks and in 2009 in an attempt to have an idea about to what extent this period caused a change in the participation banks' efficiency position. The second part of the study deals with the place of participation banks in Turkish banking system; the subsequent section examines the method to be used in the study and the set of data. Section four gives the results of DEA which are interpreted in the final section.

2. Participation Banking in Turkey

In Turkey, the participation banks were first introduced under the name of *Special Finance Houses* in 1985 following completion of the legal arrangements between 1983 and 1985. Under new regulations promulgated in 2005, the names of these institutions were converted to participation bank and they were subjected to the same regulations as conventional banks in 2006. Although the number of these interest-free banking institutions was 7 at the beginning, this figure is now 4. The activities of Ihlas Finans were terminated in 2005 by Banking Regulation and Supervision Agency and in the end of 2005 Anadolu Finans and Family Finans merged into the name of Turkiye Finans. The four active participation banks are Albaraka Turk, Bank Asya, Kuveyt Turk and Turkiye Finans.

Table 1: Selected Banking Indicators of Participation and Conventional Banks in Turkey

(%)	Participation Banks					Conventional Banks				
	2005	**2006**	**2007**	**2008**	**2009**	**2005**	**2006**	**2007**	**2008**	**2009**
Share in Total Assets	2.69	3.04	3.67	3.90	4.50	97.31	96.96	96.33	96.10	95.50
Share in Total Loans	5.05	5.11	5.59	5.72	6.82	94.95	94.89	94.41	94.28	93.18
Share in Total Private Loans	5.14	5.20	5.68	5.86	7.04	94.86	94.80	94.32	94.14	92.96
Share in Total Deposits	3.52	3.83	4.34	4.41	5.46	96.48	96.17	95.66	95.59	94.54
Share in Total FX Deposits	4.70	5.19	5.97	5.39	6.05	95.30	94.80	94.03	94.61	93.95

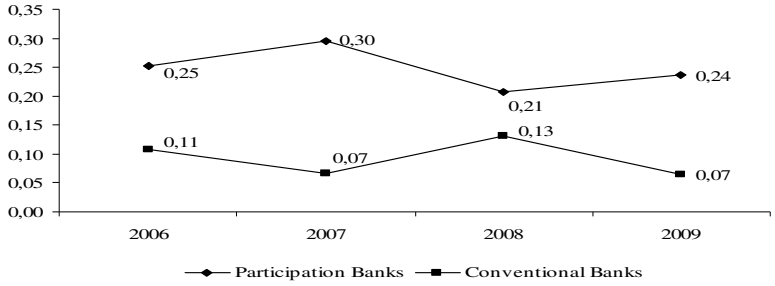
Source: Calculated from Central Bank of the Republic of Turkey Electronic Data Delivery System

Table 1 provides some ratios on participation banks and conventional banks for the purpose of seeing the development of participation banks after 2005. In this 5-year period, it can be seen that the in-system weight of the participation banks operating in Turkey has visibly increased. These banks target to increase their in-system total stakes up to 10% in the near future (Participation Banks 2009, p.5).

Graph 1 provides the annual rate of change in total real size of assets of participation banks and conventional banks doing business in Turkey between 2006 and 2009. The size of assets of participation banks refers to a greater development than that of conventional banks in the given period. Considering the higher rate of development displayed by the interest-free finance markets in international markets, it is necessary to expect the participation banks in Turkey will continue to increase their in-system weight.

[3] In this paper, the term "conventional" defines an interest based deposit banks.

Graph 1: Annual Growth Rate of Total Assets



3. Methodology

The efficiency analysis of financial markets can be made through two ways: the ratio analysis and the frontier efficiency analysis. The ratios used in measuring the performance of the banks measure the relationship between the two variables selected to reveal the different aspects of banks' complex activities in terms of various respects like liquidity, profitability, capital adequacy, asset quality and risk management. Thanks to interpretation and calculation ease, this method is frequently used; however, there are many limitations involved. For example, through each ratio only one aspect of activities of banks which are already complex organizations can be studied. An unlimited number of ratios often cause perplexing and inconsistent results thereby making the method unsuitable for evaluating the general performance. Because of not being able to determine the top of the range in any homogenous group and not being able to make a calculation with more than one input and output, the ratio analysis is incapable of measuring efficiency. These limitations of ratio analysis lead to emergence of more complex performance measuring methods. One of these methods, the frontier efficiency analysis uses two methods one of which is parametric and the other is nonparametric. In this approach the relative efficiency of production units is measured based on the deviation from the most efficient frontier, the most efficient frontier can be determined and efficient production units can be distinguished from inefficient ones. The level and resource of inefficiency can be detected through both the services produced without using additional resources and the decrease in cost of operations (Paradi et. al., 2004, p.350-352).

In this study, DEA, one of the most frequently used methods among the nonparametric methods used in evaluating the performance of decision making units (DMUs), is employed. Based on linear programming, the DEA is used for evaluating the performances of similar decision making units which transform multiple inputs into multiple outputs with respect to each other. Built for measuring the efficiency of one decision unit with respect to the similar decision units by adopting the best observatory efficiency frontier, the first DEA model was first developed by Charnes, Cooper and Rhodes (1978) (Cooper et al., 2004, p.1-4). The two of most frequently used methods in DEA are the CCR[4] model suggested by Charnes-Cooper-Rhodes in 1978 and the BBC[5] model developed by Banker-Charnes and Cooper in 1984. The basic difference between these two models is the method on how to deal with the returns to scale. The first model presumes that the decision units operate with

[4] For the study for which Charnes-Cooper-Rhodes developed the CCR data envelopment analysis by transforming the fractional model built for the measurement system of any decision unit into linear programming method, see Charnes, Cooper and Rhodes (1978).

[5] For the details of BBC model developed depending upon the variable return to scale through bringing $\sum_{j=1}^{n}\lambda_j=1$ constraint to the CCR model which has been built for measuring the efficiency of each decision unit depending on the fixed income hypothesis, see Banker, Charnes and Cooper (1984).

constant return to scale; nevertheless, in the second model variable return to scale is taken into consideration (Jemric and Vujcic, 2002, p.5).

In using DEA, it is necessary to determine which approach is to be used in the selection of inputs and outputs; it is also essential to make sure that the selected approach is input or output oriented.

The DEA models could be established for either input-minimization or output-maximization purposes. While it is aimed to use minimum input usage to get the actual current output level in the model identified as input approach, it is intended to get the maximum output level that could be obtained through the actual current input level in the output approach (Cooper et al., 2007, p.115).

There are two approaches used as the baseline of determining the inputs and outputs to measure the efficiency of banking system: production and intermediation. In the production approach, the banks are considered as the firms using capital and labor to produce the deposit and credit accounts existing in different categories (Colwell and Davis, 1992, p.113). In the intermediation approach, on the other hand, to produce the credits and other assets, the banks use the capital and the labor with the items that entail financial based on deposits (Fortin and Leclerc, 2007, p.1). The second approach basically relies on the role of the financial institutions as intermediaries in the fund transfer process.

The basic difference between the two approaches is that while the financial earning assets are considered as outputs and liabilities, labor and physical capital are regarded as inputs in the intermediation approach; both the financial earning assets and liabilities (deposits) are considered as outputs in the production approach. But there is no agreement on which approach is to be used in the analysis of the efficiency of the banks (Drake and the others, 2009, p.3). Although both approaches are imperfect, each features some degree of advantage over the other. The production approach is more suitable for measuring the efficiency of branches; however, the intermediation approach is more suitable for evaluating all the financial institutions (Berger and Humprey, 1997, p.197). Like many of the studies existing in the literature, the inputs and outputs used in this study are selected in accordance with the intermediation approach.

The inputs are defined in DEA as:

- Deposits
- Fixed Assets
- Shareholders' Equity
- Personnel Expenses

The outputs are defined as:

- Total Loans
- Total Operating Income

The input-oriented BBC model for the DMU that forms the base of this study can be written formally as:

$$\theta^* = min\,\theta$$

Subject to;

$$\sum_{j=1}^{n} \lambda_j \chi_{ij} \leq \theta x_{i0} \quad i = 1,2,...,m$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} \geq y_{r0} \quad r = 1,2,...,s$$

$$\sum_{j=1}^{n} \lambda_j = 1$$

$$\lambda_j \geq 0, \quad j = 1,2,...,n$$

Here y_{rj} shows the amount of *r* outputs produced by *j* DMUs and y_{ij} shows the amount of *i* inputs used by *j* DMUs. The value of θ that shows the technical efficiency of *j* DMUs will be 1 or lower than 1. That DMUs takes the value of 1 demonstrates that it is efficient in terms of technical side

and won't reduce the current input composition without reducing the outputs. If the score is lower than 1 the DMU is technically inefficient and it means that while the DMU continues to produce inputs with the same level, it can reduce the input composition (Zhu, 2009, p.5).

In this study, the efficiency of the banks for 2006 and 2009 years is analyzed. 2006 is selected since it is time when the participation banks first started to operate in the same status as the conventional banks. In analyzing the results for the years 2006 and 2009, we tried to assess the change in the performances of participation banks for the entire period. Because the participation banks are private equity firms, the private conventional banks are considered as the other observation unit. For each of 2006 and 2009 years, 26 conventional and 4 participation banks are used as DMU. Owing to the fact that they have no inputs as the credit value, The Ada Bank and JP Morgan are not included in the analysis. The data on the units of participation banks are provided by The Participation Banks Association of Turkey and the data on the conventional banks are provided by The Banks Association of Turkey.

4. Efficiency Results

Table 3 provides the efficiency values of private equity conventional banks and the participation banks operating in 2006 in Turkey, calculated by using Frontier Analyst software. It is seen that out of the 30 banks analyzed, 10 banks, 3 of which are participation banks are far from the efficiency frontier and that the small-size banks demonstrate a better performance as observed in the ranking, especially in the group of foreign banks.[6]

Table 3: Efficiency Score of Banks in 2006

Private Domestic Conventional Banks (12)	Efficiency Score	Efficiency	Reference Count
Alternatif Bank A.S.	100,00	Yes	7
Tekstil Bankasi A.S.	100,00	Yes	1
Turkiye Is Bankasi A.S.	100,00	Yes	0
Seker Bank T.A.S.	100,00	Yes	2
Turkiye Ekonomi Bankasi A.S.	100,00	Yes	4
Oyak Bank	100,00	Yes	0
Turkiye Garanti Bankasi A.S.	100,00	Yes	1
Akbank T.A.S.	100,00	Yes	2
Yapı ve Kredi Bankasi A.S.	100,00	Yes	3
Anadolu Bank A.S.	74,46	No	0
Tekfen Bank	73,80	No	0
Turkish Bank A.S.	44,29	No	0
Foreign Conventional Banks (14)			
Habib Bank Limited	100,00	Yes	10
Banka di Roma	100,00	Yes	1
WestLB AG	100,00	Yes	0
Bank Mellat	100,00	Yes	6
Deutsche Bank A.S.	100,00	Yes	2
Arap Turk Bankasi A.S.	100,00	Yes	2
Citi Bank A.S.	100,00	Yes	1
Deniz Bank A.S.	100,00	Yes	0
HSBC Bank A.S.	100,00	Yes	4
Finans Bank A.S.	100,00	Yes	5
Millennium Bank A.S.	81,55	No	0

[6] In their study which analyzes the period between 1988 and 1996, Isik and Hassan (2002) have identified that both the efficiency of profitability and cost of small sized banks are higher than other banks and the larger the scale becomes, the lower the efficiency is. According to the authors, the possible reasons of this situation are high costs per person and operating in a limited geographical region. The authors have also stated that the foreign capitalized banks have higher profitability and cost efficiencies than domestic capitalized banks and the reason of this is their being small-sized.

Fortis Bank A.S.	80,05	No	0
Abn Ambro Bank	77,00	No	0
Turkland Bank A.S.	72,25	No	0
Participation Banks (4)			
Albaraka Turk	100,00	Yes	4
Kuveyt Turk	98,80	No	0
Turkiye Finans	97,22	No	0
Bank Asya	87,04	No	0

It is also found that out of 26 analyzed conventional banks, 19 are efficient 7 banks inefficient; and out of 4 participation banks, only one is efficient and the remaining 3 inefficient. It becomes apparent that 73% of conventional banks and 25% of participation banks are efficient as suggested by these findings. While 6% of 20 banks identified as efficient are participation banks, 94% are conventional banks. Likewise, 30% of the banks identified as inefficient are participation banks whereas 70% are conventional banks.

The detailed analysis of participation banks of 2006 is given in Table 4. When the potential improvements are considered, it can be easily seen that the rate of change of fixed assets in inputs is much higher than the rate of improvement suggested in other inputs. The primary reason for the inefficiency in these banks is their level of fixed assets. Yet it is observed that the rates of potential improvement of Bank Asya, which has the lowest efficiency value, are close to each other in all the inputs.

Table 4: DEA Results of Participation Banks in 2006

Participation Banks	Variable		Actual (1000 TL)	Target (1000 TL)	Potential Improvement (%)	Contribution (%)
Albaraka Turk	Inputs	Deposits	2154014	2154014	0,00	4,64
		Shareholders' Equity	245905	245905	0,00	58,65
		Fixed Assets	35240	35240	0,00	1,99
		Personnel Expenses	41416	41416	0,00	41,34
	Outputs	Total Loans	1832861	1832861	0,00	68,99
		Total Operating Income	199908	199908	0,00	31,01
Kuveyt Turk	Inputs	Deposits	2369890	2327522	-1,79	5,10
		Shareholders' Equity	247238	244269	-1,20	81,11
		Fixed Assets	56511	27361	-51,58	3,19
		Personnel Expenses	63201	62442	-1,20	18,80
	Outputs	Total Loans	2102143	2102143	0,00	37,73
		Total Operating Income	203633	203633	0,00	62,26
Turkiye Finans	Inputs	Deposits	3512725	3415120	-2,78	5,34
		Shareholders' Equity	434055	421994	-2,78	58,08
		Fixed Assets	76930	62582	-18,65	4,35
		Personnel Expenses	73762	71712	-2,78	36,56
	Outputs	Total Loans	2984837	2984837	0,00	70,51
		Total Operating Income	341582	341582	0,00	29,48
Bank Asya	Inputs	Deposits	3200655	2785893	-12,96	86,65
		Shareholders' Equity	632519	550258	-13,01	6,72
		Fixed Assets	59380	51658	-12,96	6,99
		Personnel Expenses	79304	69027	-12,96	6,35
	utput	Total Loans	2766076	2766076	0,00	12,12

		Total Operating Income	479108	479108	0,00	87,87

The efficiency values of 30 banks operating in Turkey in 2009 derived from DEA are given in Table 5. It is found that 11 banks out of 30 are inefficient. Among these inefficient banks, only one is a participation bank and it is seen that the findings derived from the bank sizes study made for 2006 are still valid for 2009. According to the findings, it can be said that the efficiency levels of small scale banks are high among the foreign banks.

Table 5: Efficiency Score of Banks in 2009

Private Domestic Conventional Banks (10)	Efficiency Score	Efficiency	Reference Count
Anadolu Bank A.S.	100.00	Yes	0
Alternatif Bank A.S.	100.00	Yes	6
Yapi ve Kredi Bankasi A.S.	100.00	Yes	3
Akbank T.A.S.	100.00	Yes	0
Turkiye Garanti Bankasi A.S.	100.00	Yes	3
Turkiye Is Bankasi A.S.	98.14	No	0
Turkiye Ekonomi Bankasi A.S.	96.62	No	0
Seker Bank T.A.S.	88.92	No	0
Tekstil Bankasi A.S.	84.14	No	0
Turkish Bank A.S.	47.48	No	0
Foreign Conventional Banks (16)			
Habib Bank Limited	100.00	Yes	2
WestLB AG	100.00	Yes	0
Société Générale (SA)	100.00	Yes	4
Bank Mellat	100.00	Yes	6
Arap Turk Bankasi A.S.	100.00	Yes	3
Deutsche Bank A.S.	100.00	Yes	3
Millennium Bank A.S.	100.00	Yes	0
Citi Bank A.S.	100.00	Yes	0
HSBC Bank A.S.	100.00	Yes	0
Deniz Bank A.S.	100.00	Yes	10
ING Bank A.S.	100.00	Yes	0
Fortis Bank A.S.	97.31	No	0
Finans Bank A.S.	95.53	No	0
The Royal Bank of Scotland N.V.	78.64	No	0
Turkland Bank A.S.	73.71	No	0
Euro Bank Tekfen A.S.	63.58	No	0
Participation Banks (4)			
Kuveyt Turk	100.00	Yes	0
Albaraka Turk	100.00	Yes	2
Turkiye Finans	100.00	Yes	3
Bank Asya	92.25	No	0

According to the efficiency values, it is seen that 58% of conventional banks and 75% of participation banks are efficient. About 17% and 83% of 19 banks identified as efficient are participation banks and conventional banks respectively; and 9% of 11 banks identified as inefficient are participation banks while 91% of these groups are conventional banks.

Table 6: DEA Results of Participation Banks in 2009

Participation Banks	Variable		Actual (1000 TL)	Target (1000 TL)	Potential Improvement (%)	Contribution 0(%)
Kuveyt Turk	Inputs	Deposits	5358257	5358257	0,00	0,00
		Shareholders' Equity	807312	807312	0,00	100,00

		Fixed Assets	133244	133244	0,00	0,00
		Personnel Expenses	133941	133941	0,00	0,00
	Outputs	Total Loans	5005535	5005535	0,00	55,34
		Total Operating Income	543605	543605	0,00	44,66
Albaraka Turk		Deposits	5464645	5464645	0,00	17,97
	Inputs	Shareholders' Equity	710666	710666	0,00	20,10
		Fixed Assets	140054	140054	0,00	0,00
		Personnel Expenses	105945	105945	0,00	61,93
	Outputs	Total Loans	4632510	4632510	0,00	100,00
		Total Operating Income	440864	440864	0,00	0,00
Turkiye Finans		Deposits	6882490	6882490	0,00	0,00
	Inputs	Shareholders' Equity	1193692	1193692	0,00	66,88
		Fixed Assets	103541	103541	0,00	0,00
		Personnel Expenses	175155	175155	0,00	33,12
	Outputs	Total Loans	7123545	7123545	0,00	100,00
		Total Operating Income	710235	710235	0,00	0,00
Bank Asya		Deposits	9136578	8428448	-7,75	19,79
	Inputs	Shareholders' Equity	1707894	1575524	-7,75	31,06
		Fixed Assets	309894	180962	-41,61	0,00
		Personnel Expenses	213048	196535	-7,75	49,15
	Outputs	Total Loans	8196675	8196675	0,00	84,07
		Total Operating Income	105460	105460	0,00	15,93

Table 6 provides the details of DEA results that correspond to the participation banks. Bank Asya, fixed assets is high in order to achieve the efficiency frontier. While a -7.75% rate of improvement is necessary for the improvement of the other three inputs – deposits, equity and personnel expenses – this rate becomes -41.61% when it comes to the real assets. It can be concluded that this bank operates with excessive fixed assets in order to get the current input.

5. Conclusion

The participation banks operating in Turkey are institutions defined as Islamic banks in international literature, carry out interest-free banking and operate through profit and loss sharing method. Operating through the PLS paradigm may cause their efficiency performances look different from those of conventional banks. It makes it important to evaluate the performances of participation banks and to compare them with conventional banks for both the high rate of increase of Islamic funds in international financial markets and again the high rate of increase of their size of assets in Turkey. In addition, the efficiency of participation banks relative to their weight in the system will be effective in the banking system's consistent and coherent operation. In case of discrepancy between the efficiencies of participation and conventional banks, it is necessary to locate the reasons in order to increase the efficiency of banking system properly.

In this study, the efficiencies of 26 private conventional banks and 4 participation banks are analyzed for 2006 and 2009 years using four inputs and two outputs specified under the intermediation approach through the input-oriented BBC data envelopment analysis method.

A comparison of the results of efficiency analysis in 2006 when the participation banks became subject to the same regulations as conventional banks with the results of efficiency analysis in 2009 reveals that there is an improvement in the efficiencies of participation banks. While only one out of 4

participation banks is efficient in 2006, the number of efficient banks rose up to 3 in 2009.[7] It is also found out that the participation banks performed better than the conventional banks throughout the given period.

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