Performance Analysis of Turkish Banking Sector in the Context of The Problem of Asymmetric Information

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Abstract

Financial system in a given country brings lenders and borrowers together in one place. If the system is functioning under conditions of perfect competition, allocation of credits to the most productive ventures will be streamlined as the nature of the market necessitates perfect information. However, financial system in the real world is complex and its operation deviates from conditions that the perfect competition purports. In other words, participators in real financial markets have asymmetric information as opposed to perfect information advocated in perfect competitive market. As a result of this, as lending and borrowing decisions are not "riskless" i.e. risk is unavailable in the presence of perfect information, it may comprise moral hazard problems viz. "excessive risk taking". These cause national income to decrease, real economic activities to decline and in a worst case scenario a financial crisis to occur by hampering the functioning of financial system efficiently. More precisely, the presence of asymmetric information in financial market reduces level of market efficiency, it again causes reduction in economic efficiency as a result of wrong credit decisions in credit market and due to credit rationing, it prevents transfer of credits to investments in the economy and implementation of productive projects, thus bringing adverse effects on economic development. For this reason, especially in countries like Turkey in order to attain basic macroeconomic objectives, adverse selection and moral hazard that are caused by asymmetric information have to be lowered to the minimum. From this point forward, this study first provides conceptual explanations and literature review and then proceeds to the analysis of Turkish banking sector's efficiency under the context of asymmetric information before and after the crisis. Data Envelopment Analysis will be used in analyzing efficiency. Furthermore, different policy recommendations aimed at solving problems and limitations will be discussed.

Key Words: Turkish Banking Sector, DEA, Efficiency, Asymmetric Information.

Introduction

Banks are the institutions that accumulate deposits, give loans, secure domestic and foreign funds, undertake important duties in economic policies, or in a more accurate way are institutions that participate in all trading activities. According to this explanation banks serve as bridge between fund suppliers and fund demanders. In order for this duty to be performed without any problems, the activities of financial system and banks should increase. To achieve this objective, especially to understand the occurance of the problem of asymetric information from the banks point of view, unfavorable choice and moral hazard issues should be brought together to a solution.

Beside being specialized banks in various areas of financial markets, the loans used in the banking system of the world and our country, when criteria as the number of branches and active magnitude are taken into consideration, the largest share corresponds to commercial banks. Same as other commercial bussineses, the goal of commercial banks is to attain profits. These banks have function such as fund-raising, usage of the fund, creating deposit money and service function. In order to have a functioning fund management, components such as adequancy of real source, meeting the need of liquidity, composition of financial liability, hedging active and passive positions should be given a lot of importance. If the right importance is not given to these components and the issues of moral hazard and unfavorable choices as a result of asymetric informations show growth, facing a financial crisis in the economy and even tightening real economic activities results as an unescapable outcome.

The primary goal of banks is to generate profits. This concept can be understood as account profit or as targeting the maximization of the current market value at the same time. The criteria of profit maximization in commercial banks is done by comparing the efficiency of real resources with profit rates of enterprises operating in the same sector. Even though the short term profits are important for banks, their goal in long term should be to maximize their market value.

Some of the most important criterions of banking system's efficiency are performing the function of financial intermediation between banks' saving owners and investors and leading the collected savings into profitable areas. The superiority of commercial banks in loans' and money markets together

with the percentage of transaction's volume in these markets, the nation's economy and the variety of its services in industry and trade define the efficiency of commercial banks in loans and money markets.

In our country a big portion of loans and money markets is under the dominance of commercial banks. Because deposit money and money in circulation are mostly accumulated mostly by these kind of banks. Moreover commercial banks because of the excessness of fund possibilities, the efficiency of qualified staff and their credible image among public opinion is classified as one of the most eficient financial organizations in capital market. As a result of this, most of the investment funds are managed by commercial banks and in secondary markets the trading volume of these banks is greater than other intermediary firms.

1. Asymmetrıc Informatıon and Banking System

Asymmetric information, known as information disparity between parties, causes various market failures and results into a decrease of market efficiency level and triggers incorrect loans decisions in the loan market. (Stiglizt and Weiss, 1981). Thus, economic efficiency decrease as well, leading into loan rationing. As for loan rationing, more than loan yields given by banks it means that loans should be restricted by the ability of being paid back or not. (Stiglitz, 1981: 10). On the other hand, asymmetricinformation effects negatively the funds waiting to be transferred as investments and the implementation of effective projects, resulting in a negative way even on economic development (Aras and Müslümov, 2004: 2).

In financial markets, market failure derived as a result of asymmetricinformation is defined as an unfavorable choice when it takes place until the process of lending is completed; whereas when it appears in the time between the realisation of landing process till the end of maturity period it is defined as moral hazard. (Mishkin, 1992: 164; Colell and Whinston, 1995: 436). A proposed solution for the notion of unfavorable choice, fisrtly denoted by George Ackerloff (1970), was not considered successful as a result of the appearance of "free-rider problem" derived from getting information in private firms. According to this, the process where market participants even though do not face any cost for getting an information but some of them benefit from the information's advantages, is defined as "free-rider problem" (Okay, 2003: 12 -13).

Moreover the issue of moral hazard, in the same way as unfavorable choices, can lead up to new problems. That is to say; the problem of moral hazard becomes a cause of representation problem. (Ross, 1973: 134 -139). Because according to the agreement, since the job performer and offerer are different individuals, (Luthans, 1995: 170), then these job performers and offerers differently described as participant and agent will hold different goals concerning their risk preferences at the same time (Ross, 1973: 134-139). This situation is also known as participant-agent problem.

To solve the problem of asymmetric information banks should be more careful in the following three subjects: screening, monitoring and signaling. Usually in the solution of unfavorable choice, because of the problem of market failures screening process is used before the financial agreement takes place. (Igawa and Kanatas, 1990:485). The screening process is explained as the process where the participant in a financial market demand security or evaluate the extent of the capital stock (Igawa and Kanatas, 1990: 485) in order to distinguish firms with good or bad loan risk and accumulate information about other participant then use this information in the agreements awaiting to be held. (Mishkin, 1992: 219).

As for monitoring process, it is the constant supervision of the activities of participant and agents' in loan agreements and partnership agreement as well (Mishkin,1992:173). Mostly, because this procedure is costy in terms of time and money it is named as the method of costly state verification. (Mishkin, 1992: 173). Monitoring process in the same way as screening process does not avoid the issue of moral hazard which has lead up to the other issue of free-rider (Kanatas and Qi, 2001: 308). For this reasons banks, by geting involved into system while performing the duty of financial intermediation where not-possesed information from other lenders is easily reached and by efficiently monitoring the behaviours of loan users, can obtain a lot of advantages.

Signaling process is managed in a form where as a result of asymmetricinformation inside a low risk group of investors that are obliged to prevent funding high-interest projects, signals about these projects' quality are constantly given. In such way, the relationship between the signal evoked from the reliance given in respect to institution's or individual's project quality and the funding cost is negative, while this

relationship results positive with the cash flow obtained from various activities (Evans and Patton, 1987: 131).

An individual who wants to borrow from the banking sectors should be provided with the necessary information from the state in order to make a difference between good and bad firms, thus this seem to be another way in which asymmetricinformation problems are adapted a solution (Mishkin,1992: 168-173). But since this method is accepted to be negative information for some firms, its application has faced different political difficulties (Mishkin,1992: 169). The state, in the name of the planned regulations that forces firms to present certain information for investors should as well develop some standards in which firms are obligated to abide some standards such as accounting principles, sales, obtain constant information about the relationship regarding earnings and assets etc.

In developed economies venture capital companies as well, apply methods which lessen the principal-agent problem. These companies, with their help of the disponibility of the funds provide to other firms the possibility of being a joint-partner and suplementally being a representative of the administrative board of the company. In this way monitoring costs of this method will be low as well. (Mishkin,1992: 173-174). Moreover, since the partners of venture capital companies can not sell their shares to any other company, the free rider problem will no longer exist (Mishkin, 1992: 173-174). So, the posibility of the borrower to tend to undertake a higher risk is low, even though his/her ability to pay off the debt is high.

The bankruptcy of an operating bank in the financial system as a result of asymmetric information, will cause a recession in economy as a whole, will affect in the collapse of stock market and thereby increase uncertainty in financial markets (Yay, Yay and Yılmaz, 2001: 70). This situation also known as bank panics, as a result of a tightening on fund supply will lead to an increase in interest rate, moreover deposit owners instead of depositing money will thrust into banks (bank-run) resulting into an increase in their tendency to withdraw money. Whereas banks after a certain amount of time will need the depositors' money back and in such a circumstance they will be driven to use the disponibile deposits as loans. In other words, the banks will try to target maximum profit by superposing the time difference between collected deposits and given loans by means of matching process. Consequently, the banks will not be able to face the demand of all depositors

to take their money back in a case of bank-run. On such an occasion, banks will fail to realise the function of canalizing funds resulting in issues further than economic shrinkage. This period which will last till the total collapse of financial system and will undoubtly have its huge destructive effects in the real economic activity as well (Karabulut, 2002:8).

According to the approach of asymmetric information, the relationship between financial crisis and the withdrawal on real economic activity can be evaluated as a financial chaos where the problems of unfavorable choice and moral hazard start to aggravate (Karabulut, 2002:8). As a matter of fact, the crisis that erupted in the recent period in Amerika and which with the influence of globalization became world-wide spread, is evaluated to have been caused by mortgage problems which are by themselves a result of the problem of unfavorable choice (Erdoğan, 2008:2). According to this, taking into consideration the principle of statement, not questioning the ability of an individual to pay a demanded loan and the possibility for every category to extend a mortgage loan were reasons why during the process of paying back financial institutions became hard up for money.

2. Turkish Banking System

The liberalization movement that started with the decisions of the 24th of January 1980 has been a cause for many important changes in the country: Financial liberalization and entrance in one sector got easy, the number of banks and employment increased, the result of integration together with competition and world finance markets increased the number of banking services (Kaya, 2002: 1). On the other hand, banks had become sensitive towards systemic risks due to problems such as capital stock insufficience, the destructive effect caused by public banks' increasing share into the system, the small or fragmented banking structure, insufficient internal control nor risk management, the insufficience of transparency in bank's accountings, and the low active quality (Kaya, 2002: 1; Öncü and Aktaş, 2007: 249). Adding up macro-economic conditions to all these problems, from 1980 till nowadays banking system has been forced to face various crisis with different areas of influence. (Öncü and Aktaş, 2007: 248).

As a result, the turkish banking sector that shows characteristics of a typical oligopoly, was alienated from its fundamental function of intermediation especially between the period of 1999-2001 and was oriented into the function of ensuring financing to the public community (Tarım, 2001: 159;

Öncü and Aktaş, 2007: 249). Nevertheless, inside this same period the banking system was wraped around a dynamic sector which has contributed as well in the development of Turkey's economy. On the other hand, the events that have taken place after 1994 provoked the creation of moral hazard issue in the money markets of this system. After the banking crisis that took place in 2001, in the sector where the program was carried into action, it was observed that competition, number of new banks and the faith in system together with the value of efficiency has increased significantly (Kaya and Doğan, 2005: 1). Thus, banks should use the resources they own in the best way possible in order to reduce to the minimum the negative effects of the crisis to manage to successfully survive and to work on the efficiency and productivity analysis of the sectors with limited resources (Çolak ve Altan, 2002: 45; Kaya and Doğan, 2005: 1).

This paper will try to perform an efficiency analysis regarding the 2014 year's Turkish banking sectors. The year 2014 is a year that resulted worse than predicted in terms of growth, Central Bank interests, exchange rates and basic macroeconomic indicators in general, in the turkish economy. As a result of being a year where predictions failed to be reached, this study brings forth an alarm signal according to Financial Pressure Endex Model (Diclehan, 2015: 64)

3. Research Method: Data Envelopment Analysis

Efficiency and productivity are of the most important topics in which scientists show interest. Even though many studies have been made over efficiency measurement, the most important one has been made by Farrell (1957). In his study, Farrell has brought forward two subcategories of firms' efficiency defined as technical efficiency and allocative efficiency. According to this, while technical efficiency expresses the highest level of output capacity using a given amount of input under a certain technology, allocative efficiency on the other hand expresses a firm's optimum usage of inputs when inputs' prices and spending limits are given (Rutibabalira, 2008: 59). With reference to Farell, Charnes, Cooper and Rhodes (1978) managed to develop a fractional programming model which they named as Data Envelopment Analysis

After the work of Charnes and others, data envelopment models has found a wide range of use and has been used in hundreds of them (Armağan, 2001: 49-50). In the following part of literature review, that some of the works

including the use of this method are brought together (Seiford 1997, Tavares 2002, Emrouznejad et.al. 2008) is an input oriented model that is based upon the assumption of constant returns to scale and can be shown by solving the following programming problem. According to this; in order to generate $y \in \mathbb{R}_+^q$ output, $x \in \mathbb{R}_+^p$ inputs should be used and θ shows the efficiency scores of the decision maker under the assumption of constant returns to scale.

$$\theta_{CRS}(x,y) = \min\left\{\theta > 0 \mid y \le \sum_{i=1}^{n} \gamma_i y_i ; \theta_x \ge \sum_{i=1}^{n} \gamma_i x_i ; \gamma_i \ge 0, i = 1,....,n\right\}$$

By using this technique, firstly the **active borders** are detected and then the efficiency of decision maker's is compared to this border. Thus, when the production set is in the form of, $\Psi = \left\{(x,y) \in \mathbb{R}_+^{p+q} \mid \text{x y'yi üretiyor}\right\}$, then every i observation's technological production set is assumed to be described by Ψ. In the calculation, while the best efficiency value of a decision maker is denoted by one, unefficient entities should have smaller values (Cruz, 2012: 846-847).

The method of data envelopment analysis has taken another dimension in another study of Banker, Charnes and Cooper (1984). In order to comply with the firm's scale and effectiveness the basic formulation has been revised and by adding convex constraints, a new model where variable returns to scale is evaluated has been derived (Lau, 2013: 2). In such way, the model that was firstly introduced in 1978 was furthermore developed in 1984 and with the new perspective added it gained a wide range of different practice areas.

Data Envelopment Analasys aims to measure the relative effectiveness of decision making entities by using similar processes which generate output with similar features, can be used in different areas that extend from agriculture (Ogundari et al. 2012) to lojistic (Wanke et al. 2011) and from information technology (Chen et al. 2006) to energy (Vazhayil et al. 2013). The reason this method is gaining attention is a set of advantages that relatively to other models aim to measure the performance of decision maker entities. According to this, when in various studies where application is based on parametric methods in which expenditure and production function is calculated, the data envelopement analysis that is not parametric itself

does not need to be calculated in such a way (Sadjadi and Shahanaghi 2011: 9830). Another point of data envelopment analysis, is its ability to make simplier the process of input and output usage and overcome the problems caused by it. Moreover, with reference to efficiency border specified by this analysis, the concept of returns to scale is better explained. Another aspect in analysis is the fact that the cause of some of the inputs' exessive use or some of the outputs' low level that affect effectivity can be better defined here. The analysis can as well derive better predictions by using border method oriented to relative efficiency (Emmanuel, 1993: 1142-1143).

Output oriented constant returns to scale (CCR) model researches the least input combination for a given level of output. This fractional programming model can be converted to a linear programming problem (Bowlin, 1998: 7). This model known as "Charnes-Cooper transformation" can be shown as follows: (Banker et al. 1984: 1083).

$$\max h_{j0} = \sum_{r=1}^{s} u_r y_{rj_0}$$

In the transformation the aim of fractional function is that the denominator of the function will be equal to 1.

$$subject\ to\ \ \sum_{i=1}^{m} v_i x_{ij_0} \ = 1$$

$$\sum_{r=1}^{s} u_r y_{rj} \ - \ \sum_{i=1}^{m} v_i x_{ij_0} \ \leq 0 \ \ j = 1,2, \dots, n$$

$$u_r, v_i \ \geq 0 \ \forall \ r, i$$

$$-u_r \ \leq \ -\varepsilon$$

$$-v_i \ \leq \ -\varepsilon$$

In the models of linear programming and fractional programming is difficult to define the decision entity that will be taken as reference. For this reason by taking the dual in the previous model we gain the development model.

$$minimize: \theta - \varepsilon[\sum_{i=1}^{m} {s_i}^{-} + \sum_{r=1}^{s} {s_r}^{+}]$$

$$subject\ to: 0 = \theta x_{i_0} \ - \sum_{j=1}^{n} x_{ij}\lambda_j - {s_i}^{-}$$

$y_{r0} = \sum_{j=1}^{n} y_{rj}\lambda_j - s_r^{+}$

$0 \leq \lambda_j,\ s_i^{-},\ s_r^{+}$ for i= 1, … ,m; r = 1, … ,s; j = 1, … ,n

λ variable is used for defining the efficient reference set.

Data envelopment analysis execute models with even input and output oriented constant return to scale or input and output oriented variable returns to scale. In this study the input oriented CCR model, where it is aimed to obtain output using the minimun input, is used. In the study, a table where readers can compare values with variable inputs to scale values, will be presented.

4. Data of Research

The data published by Union of Turkish Banks in 2014 has been used in order to analyze the efficiency of banks which operate in Turkey. The input and output data shown in Table 1. are used since 2014 for the activity analysis of 3 public banks, 3 private capital domestic banks and 25 foreign capital banks.

Table 1: Input-Output Variables

Inputs	**Outputs**
Total actives (I1), Total deposit (I2), Paid-in capital (I3), off balance sheet account (I4), Total ahareholders equity (I5), Number of branches (I6), Number of staff (I7)	Total loans and receivables (O1)

The real data average of the banks that reach effective border according to constant returns to scale input oriented model are shown in Table 2. According to this, in terms of total assests 7 banks are above the average value. In terms of average total deposits 7 banks, in terms of total shareholders' equity 11 banks, in terms of off-balance sheet accounts 10 banks, total shareholders' equity 8 banks, in terms of branch numbers and in terms of personnel numbers 10 banks have been using inputs above the average level. In terms of total credit the number of banks with output variable which have provided output over average value is 7. The banks which values are over the average level are Ziraat Bank, Ziraat Bankası, İş Bankası, Garanti Bankası, Akbank, Yapı Kredi Bankası, Vakıflar Bankası ve

Halk Bankası. Among the before-mentioned banks 3 of them are public banks and the other 4 banks are private capital banks.

Table 2: Average Values of Real Data of Effective Banks

		Input Oriented	
		CCR Effective Company Average	**BCC Effective Company Average**
Inputs	Total Actives	77.724	71.840
	Total Deposits	45.269	74.518
	Paid-in Capital	1.770	1.526
	Off Balance sheet Accounts	329.977	290.415
	Total shareholders equity	8.516	7.964
	Number of branches	446	424
	Number of staff	8068	7361
Outputs	Total loans and receivables	50.413	45.654

5. Empirical Analysis

The effectiveness values of 31 banks operating in Turkey have been analyzed according to their best frontiers by measuring data envelopment analysis. In order to measure the effectiveness level it has been used Win4Deap package. For measuring the effectiveness index of banks an input oriented approach that aims to derive data output with minimal input use possible, is taken into consideration.

The input oriented aproach has been applied differently for Constant returns of scale CRS assumption and Variable Returns of Scale VRS assumption models. Also the purpose in chossing the input oriented model as pace setter is to specify how much it can rationally decrease the quantity of inputs used in production without reducing the quantity of output.

In the following Table 3 input oriented CCR and BCC efficiency scores, scale efficiency and returns of scale conditions of banks have been shown. With respect to this, 13 banks assuming constant returns to scale, and 23 banks assuming variable returns to scale has achieved the efficient frontier. According to the CCR method most efficient banks who get a value of 1000 are: İş Bankası, Garanti Bankası, Ak Bank, Yapı Kredi Bankası, Vakıflar Bankası, Halk Bankası, Deniz Bank, Türk Ekonomi Bankası, ING Bank, Odea Bank, Alternatif Bank, Burgan Bank, Fibabanka, Citi Bank, Tekstil Bank, Bank of Tokyo, Deutsche Bank and Intesa Sanpaolo Bank. According to BCC method in addition to these banks also Ziraat Bankası, The Royal

Bank, Birleşik fon Bankası, Societe Generale Bank and Habib Bank have achieved the efficient border.

In terms of the efficiency scale 20 banks are working with constant returns of scale, 2 bank are working with decreasing returns of scale and 9 banks are working with increasing returns of scale. According to CCR method the farthest bank from efficiency has been Birleşik Fon Bankası. According to CCR method efficiency average has been actualized 0.898 so has been understood that 11.35% of banking sector works unefficiently. Because this ratio according to BCC method has been realized 0.962 the unefficiency ratio has been 3.9 %.

Tablo 3: Efficiency Scores of Banks, Efficiency Rating, Scale Efficieny and Returns to Scale

		Input Oriented					
No	**Banks**	**CCR**	**Rate**	**BCC**	**Rate**	**Scale Efficiency**	**Returns to Scale**
1	**Ziraat Bankası**	0.986	2	1.000	1	0.986	DRS
2	**İş Bankası**	1.000	1	1.000	1	1.000	CRS
3	**Garanti Bankası**	1.000	1	1.000	1	1.000	CRS
4	**Akbank**	1.000	1	1.000	1	1.000	CRS
5	**Yapı Kredi Bankası**	1.000	1	1.000	1	1.000	CRS
6	**Vakıflar Bankası**	1.000	1	1.000	1	1.000	CRS
7	**Halk Bankası**	1.000	1	1.000	1	1.000	CRS
8	**Finans Bank**	0.938	4	0.944	3	0.994	DRS
9	**Denizbank**	1.000	1	1.000	1	1.000	CRS
10	**Türk Ekonomi Bankası**	1.000	1	1.000	1	1.000	CRS
11	**ING Bank**	1.000	1	1.000	1	1.000	CRS
12	**HSBC Bank**	0.878	10	0.886	7	0.991	IRS
13	**Odea Bank**	1.000	1	1.000	1	1.000	CRS
14	**Şekerbank**	0.928	5	0.936	4	0.992	CRS
15	**Alternatif Bank**	1.000	1	1.000	1	1.000	CRS
16	**Anadolubank**	0.922	6	0.922	6	1.000	CRS
17	**Burgan Bank**	1.000	1	1.000	1	1.000	CRS
18	**Fibabanka**	1.000	1	1.000	1	1.000	CRS
19	**Citibank**	1.000	1	1.000	1	1.000	CRS
20	**Turkland Bank**	0.881	8	0.885	8	0.995	IRS
21	**Arap Türk Bankası**	0.952	3	0.962	2	0.989	IRS
22	**Tekstil Bankası**	1.000	1	1.000	1	1.000	CRS
23	**Bank of Tokyo-Mitsubishi**	1.000	1	1.000	1	1.000	CRS
24	**Deutsche Bank**	1.000	1	1.000	1	1.000	CRS
25	**The Royal Bank**	0.684	12	1.000	1	0.684	IRS
26	**Birleşik Fon Bankası**	0.006	14	1.000	1	0.006	IRS
27	**Intesa Sanpaolo**	1.000	1	1.000	1	1.000	CRS
28	**Turkish Bank**	0.894	7	0.935	5	0.957	IRS
29	**Societe Generale**	0.879	9	1.000	1	0.879	IRS

		Input Oriented					
No	**Banks**	**CCR**	**Rate**	**BCC**	**Rate**	**Scale Efficiency**	**Returns to Scale**
30	**Bank Mellat**	0.051	13	0.354	9	0.143	IRS
31	**Habib Bank**	0.828	11	1.000	1	0.828	IRS
	Ort.	0.898		0.962		0.918	
CRS: Constant Returns to Scale, DRS: Decreasing Returns to Scale, IRS: Increasing Returns to Scale							

6. Potantial Improvements of Ineffective Banks

In order to become more efficient some of the banks should lessen the inputs used and some other should increase the outputs. For this reason the decrease and increase in the input and output amounts should be exposed. In this work, there have been made suggestions for potential developments in the banks which are not efficient.

As an example lets consider the efficiency value of Ziraat Bank which is 0.986; the target value calculation is done as follows. The Banks in the Ziraat Bank's reference group are: Ak Bank, Iş Bank and Halk Bank. Volume values of these banksa are in order of $\lambda = 0.079$, $\lambda = 0.204$ and $\lambda = 0.984$. According to this in order for Ziraat Banka to be efficient, the input and output values are calculated as follows: As an example Input 1 (Total assets) Ziraat Bank = (0.079 x 205.451) +(0.204x237.772) + (0.984x155.423) = 217.673 should reach this target value.

For all the banks which are not efficient, the input and output values have been calculated as in the example and shown in the table. If desired, the weight values to make suggestions for improvement in the situation of varying returns to scale the reader is shown in Table 4.

According to the CCR results given in the table Ziraat Bank should decrease its total assets by 12.08 %. In other words it should decrease the value of 247.600 to 217.673. In a similiar way it should decrease its total deposit accounts from 153.255 to 138.25. Ziraat Bank should decrease the issued capital from 2.500 to 2.400, off balance sheet items from 726.209 to 715.696, total equity capital from 28.540 to 24.238, personnel number from 23.617 to 23.284, It should increase number of branches from 1107 to 1241. It should decrease the output value of total credits from 141.915 to 141.890.

Finans Bank should decrease its total assets by % 6.08. In other words it should decrease the value of 75.206 to 70.519. In the same way it should increase its deposit accounts from 42.075 to 42.145. In a similiar way Finans Bank should decrease the issued capital from 2.835 to 2.658, off balance sheet items from 637.861 to 350.332, equity capital from 8.574 to 6.575,

personnel number from 12830 to 10510, number of branches from 652 to 573. It should decrease the output value of total credits from 50.246 to 50.244.

HSBC Bank shoul decrease its assets to %40.13 or in another way it should decrease from 33.821 to 20.248. In the same way, its deposits of 19.040 should be decreased to 12.256. HSBC Bank should decrease in the same way the issued capital from 652 to 543, off balance sheet items from 244.904 to 109.527, equity capital from 2.994 to1.757, personnel number from 5659 to 3585 and number of branches from 298 to 193. The output value of total loans should on the other hand decrease from 19.334 to 13.518.

Şekerbank, should decrease the total assets by % 7.11. In other words it should change the value 21.187 to 19.680. In the same way the total deposit accounts should be decreased from 13.539 to 12.574. In a similiar way Şeker Bank should decrease the issued capital from 1.087 to 1.009, off balance sheet items from 404.139 to 126.484, equity capital from 2.392 to 1.644, personnel number from 4460 to 3082, number of branches from 312 to 168. It should increase the output value of total credits from 14.633 to 14.654.

Anadolu Bank should decrease its total assets by % 8.63. In other words it should decrease the value of 9.477 to 8.659. In a similiar way it should decrease its total deposit accounts from 6.512 to 5.596. Anadolu Bank, in a similiar manner, should decrease the issued capital from 600 to 552, off balance sheet items from 21.723 to 19.831, equity capital from 1.228 to 1.123, personnel number from 1761 to 1394, number of branches from 108 to 73. It should decrease the output value of total credits from 6.249 to 6.196.

Turkland Bank should decrease its total assets by 11.93 %. In other words it should decrease the value of 5.089 to 4.482. In a similiar way it should decrease its total deposit accounts from 3.589 to 3.141. Turkland Bank should decrease the issued capital from 650 to 294, off balance sheet items from 82.632 to 31.205, equity capital from 754 to 300, personnel number from 641 to 556, number of branches from 33 to 29. It should decrease the output value of total credits from 3.365 to 3.364.

Arap Turk Bank should decrease its total assets by 41.26 %. In other words it should decrease the value of 3.717 to 2.183. In a similiar way it should decrease its total deposit accounts from 3.108 to 2.580. Arap Turk Bank should decrease the issued capital from 440 to 419 and increase off balance sheet items from 3.116 to 3.441. It should decrease total equity capital from

532 to 386, personnel number from 282 to 150, number of branches from 7 to 6. It should increase the output value of total credits from 1.364 to 1.368.

The Royal Bank should decrease its total assets by 71.44 %. In other words it should decrease the value of 2.721 to 0.770. In a similiar way it should decrease its total deposit accounts from 0.514 to 0.297. Royal Bank should decrease the issued capital from 0.108 to 0.074 and off balance sheet items from 6.563 to 4.505. It should decrease total equity capital from 0.576 to 0.098, personnel number from 76 to 28. Number of branches shouldnt be changed. The output value of total credits should remain as 0.381.

The Birleşik Fon Bank should decrease its total assets by 5.53 %. In other words it should decrease the value of 2.059 to 1.945. In a similiar way it should decrease its total deposit accounts from 24 to 21. Birleşik Fon Bank should decrease the issued capital from 461 to 323 off balance sheet items from 6.193 to 2.412, total equity capital from 603 to 339, personnel number from 227 to 134. Number of branches shouldnt be changed. The output value of total credits should remain as 3.

Turkish Bank should reduce the total assets by % 10.36. In other words it should reduce the value 1.400 to 1.255. In the same way it should reduce the total deposit accounts from 0.906 to 0.812. Turkish Bank should decrease the issued capital from 0.175 to 0.126 and increase off balance sheet items from 2.814 to 2.520. It should decrease total equity capital from 0.187 to 0.167, personnel number from 265 to 36, number of branches from 18 to 11. The output value of total credits should remain as 0.896.

Societe Generale Bank should decrease its total assets by 20.82 %. In other words it should decrease the value of 0.831 to 0.658. It should leave its total deposit accounts as 73. Societe Generale Turk Bank should decrease the issued capital from 0.135 to 0.101, balance sheet items from 0.892 to 0.803, total equity capital from 0.117 to 0.103, personnel number from 126 to 21. It shouldnt change the number of branches. It should decrease the output value of total credits from 0.265 to 0.221.

Mellat Bank should decrease its total assets by 96.63 %. In other words it should decrease the value of 0.326 to 0.011. In a similiar way it should decrease its total deposit accounts from 0.120 to 0.009. Mellat Bank should decrease the issued capital from 0.157 to 0.029 and increase off balance sheet items from 0.970 to 0.013. It should decrease total equity capital from 0.198 to 0.038, personnel number from 48 to 18, number of branches from 3 to 1. It should decrease the output value of total credits from 0.011 to 0.007.

Habib Bank should decrease its total assets by 50 %. In other words it should decrease the value of 0.078 to 0.052. In a similiar way it should decrease its total deposit accounts from 0.014 to 0.007. Mellat Bank should decrease the issued capital from 0.030 to 0.020, off balance sheet items from 0.109 to 0.019, total equity capital from 0.050 to 0.022, personnel number from 17 to 13, number of branches from 312 to 168. It should decrease the output value of total credits from 0.035 to 0.026.

Tablo 4: Input Oriented CCR method with Targets and Potential Improvements

			CCR		
Bank	**Variable**	**Real**	**Target**	**Difference**	**Improve**
Ziraat Bankası	**G1**	247.600	217.673	-29.927	-12.08 %
	G2	153.255	138.25	-15.005	-9.79 %
	G3	2500	2464	-36	-1.44 %
	G4	726.209	715.696	-10.513	-1.45 %
	G5	28540	24238	-4212	-14.76 %
	G6	1107	1241	134	12.10 %
	G7	23617	23284	-333	-1.41 %
	Ç1	141.915	141.890	-.0.3	- 0.18 %
Finans Bank	**G1**	75.206	70.519	- 4.687	- 6.23 %
	G2	42.075	42.145	0.07	0.16 %
	G3	2835	2658	-177	- 6.24 %
	G4	637.861	350.332	-287.529	- 45 %
	G5	8574	6575	-1999	- 23.3 %
	G6	652	573	-79	- 12.11 %
	G7	12830	10510	-2320	- 18 %
	Ç1	50.246	50.244	-0.002	- 0. 01 %
HSBC Bank	**G1**	33.821	20.248	-13.573	-40.13 %
	G2	19.040	12.256	-6.784	- 35.6 %
	G3	652	543	-109	-16.7 %
	G4	244.904	109.527	-135.377	-55.27 %
	G5	2994	1757	-1237	-41.31 %
	G6	298	193	-105	-35.23 %
	G7	5659	3585	-2074	-36.65 %
	Ç1	19.334	13.518	-5.816	-30.08 %
Şeker Bank	**G1**	21.187	19.680	-1.507	- 7.11 %
	G2	13.539	12.574	-0.965	-7.13 %
	G3	1087	1009	-78	-7.17 %
	G4	404.139	126.484	-277.655	-68.7 %
	G5	2392	1644	-748	-31.27%
	G6	312	168	-144	-46.15%
	G7	4460	3082	-1378	-30.88%
	Ç1	14.633	14.654	0.021	0.14%
Anadolu Bank	**G1**	9.477	8.659	-0.818	-8.63%
	G2	6.512	5.596	-0.916	-14.06
	G3	600	552	-48	-8%
	G4	21.723	19.831	-1.892	-8.71%

			CCR		
Bank	**Variable**	**Real**	**Target**	**Difference**	**Improve**
	G5	1228	1123	-105	-8.55%
	G6	108	73	-35	-32%
	G7	1761	1394	-367	-20.84%
	Ç1	6.249	6.196	-0.053	-0.85%
Turkland Bank	**G1**	5.089	4.482	-0.607	-11.93%
	G2	3.589	3.141	-0.448	-12.48%
	G3	650	294	-356	-54.77%
	G4	82.632	31.205	-51.427	-62.24%
	G5	754	300	-454	-60.21%
	G6	33	29	-4	-12.12%
	G7	641	556	-85	-13.26%
	Ç1	3.365	3.364	-0.001	-0.03%
Arap Turk Bankası	**G1**	3.717	2.183	-1.534	-41.26%
	G2	3.108	2.580	-0.528	-16.99%
	G3	440	419	-21	-4.77%
	G4	3.116	3.441	0.325	10.43%
	G5	532	386	-146	-27.44%
	G6	7	6	-1	-14.28%
	G7	282	150	-132	-46.81%
	Ç1	1.364	1.368	0.004	0.29%
The Royal Bank	**G1**	2.721	777	-1.944	-71.44%
	G2	514	297	-217	-42.22%
	G3	108	74	-34	-31.48%
	G4	6.563	4.505	-2.058	-31.36%
	G5	576	98	-478	-82.99%
	G6	1	1	0	0.00%
	G7	76	28	-48	-63.16%
	Ç1	381	381	0	0.00%
Birleşik Fon Bankasi	**G1**	2.059	1.945	-0.114	-5.53%
	G2	24	21	-3	-12.5%
	G3	461	323	-138	-29.93%
	G4	6.193	2.412	-3.781	-61.05%
	G5	603	339	-264	-43.78%
	G6	1	1	0	0.00%
	G7	227	134	-93	-40.97%
	Ç1	3	3	0	0.00%
Turkish Bank	**G1**	1.400	1.255	-0.145	-10.36%
	G2	906	812	-94	-10.38%
	G3	175	126	-49	-28%
	G4	2.814	2.520	-0.294	-10.45%
	G5	187	167	-20	-10.70%
	G6	18	11	-7	-38.89%
	G7	265	36	-229	-86.42%
	Ç1	896	896	0	0.00%
Societe Generale	**G1**	831	658	-173	-20.82%
	G2	73	73	0	0.00%
	G3	135	101	-34	-25.19%
	G4	892	833	-59	-6.61%

			CCR		
Bank	**Variable**	**Real**	**Target**	**Difference**	**Improve**
	G5	117	103	-14	-11.97%
	G6	1	1	0	0.00%
	G7	126	21	-105	-83.33%
	Ç1	265	221	-44	-16.60%
Bank Mellat	**G1**	326	11	-315	-96.63%
	G2	120	9	-111	-92.5%
	G3	157	29	-128	-81.53%
	G4	970	13	-957	-98.66%
	G5	198	38	-160	-80.81%
	G6	3	1	-2	-66.67%
	G7	48	18	-30	-62.5%
	Ç1	11	7	-4	-36.37%
Habib Bank	**G1**	78	52	-26	-33.33%
	G2	14	7	-7	-50%
	G3	30	20	-10	-33.33%
	G4	109	19	-90	-82.57%
	G5	50	22	-28	-56%
	G6	1	1	0	0.00%
	G7	17	13	-4	-23.53%
	Ç1	35	26	-9	-25.71%

CONCLUSION

Asymmetric information clearly affects in a negative way the profits of banking system. Especially, asymmetric information has become an obstacle for transferring funds that are affected by financial structure of banks in the loan markets and for directing with difficulty the sources through investments. So, when loan rationing appears, more financial possibilities as a result of a higher demand of productive projects and firms with strong financial structure are not easily found.

After the crisis of 2000-2001, the structural reforms undertaken in turkish banking sector lead to the strengthening of its financial markets' fragile (brittle) structure resulting in an increase on the interest or concern of foreign banks. In this reform package put into practice are found three important divisions as: reconstruction in finacial, operational and structural term. The goal is to strengthen the financial and operational structure of banking system and to establish system effectiveness and competitions as a permanent feature. In 2001 crisis, the measures taken to apply this program made that the turkish banking sector could stay in a more strong position during 2008 mortgage crisis.

The competence in turkish banking system has increased considerably, especially after the participation on this sector of foreign banks. They have as well forced the sector to use its resources in an efficient way. For this reason banks should evaluate their performance inside the sector they compete and in order to take place into efficiency borders they should define the banks they choose as reference. The continuation without any doubt, the growth and productivity or briefly the existence of an efficient financial system will help into collecting savings from different resources and lessen their usage in more productive areas. The realisation of this process is linked with the non-existence of asymmetric information and with a financial system where trust and political stability should prevail.

In this study, to measure efficiency data envelopment analysis (DEA) is used, Efficiency scores are calculated as input oriented by both CCR and BCC methods separately. But only input oriented CCR model has been explained. In order for the reader to make a comparison, the efficiency scores calculated by BCC method are as well presented in a tabular form. According to the CCR method, the average efficiency score for Turkey is calculated as 0.898. According to another statement the banking systems

works under % 10.2 level of efficiency border. From a total of 31 banks 2 work with decreasing returns to scale (DRS), 9 work with increasing returns to scale (IRS) and other 20 work with constant returns to scale (CRS).

When effectiveness results are commented, the most important result is that they have relative effectiveness A bank that has a 100 percentage efficiency means that the output and input of this bank comparing to others is 100 percent efficient. In models where different values or different decision makers are used, even their efficiency values will vary. In a nutshell, in order to prevent the problem of asymmetric information the resource distribution should be brought close to the optimum level in the banking system, thus causing an increase in the efficiency level inside the financial sector. As a result of this, even real economic activities will be affected.

Appendix: Reference Sets for Banks' Efficiency Scores

In order to bring unefficient banks into an efficient way, the needed lamda value that is used to show the calculation of the targeted values, are shown as follows in the table 3 by using both CCR and BCC methods. Moreover, the efficiency values (1.000) generated by both methods are gathered in one table. According to this, for the method of CCR are at most taken as reference 5 times banks as ING Bank, Odea and Tekstil Bank, Banks such as Türk Ekonomi Bank, Intesa Sanpaolo and Bank of Tokyo has been taken as reference 4 times, Alternatif Bank is taken 3 times and Fibank and İşbankası just two times.

Table 5: Volume Values and Reference Clusters of Banks

Bank		**RA**	**RA**	**RA**	**RA**	**RA**
Ziraat Bankası	CCR	Akbank λ = 0.079	İş Bankası λ = 0.204	Halk Bankası λ = 0.984		
Finans Bank	CCR	Vakıflar Bankası λ = 0.081	Türk Ekonomi Bankası λ = 0.735	ING Bank λ = 0.300		
	BCC	Yapı Kredi Bankası λ = 0.124	Türk Ekonomi Bankası λ = 0.606	ING Bank λ = 0.269		
HSBC Bank	CCR	Deniz Bank λ = 0.161	Türk Ekonomi Bankası λ = 0.098	ING Bank λ = 0.076		
	BCC	Deniz Bank λ = 0.181	Habib Bank λ = 0.656	ING Bank λ = 0.072	Vakıflar Bankası λ = 0.091	
Şekerbank	CCR	Türk Ekonomi Bankası λ = 0.160	Fibabanka λ = 1.194			
	BCC	Türk Ekonomi	Fibabanka	ING		

Bank		RA	RA	RA	RA	RA
		Bankası λ = 0.168	λ = 0.747	Bank λ = 0.084		
Anadolubank	CCR	İş Bankası λ = 0.012	Odea Bank λ = 0.030	Tekstil Bank λ = 0.947	Türk Ekonomi Bankası λ = 0.025	
	BCC	Tekstil Bankası λ = 0.0926	İş Bankası λ = 0.012	Odea Bank λ = 0.037	Türk Ekonomi Bankası λ = 0.025	
Turkland Bank	CCR	Fibabanka λ = 0.398	Odea Bank λ = 0.050			
	BCC	Fibabanka λ = 0.391	Odea Bank λ = 0.051	Habib Bank λ = 0.558		
Arap Türk Bankası	CCR	Intesa Sanpaolo λ = 0.461	Odea Bank λ = 0.046	Tekstil Bankası λ = 0.091		
	BCC	Odea Bank λ = 0.047	Intesa Sanpaolo λ = 0.453	Tekstil Bank λ = 0.083	Habib Bank λ = 0.418	
The Royal Bank	CCR	Deutsche Bank λ = 0.069	Odea Bank λ = 0.011	Bank of Tokyo λ = 0.091		
Birleşik Fon Bankası	CCR	Intesa Sanpaolo λ = 0.004	Bank of Tokyo λ = 0.001			
	BCC	Intesa Sanpaolo λ = 0.278	Habib Bank λ = 0.722			
Turkish Bank	CCR	Tekstil Bankası λ = 0.199	Bank of Tokyo λ = 0.033	Alternatifbank λ = 0.013	Odea Bank λ = 0.011	
	BCC	Odea Bank λ = 0.022	Alternatifbank λ = 0.012	Habib Bank λ = 0.809	Tekstil Bank λ = 0.120	Bank of Tokyo λ = 0.037
Societe Generale	CCR	Bank of Tokyo λ = 0.182	ING Bank λ = 0.001	Alternatifbank λ = 0.003		
Bank Mellat	CCR	Alternatifbank λ = 0.000	ING Bank λ = 0.000	Tekstil Bankası λ = 0.002	Intesa Sanpaolo λ = 0.003	
Habib Bank	CCR	Tekstil Bankası λ = 0.003	Intesa Sanpaolo λ = 0.028	ING Bank λ = 0.000		

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